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Daily assessment of Alcohol Consumption and Condom Use with Known and Casual Partners among Young Female Bar Drinkers

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Abstract

The relationship between alcohol and condom use has been studied extensively over the past several decades. Reviews of event-level studies suggest that alcohol's effect on risky sexual behavior are not due to simple main effects, but appear to be dependent upon individual characteristics, and situational or contextual factors. In the current study, we assessed the temporal relationship between daily alcohol consumption and unprotected sexual behavior, taking into account sexual partner type (casual or known) as well as individual and situational characteristics among a group of young female bar drinkers. Greater alcohol consumption was not associated with unprotected sex. However, greater alcohol consumption was associated with an increase in sex (protected and unprotected) with casual partners. Having less HIV knowledge was associated with increased unprotected sex, while greater frequency of drinking in bars was associated with increased protected sex with casual partners. These findings are discussed in terms of possible prevention programs that increase HIV knowledge and decrease alcohol consumption to reduce young women's risky sexual behavior.

Keywords

Alcohol Consumption; Risky Sexual Behavior; Young Women; Drinking Context; HIV Knowledge; Partner Type

INTRODUCTION

The majority of newly diagnosed HIV infections among women are the result of high-risk heterosexual transmission.[1] Over the past several decades numerous research studies have attempted to delineate the factors that are most likely to influence high risk sexual behavior (e.g., failure to use a condom, multiple sexual partners, sex with casual partners or known IV drug users), a known vector for HIV transmission. Evidence has emerged that an association exists between alcohol use and unprotected sex (i.e., failure to use a condom). In reviews of event-level studies, it has been noted that alcohol's effect on risky sexual behavior appears to be dependent upon individual characteristics, and situational or contextual factors.[2,3] Using this theoretical framework, Cooper[4] in a recent event-level study, found that modeling individual (within-person) effects across sexual situations and

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relationship contexts accounted for greater variance in sexual risk-taking than did between person effects.

Daily diary studies allow for assessment of within-person effects, as well as the temporal relationship between alcohol use and risky sexual behavior. Recent analyses have suggested that the relationship between alcohol consumption and condom use may be more complicated than a simple main effect. For example, Schroder et al.[5] used daily data and found no main effect of alcohol consumption on condom use, but did find an interaction in which unprotected sex was most likely when positive mood and alcohol consumption occurred on the same day. Leigh et al.,[6] also using daily data, found an interaction between drinking and partner type for women, such that women who were drinking before sex with a casual partner were more likely to have protected sex. Drinking was unrelated to the use of protection with steady partners. In both of these studies, individuals tended to follow their usual pattern of condom use regardless of alcohol consumption. However, certain situational factors did interact with alcohol to influence condom use, suggesting that daily, event-level studies need to incorporate individual and situational factors when assessing the relationship between alcohol and condom use.

Potential Factors Influencing the Alcohol-Risky Sex Relationship

Previous research suggests several individual and situational factors that may play a role in the relationship between alcohol and condom use. These include situational factors such as the drinking context and the familiarity of the relationship between the sexual partners, as well as individual factors such as, sex-related alcohol expectancies (SRAEs), HIV knowledge, number of sexual partners, sexually transmitted infections (STIs), and history of sexual assault.

Both women and men report meeting members of the opposite sex and looking for sexual encounters as primary reasons for going to bars.[7,8] In previous studies, a substantial percentage (30%) of women who drank in bars regularly (i.e., weekly) engaged in casual sex, sex with a man they had met in a bar on that same night.[9,10] This finding is consistent with research that suggests a positive association between indiscriminate forms of risky sex and alcohol.[3,11] However, it is unclear whether women bar drinkers are engaging in unprotected sex with a casual/new sexual partners they meet in the bar context.

A small number of studies have suggested that condom use is influenced by the familiarity of the relationship between the sexual partners.[12,13] Some have found that women are more likely to use a condom with new or casual partners compared with regular partners, [13] even when drinking.[14] Others have found that condom use is less frequent with casual partners when alcohol has been used.[12] In a recent study of college students' risky sexual behavior with casual partners, Abbey et al.[15] found that condom use when sober was the strongest predictor of condom use when drinking. In combination, these studies suggest that the relationship between drinking and engaging in unprotected risky sex with a casual partner is equivocal, and in need of further study.

