Published in final edited form as:

J Sex Res. 2015 June ; 52(5): 558–569. doi:10.1080/00224499.2014.964167.

Use of Drinking Protective Behavioral Strategies and Sexual Perceptions and Behaviors in U.S. College Students

Diane E. Logan¹, Kelly H. Koo^{2,3}, Jason R. Kilmer^{4,5}, Jessica A. Blayney⁶, and Melissa A. Lewis⁴

¹Department of Behavioral and Social Sciences; Brown University

²Department of Mental Health; San Francisco VA Medical Center

³Department of Psychiatry; University of California, San Francisco

⁴Department of Psychiatry and Behavioral Sciences; University of Washington

⁵Health & Wellness, Division of Student Life; University of Washington

⁶Department of Psychology, State University of New York at Buffalo

Abstract

Alcohol use among college students is linked to an increased likelihood of engaging in risky sexual behaviors, including casual sex and unprotected sex. These behaviors increase college students' risks for negative social and health-related consequences. This study examined the relationship between drinking behaviors and protective behavioral strategies (PBS), expectancies and perceptions of sexual risk, and actual alcohol-related sexual behaviors and consequences. Sexually active college students completed web-based self-report measures of drinking behaviors and use of PBS, alcohol expectancies and perceptions of risk, sexual behaviors and related consequences ($n = 524$; 57.1% women). Findings indicated that PBS were related to lower expectancies of sexual risk and sexual disinhibition, and among lighter drinkers, lower expectancies of sexual enhancement from alcohol. PBS were also related to decreased perceptions of sexual-related risks, some alcohol-related sexual behaviors, including number of drinks before/ during sex, and number of sexual consequences, but were not related to abstaining during sex, frequency of alcohol-related sexual behavior, or general condom use. These findings demonstrate a disconnect between perceived and actual risks among college students, such that decreased perceptions of risk may not be associated with protective behaviors. Prevention and intervention implications are discussed.

Keywords

alcohol and safer sex; college students; protective behavioral strategies; sexual behaviors; sexual risk taking

Among college students, alcohol use has been linked to an increased likelihood of engaging in risky sexual behaviors, including casual sex and/or unprotected sex (Cooper, 2002). These behaviors put college students at an increased risk for negative consequences, such as exposure to sexually transmitted infections and HIV, unwanted pregnancies, and/or sexual victimization (American College Health Association, 2013; Hingson, Heeren, Zakocs, Kopstein, & Wechsler, 2002). In the U.S., 37% of college students from a nationally representative sample reporting drinking five or more drinks in one occasion in the past two weeks and nearly 40% reporting being drunk in the past 30 days (Johnston, O'Malley, Bachman, & Schulenberg, 2013). During the course of one academic year, 5% of college women experience rape, with 72% occurring when the victim is too intoxicated to consent (Mohler-Kuo, Dowdall, Koss, & Wechsler, 2004). Sexual regret, or self-blame following a behavior an individual feels he or she should not have done, is also commonly related to alcohol use and sexual decision making. Alcohol-related sexual regret is among college students, with 72% of sexually active college students reporting at least one episode of sexual regret in their lifetime (Oswalt, Cameron, & Koob, 2005) and 25% reporting at least one occurrence in the past month (Orchowski, Mastroleo, & Borsari, 2012). Overall, a substantial number of college students are at particular risk for experiencing alcohol-related sexual consequences, though these relationships are complex, influenced by factors such as gender, relationship status, and alcohol expectancies (e.g., Cooper, 2006; Cowley, 2014; Patrick, Maggs, & Lefkowitz, 2014).

Increased alcohol consumption is associated with increases in alcohol-related negative consequences in general (Park & Grant, 2005), as well as across specific settings and occasions (Del Boca, Darkes, Greenbaum, & Goldman, 2004; Lee et al., 2010; Lewis, Rees, Logan, Kaysen, & Kilmer, 2010; Neal & Fromme, 2007a). Increased alcohol consumption is related to sexual consequences as well (Neal & Fromme, 2007b), and given that risks vary by individual as a function of drinking behaviors, which are variable over time (including week-to-week), it is critical that we identify the factors associated with general perceptions of sexual risks and specific behaviors to reduce risk.

Targeting college student alcohol use through drinking protective behavioral strategies (PBS) can lead not only to decreases in alcohol consumption, but also to fewer negative consequences related to alcohol use (Martens et al., 2005, 2008; Martens, Pederson, LaBrie, Ferrier, & Cimini, 2007a; Martens, Ferrier, & Cimini, 2007b). PBS are cognitive-behavioral strategies used to limit alcohol consumption, minimize subsequent negative consequences, or both (e.g., Benton et al., 2004; Delva et al., 2004; Glassman, Werch, & Jobli, 2007; Martens et al., 2004, 2005, 2007a, 2007b, 2008; Sugarman & Carey, 2007). Examples of these strategies include spacing out drinks over time, alternating alcoholic drinks with non-alcoholic beverages, setting a limit on alcohol consumption, never leaving a drink unattended, and going home with a friend.