As previously mentioned a number of individual and experiential variables have been associated with women's risky sexual behavior, including: SRAEs, HIV knowledge, number of sexual partners, STIs, and history of sexual assault. Research related to each of these factors will be reviewed briefly. Several studies have found that positive SRAEs are associated with reduced condom use and sex with a new partner.[16,17] Using an experimental design with heterosexual women, Maisto et al.[18] found that stronger alcohol expectancies and a higher dose of alcohol were associated with greater motivation to engage in risky sexual behavior with a new sexual partner.

Some research suggests that increasing knowledge about HIV may be effective in changing attitudes about risk and future condom use, and may in fact produce a change in behavior (i.e., reduce unprotected sex).[19,20] In a study with adolescent African American girls, DiClemente et al.[19] found a relative increase in HIV prevention knowledge of nearly 19% at 6 months post intervention and 8% at 12 months post intervention. This increase in knowledge was paired with an increase in condom use of 47% in the "previous 6 months" as reported at the 12-month follow-up. Using a daily diary method, O'sullivan, Udell, and Patel[21] assessed young adults with moderate to high HIV knowledge and their perceptions of safety and risk in sexual interactions. The majority of sexual interactions were with regular partners (74.9%). Despite inconsistent condom use (57.5% of vaginal intercourse) and high HIV knowledge, most intercourse was rated as safe. However, women did rate encounters that involved a condom as "safer" than those that did not involve the use of a condom. These findings suggest that increases in HIV knowledge might ameliorate the influence of other factors (e.g., expectancies, alcohol use) to reduce risky sexual behavior during a specific event.

Alcohol consumption has been associated with having a greater number of sexual partners and with women experiencing more frequent and severe bar-related sexual assault.[2,22] As the number of different consensual sexual partners a woman has increases so does her likelihood of having unprotected sex and contracting an STI, including HIV. In addition, her likelihood of encountering a sexually aggressive partner and experiencing a sexual assault also increases. Thus, it is likely that women who frequently drink in bars have had a greater number of sexual partners, more STIs, and a history of more severe sexual assault associated with the bar context.

The Current Study

Our study focused on women who report drinking in bars on a weekly basis. Based on our previous studies, we conceptualized these women as a sample at high risk for engaging in increased sexual activity with casual sexual partners, as well as increased risk for unprotected sexual activity (i.e., non-condom use) when drinking. Using a multi-method approach that included an initial in-person interview, 12 weeks of daily data collection, and monthly follow-up interviews we assessed daily alcohol use and daily sexual behavior. As suggested by reviews of event-level studies [3,11] of the relationship between alcohol and condom use, as well as Cooper's recent analysis,[4] our analyses focus on changes in risky sexual behavior (i.e., unprotected vaginal or anal intercourse) as a function of individual characteristics (sex-related alcohol expectancies, HIV knowledge, and history of sexual assault) and differences in situational factors (drinking locations and two types of sexual partners).

METHODS

Participants

A sample of 280 women bar drinkers were recruited through newspaper advertisements, fliers, and word of mouth. Advertisements indicated that "Women bar drinkers needed for a study of alcohol use and social interactions. Must be 18-30 years old to participate". Upon calling the study, women were provided with a description of the project as a "confidential study of women who drink in bars, their alcohol and other substance use and sexual activity". Participation involved coming to the Research Institute for an initial interview and three monthly interviews, as well as providing daily telephone reports over a 12-week period.

Women who indicated interest in the study were then screened by telephone for eligibility. Women were eligible to participate in the project if they drank in bars weekly, were heterosexual, sexually active during the past 6 months, not alcohol or drug dependent, not currently abstinent or pregnant, not married or cohabiting (i.e., single), and currently reported their mental and physical health as good. A total of 1256 women called the project. Of those women, 130 were not interested in participating in the study (10.4%). Among those women interested in participating in the study, 524 (46.5%) met all eligibility criteria. Women were most likely to be ineligible for the study because they did not frequent bars one or more times each week (20.2%). Of the 524 women eligible to participate in the study, we included the 280 (53.4%) women who completed an initial interview and provided a minimum of five days of daily IVR data in the current study.

The average age of participants was 22.11 years (*SD* = 2.45). Women between the ages of 18 and 20 were included in the sample, despite being below the legal age allowed to drink in bars, because they have been shown in previous research to drink heavily in this context and to experience associated negative consequences along with women of legal drinking age.[7,22] The majority (76.4%) of the women were European American, with 12.1% African American, 2.9% Asian American, 2.1% Hispanic, and 6.4% from other or multiple ethnic groups. Half (50.7%) of the women reported having some college education, while 29.6% were college graduates. Nearly fourteen percent (13.5%) reported having only a high school education, and small percentages reported having less than a high school education (2.5%) or a postgraduate (3.6%) degree. A majority of women reported working part-time (62.1%) and being a current student (59.6%), while 43.6% of women reported working full-time, and a small percentage (10.4%) were unemployed. The average annual household income was between $20,001 and $30,000.

Procedure

All procedures for the current study received Institutional Review Board approval and the participants provided informed consent prior to beginning the study. Women attended a comprehensive initial, in-person interview with a trained female interviewer at the Research Institute. Immediately following the initial interview the participants were trained in the procedure for providing daily reports using their telephones and an interactive voice response (IVR) system. Average length of the interview and IVR training was 75 minutes and women received $25 compensation. Participants were required to call the IVR system using a toll-free number once each day between 12 a.m. and 11:59 p.m. to respond to a series of automated questions using the touch-tone key pad of their telephone.[23] Daily calls took approximately 4 minutes and women received $1 for each completed call, with a $10 bonus for 7 consecutive days of calling. If they missed a call during the 7 day period, but provided a missing report, they could receive $7 of the original $10 bonus. Similar compensation schedules have been used in other studies to achieve high rates of daily reporting[24,25] over an extended period of time. Women also participated in monthly qualitative interviews about consensual sexual events they reported using the IVR system over the preceding four-week period.

Measures

The initial interview was comprehensive and included measures of individual differences (e.g., demographics, psychological symptoms, alcohol expectancies, sexual assertiveness), historical information (e.g., sexual and victimization history), and substance use patterns (see [26] for a more detailed description).

Sex-related alcohol expectancies were assessed using the 13-item scale developed by Dermen and Cooper.[27] Sex-related alcohol expectancies assessed by this scale fall within

three subscales: sexual enhancement, risk, and disinhibition. Items (e.g., 'I am a better lover', 'I am more likely to have sex on a first date') were measured on a 6-point Likert-type scale from 1 '*strongly disagree'* to 6 '*strongly agree'* and mean scores were calculated for each subscale. The measure has been found to have good reliability (Cronbach's α = .82-.90) when used with young, single, female drinkers.[28] Reliability with the current sample was good (enhancement α = .86, risk α = .85, disinhibition α = .78).

History of sexually transmitted infections (STIs) and unplanned pregnancies were assessed using a measure developed for the current study that asked women to indicate the number of times they had been pregnant, and of those how many had been unplanned and the ages at which those pregnancies occurred. In addition, the measure assessed whether they had ever been diagnosed with any of 11 STIs (e.g., Chlamydia, genital herpes, human papilloma virus [HPV]). A summary score for total number of different STIs contracted was created to indicate elevated sexual risk taking.

Severity of prior bar-related sexual assault was assessed using a modified version of the *Sexual Experiences Survey* (SES).[29] The SES uses 10 behaviorally based items to measure sexually aggressive incidents that range from unwanted contact through sexually coerced intercourse, attempted and completed rape. Women are then categorized based on the highest mutually exclusive category in which they have endorsed items (0, *'No sexual aggression'*, 1 '*sexual contact'*, 2 '*sexual coercion'*, 3 '*attempted rape'*, 4 '*rape'*). This measure has been used extensively over the past several decades and has good internal consistency.[30] Internal consistency with the current sample was good (Cronbach's alpha = .81).

HIV knowledge was assessed using Sikkema et al.'s 12-item, true-false scale.[31] Items included "Vaseline and other oils should not be used to lubricate condoms", and "Most people who carry the AIDS virus look and feel healthy". Correct responses were summed to create a total HIV knowledge score. Sikkema et al. found that the scale demonstrated adequate internal consistency (Cronbach's alpha = .74).[31] Internal consistency for use with the current sample was poor (Cronbach's alpha = .31); however, the average score on the scale was 11.2 (*SD* = .99; range 8-12), suggesting that this sample of women was high in HIV knowledge, with little variance between participant scores. The high mean and low variance could explain the lower Cronbach's alpha. Given the importance of HIV knowledge as a potential predictor in risky sexual behavior, we continued to include scores on this measure as a Level-2 (between person) predictor in our analytic models.