However, research specifically examining alcohol-related sexual consequences and drinking PBS is sparse (Lewis et al., 2010). Either previous studies did not include alcohol-related sexual consequences or they did not evaluate sex-related negative consequences separately from consequences unrelated to sex (Clapp, Shillington, & Segars, 2000; Delva et al., 2004; Haines, Barker, & Rice, 2006; LaBrie, Kenney, Lac, Garcia, & Ferraiolo, 2009). Three

studies serve as exceptions. First, using a single item measurement of sex-related negative outcomes, drinking PBS was shown to be negatively associated with unprotected sex (Martens et al., 2004). Second, Lewis, Rees, Logan, Kaysen, and Kilmer (2010) demonstrated that women's use of drinking PBS was associated with fewer alcohol-related sexual consequences. Finally, Gilmore, Granato, and Lewis (2013) observed positive relationships between drinking PBS and drinking behaviors, and positive relationships between condom PBS and condom behavior, but found no support that drinking PBS influenced condom behaviors or vice versa. In the current study, we sought to extend the understanding of the relationship between PBS and alcohol-related sexual consequences.

Another factor that influences drinking behaviors and consequences is alcohol expectancies. Alcohol expectancies are beliefs about the effects of alcohol on behaviors (Jones, Corbin, & Fromme, 2001), and sex-related alcohol expectancies are beliefs about alcohol's effects on sexual behaviors and feelings (Goldman & Roehrich, 1991). Sex-related alcohol expectancies have been shown to be associated with drinking in sexual or potentially sexual situations (Cooper, 2002; Dermen & Cooper, 1994b; Leigh, 1990). Dermen and Cooper (1994a) identified three distinct types of alcohol expectancies: enhancement (enhancing the sexual experience, e.g., "I am a better lover"), sexual risk (increasing risky sexual behavior, e.g., "I am less likely to [ask a partner to] use a condom"), and disinhibition (decreasing sexual inhibitions, e.g., "I am more likely to do sexual things that I wouldn't do when sober"). Of these, sexual enhancement expectancies appear particularly related to increased risky behaviors, including casual sex, while drinking (Dermen & Cooper, 2000; Dermen, Cooper, & Agocha, 1998), perhaps due to the greater relationship in general between positive expectancies and drinking behaviors (Logan, Henry, Vaughn, Luk, & King, 2011).

Specific to sex-related expectancies, college students with more positive sex-related alcohol expectancies were more likely to have oral sex and engage in a greater total number of sexual behaviors after drinking (Patrick & Maggs, 2009). White, Fleming, Catalano, and Bailey (2009) also found an indirect relationship between alcohol-related sexual enhancement expectancies and engaging in sex after drinking. Additional research suggests that the expectancy may be even more important than the drinking behavior; in a laboratory study, individuals rated perceptions and engaged in behaviors consistent with their sex-related alcohol expectancies in spite of being given a placebo instead of alcohol (George, Stoner, Norris, Lopez, & Lehman, 2000).

Another predictor of behavior is perceived risk of behavioral consequences, though the relationship between perceived and actual risk are not always consistent. College students have been found to inaccurately estimate national guidelines for low-risk drinking and alcoholic content of beverages, a risk for increased consumption (Hasking, Shortell, & Machalek, 2005). Students also tend to estimate the frequency of alcohol-related problems as significantly higher for others than themselves, even when there are no differences in actual risks (Baer & Carney, 1993). College students also typically underestimate the likelihood and importance of alcohol-related negative consequences (Logan et al., 2011; Park, 2004), and overestimate the number of drinks required to experience those consequences (Mallett, Lee, Neighbors, Larimer, & Turrisi, 2006). Risk perceptions related to sexual consequences and behaviors also vary, though greater perceived risk of HIV was

positively associated with condom use (Randolph, Torres, Gore-Felton, Lloyd, & McGarvey, 2009). College students underestimated their own risk of contracting HIV, though they grossly overestimated the risk of “typical” odds of transmission and risk to others (Pinkerton, Wagner-Raphael, Craun, & Abramson, 2000). Specifically related to alcohol use and sexual behavior, heavier drinking college freshmen accurately perceived higher sexual risk, although those who increased their drinking following a risk assessment underestimated their sexual risk (Klein, Geaghan, & MacDonald, 2007). Thus, overall, research has demonstrated that college students typically underestimate the individual and cumulative risks of alcohol- and sex-related consequences. These findings would suggest that increasing the accuracy of perceived risk and likelihood of sexual consequences might influence more safety-focused behaviors, including increasing the use of PBS. Further, a complex reciprocal interaction likely exists between these variables, such that increased risk perceptions may be associated with increased use of PBS, which would then lower future risk perceptions.