Daily IVR reports—Each day, the participants provided information about any alcohol they had consumed during the past 24 hours, including: 1) number of drinks (quantity) consumed; 2) time of their first and last drink 3) greatest intoxication after drinking (1 '*Not at all*' to 4 '*Extremely or Drunk*'); and 4) contexts in which they drank (e.g., at a bar, at home alone, etc.). They also reported on any sexual activity during the past 24 hours, including: 1) the time; 2) the type (e.g., vaginal, and anal); and 3) the use of appropriate protection (i.e., latex condom). They then were asked to identify their relationship to the person with whom they had sex (i.e., someone just met, acquaintance, friend, current or former sexual partner or boyfriend, and other). In addition, women were asked whether the person with whom they had sex was using alcohol or drugs at the time of the sexual activity (yes/no), and if so whether that person appeared to be intoxicated (yes/no). Women provided daily reports on an average of 71.4 days (*SD* = 23.9, *Median* = 84.0, *Range* 5-85).

Monthly Interviews—The monthly qualitative interviews were used to clarify the IVR data and to obtain additional qualitative information on the events prior to and following the sexual activity (e.g., any changes in partner type since the preceding sexual event,

discussions and decisions about condom use, location and use of alcohol and drugs). Women were specifically asked who their sexual partner was for each sexual event and whether this partner was the same or different than previously reported (i.e., previous month, and events within that month). Any reports of "other" partner types were clarified as to the specific relationship for further classification. The qualitative data were not included in the current study beyond clarifying the daily data, but can be found elsewhere (please see [32]).

Data Analyses

The data for the current study were multilevel in nature, with daily reports (within person or "Level 1" data) nested within people (between person or "Level 2" data). Given the multilevel (or hierarchical) structure of the data, our primary analytic technique was multilevel modeling with the statistical package HLM6. A minimum of five days of IVR data was chosen as a cut off point for including a participant in the current analyses. Multilevel modeling can be conducted using a minimum of one data point for a given participant,[33] however, the majority of women who dropped out of the study did so within the first five days of participation, thus we chose five days as a more appropriate number of data points for inclusion in this study.

Risky sexual behavior was defined as unprotected sexual intercourse (i.e., vaginal or anal intercourse) without the use of a latex condom. Vaginal and anal intercourse were combined together because there were not a sufficient number of days on which unprotected anal sex occurred alone to analyze the two categories separately. We categorized the type of sexual partner with whom women engaged in sexual activity into two mutually exclusive categories: *casual partners* were comprised of individuals just met or acquaintances; and *known partners* were comprised of friends, defined known others, and current and former sexual or romantic partners/boyfriends. We coded each day based on the type of sexual activity that occurred (i.e., none, protected, or unprotected) and the partner type (casual or known). Therefore, each day could be coded into one of five mutually exclusive categories: no sex, unprotected sex with a known partner, unprotected sex with a casual partner, protected sex with a known partner, or protected sex with a casual partner. Therefore, the equations for Level 1 specified involvement in sexual behavior, which consisted of the five aforementioned categories, as the dependent variable. Days of no sex were used as the reference category during modeling.

At Level 1, we regressed each category of the dependent variable onto alcohol consumption and day (i.e., Level 1 predictors). Both Level 1 predictors were person-centered. Alcohol consumption for a given day was calculated as the average number of drinks consumed per hour (i.e., number of drinks consumed divided by the number of hours over which a woman drank). On days during which a woman engaged in sexual activity, the hours of alcohol consumption were measured from the beginning of drinking until the start of the sexual event.[I]

At Level 2, we modeled each intercept as a function of the individual and experiential variables as individual risk factors. Specifically, we modeled the three SRAE subscales (i.e., Enhancement, Sexual Risk, Disinhibition), history of prior bar-related sexual assault

[I]If a woman stopped drinking for more than 4 hours prior to the initiation of a sexual event, an estimated blood alcohol concentration (BAC) was calculated, if the BAC was less than .02 she was not considered to have been drinking at the time of the sexual event and her number of drinks per hour was entered as 0 for that day.
On days of no sexual activity, alcohol consumption was measured for the duration of the drinking event. This measure (average drinks per hour) was chosen over the more traditional measure of number of drinks (quantity), because it takes into account the amount of time (frequency) over which the drinks were consumed. Therefore, it provides a more accurate assessment of the level of alcohol consumption prior to the sexual event. The day on which a participant's daily report occurred during the week was categorized as either a weekday (Sunday – Thursday) or a weekend (Friday-Saturday).

severity, total HIV knowledge, and percentage of drinking days spent drinking in a bar, because of their possible association with risky sexual behaviors. For the Level 2 model, the person-specific intercepts were assumed to vary randomly across individuals, while all other Level 1 regression coefficients were constrained to be fixed. All Level 2 predictors were grand-mean centered.

RESULTS

Individual Difference Variables

Nearly two-thirds (64.6%) of the women had a history of prior bar-related sexual assault. Among those women, 19.3% had experienced a rape, 22.1% had experienced an attempted rape, 18.2% had experienced coerced sexual intercourse, and 5% had experienced unwanted touching as the most severe form of sexual aggression associated with the bar context. Nearly one-third of women (31.8%) reported having one or more STIs, and STI total was correlated with sexual assault severity ($r = 0.27$, $p < .001$), therefore, only sexual assault severity was included in the multilevel regression equations. This population of women was quite knowledgeable about HIV ($M = 11.2$, $SD = 0.99$, range = 8-12). Average scores for the SRAE subscales were 4.2 ($SD = 0.97$) for enhancement, 2.6 ($SD = 1.1$) for risk, and 3.0 ($SD = 1.1$) for disinhibition. These means suggest that on average, these women expected alcohol to enhance sex, but did not expect alcohol to increase their sexual risk taking, and they were slightly less likely to think alcohol would cause them to become disinhibited about sex. Intercorrelations among the three subscales ranged from $r = .32$ to $r = .57$, $p < .001$.

Daily Reports

Data were available for 19,990 person-days. The participants reported drinking on 36.2% of days and engaging in consensual sexual activity on 14.7% of days. Risky sexual behavior occurred on 59.7% of days with sexual activity, and sexual activity happened on 51.9% of drinking days. The average number of drinks per hour on drinking days was 1.49 ($SD = 1.07$) and the average number of drinks per hour on days on which sexual activity occurred was 1.41 ($SD = 1.10$). On average, women spent half 50.5% ($SD = 22.1$) of their drinking days in bars. Half (50.8%) of drinking days with sexual activity involved time spent drinking in a bar. Table 1 provides descriptive rates of protected and unprotected sexual activity with casual and known partners on drinking and non-drinking days. Rates of both protected and unprotected sex with casual partners appear to be substantially higher on drinking days compared to non-drinking days, while no such difference was observed with regular partners. Multi-level modeling was used as an inferential test of this difference.

Using multilevel modeling, we assessed risky sexual behavior (unprotected sex or non-condom use) with casual and known partners as a function of alcohol consumption (i.e., average drinks per hour), time of the week (weekday or weekend), and individual differences (i.e., SRAE, history of sexual assault, HIV knowledge, and frequency in bars). Given that the three subscales of the SRAE scale were moderately correlated, we ran further diagnostic tests before including the three sub-scales in the same models. Additional testing indicated that calculations of tolerance (VIF < 10) and variance proportion (< .50) were below the criteria needed to rule out multicollinearity as a concern when including all three sub-scales in the same model.[34,35]

Table 2 provides a summary of the multilevel models. This includes the effects of the level 2 variables (i.e., SRAEs, history of sexual assault, HIV knowledge, and frequency in bars), the level 1 variables (alcohol consumption and weekend) on the odds of engaging in unprotected sex and protected sex with known and casual partners compared to not having sex, and the

interactions between the level 2 alcohol-related sexual expectancy variables and the level 1 alcohol consumption variable.

Unprotected Sex with a Known Partner

As presented under Category 1 of Table 2, there were no effects of any of the level 2 variables on unprotected sex with a known partner. Among the level 1 variables, only weekend was significant. Women were more likely (*OR* = 1.38, $p < .0001$, *CI* = 1.187, 1.613) to have unprotected sex with known partners on weekend days than on week days. There were no significant interactions.

Unprotected Sex with a Casual Partner

As presented under Category 2 of Table 2, having less HIV knowledge (*OR* = 0.66, $p < .05$, *CI* = 0.438, 0.994; level 2) and consuming a greater average number of drinks per hour (*OR* = 1.25 $p < .0001$, *CI* = 1.204, 1.574; level 1) both increased the likelihood of unprotected sex with a casual partner. There were two significant interactions, such that women with greater expectations of enhancement were more likely to engage in unprotected sex as their drinking increased (*OR* = 1.22, $p < .05$, *CI* = 1.031, 1.442), while women with greater expectations of disinhibition were less likely to engage in unprotected sex with casual partners as their drinking increased (*OR* = 0.88, $p < .05$, *CI* = 0.772, 0.998).

Protected Sex with a Known Partner

As presented under Category 3 in Table 2, alcohol expectancies of sexual risk taking (level 2) and weekend day (level 1) significantly affected protected sex with a known partner. Having less expectation of sexual risk taking when drinking (*OR* = 0.77, $p < .01$, *CI* = 0.654, 0.918) increased the likelihood of protected sex with a known partner. In addition, women were more likely to have protected sex with known partners on weekend days (*OR* = 1.39, $p < .0001$, *CI* = 1.200, 1.609) than on week days. There was one significant interaction. Women who expected sex to be enhanced were more likely to engage in protected sex with known partners as their drinking increased (*OR* = 1.14, $p < .01$, *CI* = 1.040, 1.245).

Protected Sex with a Casual Partner

As presented under Category 4 in Table 2, alcohol expectancies of sexual risk taking and disinhibition (level 2), as well as, percentage of days spent drinking in a bar (level 2) and alcohol consumption (level 1) significantly affected protected sex with a casual partner. Having lower expectations of sexual risk taking (*OR* = 0.68, $p < .05$, *CI* = 0.480, 0.977) and greater expectations of sexual disinhibition when drinking (*OR* = 1.79, $p < .01$, *CI* = 1.180, 2.701) increased the likelihood of protected sex with a casual partner. Drinking in bars on a greater percentage of drinking days (*OR* = 7.78, $p < .05$, *CI* = 1.171, 51.727) also increased the likelihood of protected sex with a casual partner, as did consuming a larger number of drinks per hour (*OR* = 1.35, $p < .0001$, *CI* = 1.184, 1.545). There were two significant interactions. As found for unprotected sex with casual partners, women who expected sex to be enhanced when drinking were more likely to engage in protected sex with casual partners as their drinking increased (*OR* = 1.20, $p < .05$, *CI* = 1.044, 1.369). In addition, as found for unprotected sex with casual partners, women who expected to be more disinhibited sexually were less likely to engage in protected sex with casual partners as their drinking increased (*OR* = 0.89, $p < .05$, *CI* = 0.799, 0.995).

DISCUSSION

Reviews of event-level studies have suggested that alcohol's effect on risky sexual behavior are not due to simple main effects, but rather are dependent upon individual characteristics,

and situational or contextual factors.[2,3] Using daily data collected through IVR reports, we sought to assess changes in the likelihood of risky sexual behavior as a function of individual characteristics (i.e., sex-related alcohol expectancies, HIV knowledge, and history of sexual assault), and daily fluctuations in alcohol consumption and situational factors (i.e., type of sexual partner, drinking location) among a sample of young women bar drinkers. We did not find a temporal association between alcohol use and unprotected sex. However, we did find a temporal association between alcohol use and sex, such that both protected and unprotected sex with casual partners increased on days with greater alcohol consumption (i.e., following the alcohol consumption). Stein et al.[36] also found that alcohol increased both protected and unprotected sex in a high risk sample of hazardously drinking incarcerated women. Our findings are consistent with findings from event-level studies in suggesting that alcohol is associated with an increase in indiscriminate sex (i.e., sex with a casual partner), but has no influence on condom use.[3,11]

We did not find that alcohol consumption was associated with sex with known partners. Rather, we found that time of week was associated with sex with known partners. Regardless of condom use, women were more likely to have sex (protected and unprotected) with known partners on weekend days rather than weekdays. Thus, alcohol appears to "promote or fuel" sex with casual partners, and weekends appear to provide the "opportunity" for sex with known partners. These findings support previous suggestions that the relationship between alcohol and sex is influenced by situational characteristics.[2,3]

We found that decreased HIV knowledge was associated with increased likelihood of unprotected sex with casual partners, while greater frequency of drinking in bars was associated with protected sex with casual partners. Again, these findings serve to accentuate the complicated relationship between individual (i.e., HIV knowledge) and situational factors (i.e., partner type, drinking location) and their association with condom use. These findings suggest that women who drink in bars regularly, particularly those with less HIV knowledge, are a population at high risk for engaging in risky sexual behaviors (casual and unprotected), and thus, are a population in need of targeted intervention/prevention programs aimed at decreasing their likelihood of contracting STIs and HIV.

We found some evidence that sex-related alcohol expectancies influenced condom use. Women with lower sex-related alcohol expectancies of sexual risk taking were more likely to use a condom with both known and casual partners. In addition, women who had higher sex-related alcohol expectancies of disinhibition were more likely to use a condom with a casual partner in general, but less so when drinking. Interactions between sex-related alcohol expectancies and drinking suggest that alcohol does affect expectancies in such a way as to alter condom use. Our findings are somewhat discordant with the current literature on expectancies, however to our knowledge this is the first study to include expectancies in a multilevel model of the daily relationship between drinking and condom use. Thus, further exploration of these relationships is needed.

The finding that percentage of time spent in the bar context was associated with an increase in the odds of having protected sex with a casual partner is consistent with our earlier findings of increased casual sex associated with this drinking context. In our earlier studies, both women and men described the bar context as a venue for meeting members of the opposite sex for casual sexual encounters.[7,8] The bar environment promotes both heavier drinking and more permissive behaviors, thus increasing the likelihood that the conditions will be right for women to engage in casual sexual encounters. In an earlier study of women who regularly drink in bars, we found typical consumption of more than 5 drinks per occasion and 25% of women reporting one or more events of casual sex associated with the bar over the past year.[9] It is somewhat heartening to note, that despite alcohol's influence

on sex with a casual partner, higher rates of drinking in bars were associated only with protected sex (i.e., condom use) with a casual partner and not with unprotected sex with a casual partner. Perhaps women are aware that they are more likely to engage in sex with a casual partner when drinking in bars and are more prepared to engage in protected sex (either through negotiation strategies or carrying their own condoms). This is an avenue for future research exploration.

Our use of daily IVR data collection was a strength of the study, because it reduced the time between the event and the report and allowed us to temporally link drinking and sexual activity. However, it had some limitations. Our daily reports were still a form of self-report and were not “in-the-moment.” In addition, the daily IVR calls were limited in length, approximately four minutes, which reduced the amount of information that could be collected. Specific information about each sexual event was restricted to basic information about time, duration, basic partner type, alcohol consumption, and basic sexual acts and use of condom or dental dam. Thus, nuances about partner type may have made partner categorization imperfect. In addition, limiting sexual activity to basic functional categories can lead to some confusion (i.e., an indication of sexual activity, but no categorization) in risk categorization. In addition, this was one study conducted with a non-random sample of young women in one region of the US. Thus, our findings may not generalize to all young women who drink heavily. However, they likely are generalizable to women between the ages of 18-30 years who frequently drink in bars. Based on estimates from the General Social Survey (GSS, 1990-2006) approximately 40% of women between the ages of 18 and 30 years go to bars regularly (i.e., one or more times per month).[37]

Our findings suggest that additional studies using daily data are needed to examine the relationship between drinking and condom use, as well as several of the individual risk factors (SRAEs, HIV knowledge, drinking context). Our findings further suggest that developing effective HIV prevention strategies targeted at reducing young women's risky sexual behavior will require changes in their beliefs and social behaviors related to the use of alcohol. However, given the high level of standard HIV knowledge displayed by this population, and the limited effect that HIV knowledge played in influencing risky sexual behavior, prevention strategies likely will need to be more behaviorally based. Creative programs that incorporate a focus on reducing alcohol consumption in social settings, while challenging young women's sex-related alcohol expectancies and preconceptions about the safety of drinking prior to engaging in sexual intercourse may be efficacious with this population.

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Table 1

Rates of Sexual Activity by Partner Type on Drinking and Non-Drinking Days.

Partner Type	Unprotected Sex		Protected Sex	
	Drinking Days	Non-Drinking Days	Drinking Days	Non-Drinking Days
Known	51.3 (878)	48.7 (832)	50.4 (565)	49.6 (556)
Casual	89.7 (26)	10.3 (3)	80.8 (42)	19.2 (10)

Note: Sexual activity occurred on 2929 days, drinking occurred on 1511 of those days.

Table 2

Multilevel Regression Models for the Effects of Daily and Individual Effects on Protected and Unprotected Sex by Partner Type (N = 19990 days).

Category 1 (Unprotected Sex with Known Partner) n = 1710 days					
Fixed Effect	**β**	**s.e.**	**T**	**OR**	**C. I.**
Intercept	-3.02	0.10	-28.89		
SRAE-Enhancement	0.08	0.13	0.63	1.09	(0.838, 1.411)
SRAE-Sex Risk	0.13	0.12	1.15	1.14	(0.910, 1.440)
SRAE-Disinhibition	-0.06	0.13	-0.49	0.94	(0.731, 1.208)
Sexual Assault History	0.10	0.07	1.44	1.10	(0.965, 1.258)
HIV Knowledge	0.09	0.10	0.90	1.10	(0.896, 1.344)
% Drinking Days in a Bar	-0.61	0.48	-1.29	0.54	(0.213, 1.380)
Average Number of Drinks per Hour	0.03	0.04	0.69	1.03	(0.947, 1.121)
Drinks × SRAE- Enhancement	0.10	0.06	1.63	1.10	(0.981,1.239)
Drinks × SRAE- Sex Risk	0.06	0.05	1.36	1.07	(0.972,1.171)
Drinks × SRAE- Disinhibition	-0.05	0.06	-0.85	0.95	(0.842,1.070)
Weekend	0.32	0.08	4.15****	1.38	(1.187, 1.613)

Category 2: (Unprotected Sex with Causal Partner) n = 29 days					
Fixed Effect	**β**	**s.e.**	**T**	**OR**	**C. I.**
Intercept	-7.02	0.27	-25.78		
SRAE-Enhancement	0.12	0.32	0.38	1.13	(0.599, 2.128)
SRAE-Sex Risk	0.06	0.24	0.23	1.06	(0.656, 1.703)
SRAE-Disinhibition	0.31	0.31	1.00	1.36	(0.741, 2.512)
Sexual Assault History	-0.13	0.14	-0.93	0.88	(0.661, 1.159)
HIV Knowledge	-0.42	0.21	-1.99*	0.66	(0.438, 0.994)
% Drinking Days in a Bar	0.69	1.37	0.51	2.00	(0.135, 29.817)
Average Number of Drinks per Hour	0.32	0.07	4.68****	1.38	(1.204, 1.574)
Drinks × SRAE- Enhancement	0.20	0.09	2.31*	1.22	(1.031,1.442)
Drinks × SRAE- Sex Risk	-0.04	0.04-	0.85	0.96	(0.882,1.051)

Category 2: (Unprotected Sex with Causal Partner) n = 29 days					
Fixed Effect	**β**	**s.e.**	**T**	**OR**	**C. I.**
Drinks × SRAE- Disinhibition	-0.13	0.07	-1.98*	0.88	(0.772,0.998)
Weekend	0.49	0.37	1.33	1.63	(0.791, 3.376)

Category 3: (Protected Sex with Known Partner) n = 1121 days					
Fixed Effect	**β**	**s.e.**	**T**	**OR**	**C. I.**
Intercept	-3.17	0.08	-38.90		
SRAE-Enhancement	0.04	0.11	0.36	1.04	(0.843, 1.281)
SRAE-Sex Risk	-0.26	0.09	-2.96**	0.77	(0.654, 0.918)
SRAE-Disinhibition	-0.02	0.10	-0.21	0.98	(0.800, 1.198)
Sexual Assault History	-0.01	0.05	-0.23	0.99	(0.889, 1.097)
HIV Knowledge	0.12	0.08	1.41	1.13	(0.954, 1.330)
% Drinking Days in a Bar	-0.20	0.37	-0.55	0.82	(0.395, 1.687)
Average Number of Drinks per Hour	0.06	0.04	1.45	1.06	(0.980, 1.144)
Drinks × SRAE- Enhancement	0.13	0.05	2.81**	1.14	(1.040,1.245)
Drinks × SRAE- Sex Risk	0.01	0.05	0.23	1.01	(0.922,1.109)
Drinks × SRAE- Disinhibition	-0.03	0.05	-0.65	0.97	(0.889,1.061)
Weekend	0.33	0.07	4.40****	1.39	(1.200, 1.609)

Category 4: (Protected Sex with Causal Partner) n = 52 days					
Fixed Effect	**β**	**s.e.**	**T**	**OR**	**C. I.**
Intercept	-6.67	0.20	-33.19		
SRAE-Enhancement	0.21	0.24	0.89	1.24	(0.775, 1.975)
SRAE-Sex Risk	-0.38	0.18	-2.10*	0.68	(0.480, 0.977)
SRAE-Disinhibition	0.58	0.21	2.75**	1.79	(1.180,2.701)
Sexual Assault History	0.01	0.12	0.09	1.01	(0.799, 1.277)
HIV Knowledge	-0.24	0.17	-1.38	0.79	(0.560, 1.106)
% Drinking Days in a Bar	2.05	0.96	2.13*	7.78	(1.171, 51.727)

Category 4: (Protected Sex with Causal Partner) n = 52 days					
Fixed Effect	**β**	**s.e.**	**T**	**OR**	**C. I.**
Average Number of Drinks per Hour	0.30	0.07	4.44****	1.35	(1.184, 1.545)
Drinks × SRAE- Enhancement	0.18	0.07	2.58*	1.20	(1.044,1.369)
Drinks × SRAE- Sex Risk	-0.005	0.05	-0.09	1.00	(0.903,1.097)
Drinks × SRAE- Disinhibition	-0.11	0.06	-2.05*	0.89	(0.799,0.995)
Weekend	0.27	0.30	0.90	1.31	(0.726, 2.361)

Note: Reference Category is No Sex Days, n = 17063;

***p < .001

* p < .05

** p < .01

**** p<.0001

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