As we evaluate the relationships between expectancies, perceptions, and behaviors, it is important that we also consider the impact of gender. To our knowledge, Lewis and colleagues' research (2010) is the only published study specifically evaluating gender effects related to drinking PBS and alcohol-related sexual consequences, although other studies have found gender differences related to PBS, such that women are more likely than men to use drinking PBS (Benton et al., 2004; Benton, Downey, Glider, & Benton, 2008; Walters, Roudsari, Vader, & Harris, 2007). Sex-related alcohol expectancies for sexual risk-taking behaviors and sexual disinhibition of sexual behavior are more strongly endorsed by males than females (Dermen & Coooper, 1994a), possibly because there is less discrepancy between perceived benefits and costs of sexual encounters for men while women perceive greater costs such as risk of sexual assault and disproportionate transmission of STIs (Cooper, 2002). However, increased perception of sexual consequences resulted in behavior change (increased condom use) for both men and women (Randolph et al., 2009). Thus, prior research illustrating differential use and effects of PBS and endorsement of expectancies highlights the importance of considering gender as we explore the relationships between these variables.

The purpose of this study was to extend previous research by examining the relationships between drinking behaviors and PBS, sexual expectancies and risk perceptions, and actual sexual behaviors and alcohol-related sexual consequences. In other words, we were interested in the relationships between perceptions (based on expectancies and risk perceptions) and actual sexual risks (based on actual behaviors and consequences) as they relate to alcohol use and PBS. Presumably, PBS would be utilized as a function of an individual's expectancies and perceived risks (and could even be impacted by past experiences of consequences), and, if utilized consistently, could be associated with lower perceived risk as one sees the impact that use of PBS can have on consequences. We controlled for relationship status due to the potential differential impacts of a committed relationship on participants' perceptions, behaviors, and risks. It was hypothesized that PBS would be associated with lower alcohol-related sexual expectancies, lower perceived sexual risk, and lower actual sexual risk. We also explored gender as a moderator of these relationships, given the different perceptions and PBS behaviors between men and women.

Finally, we hypothesized that typical drinking would moderate these findings, such that greater drinks per week would be associated with greater sexual expectancies and both perceived and actual sexual risks.

Method

Participants and Procedures

A random sample of 2,000 undergraduate students obtained from the registrar's office was mailed and emailed an invitation to take a 40-minute web-based survey assessing risky sexual behaviors and alcohol use. Of those invited, a total of 1,002 (56.9% women) agreed to participate and 958 (95.6%) completed the survey. Women were more likely to participate than men, $\chi^2(1, n = 2000) = 37.53, p < .001$ based on the number invited and the number who completed the survey. Ethnicity of the sample was 60% Caucasian, 26% Asian, 9% Multiracial, and 5% identified as other. A small portion (5%) of the sample identified as Hispanic. There was no significant difference in ethnic composition (Caucasian, Asian, and other) based on whether students decided to participate or not, $\chi^2(2, n = 1901) = 3.20, p = ns$. Compared to the demographics of the undergraduate population at the University, participants were more likely to be women, $\chi^2(1, n = 28570) = 10.50, p < .01$, and Caucasian, $\chi^2(1, n = 28570) = 31.20, p < .001$. The mean age for participants was 20.61 years old ($SD = 2.07$). Because we were examining alcohol-related sexual consequences, and because PBS are theoretically used only when an individual is consuming alcohol, participants in the final analyses included only those students who reported ever having had vaginal sexual intercourse and who reported consuming at least one drink during a typical week ($n = 524$; 57.1% women). Upon completion, participants were paid \$20 for their time. All procedures were reviewed and approved by the University's institutional review board. In addition, a Federal Certificate of Confidentiality was obtained for this research.

Measures

Demographics—Participants provided demographic information, including age, gender, and race/ethnicity. Current relationship status was assessed by selecting one of seven options: “Single, not dating” and “Single, dating” (classified as Not in a Relationship for this study), “In a serious relationship” “Engaged” and “Married” (classified as In a Relationship), and “Divorced, not dating” and “Divorced, dating” (not endorsed by any participants).

Alcohol Consumption—Typical number of drinks consumed per week was assessed with the Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985). Participants were asked: “Consider a typical week during the last three months. How much alcohol, on average (measured in number of drinks), do you drink on each day of a typical week?” The definition of a standard drink included: 1) 12 oz. of beer (8 oz. of Canadian, malt liquor, or ice beers or 10 oz. of microbrew); 2) 10 oz. of wine cooler; 3) 4 oz. of wine; or 4) 1 cocktail with 1 oz. of 100-proof liquor or 1 1/4 oz. of 80-proof liquor. Participants then reported the number of drinks they usually consumed for each day of the week, which were summed to yield the typical weekly drink total (response range 1-62).

Sex-Related Alcohol Expectancies—Alcohol expectancies were measured by the Effects of Drinking Questionnaire (EDQ; Dermen & Cooper, 1994a). Participants are asked how they thought alcohol influenced their sexual behavior. The EDQ can be broken down into three subscales: enhancement ($\alpha = .87$), sexual risk ($\alpha = .86$), and disinhibition ($\alpha = .75$). The enhancement subscale includes five statements like “I feel closer to a sexual partner” and “I am less nervous about sex.” Examples of the four sex risk statements include “I am less likely to take precautions before having sex” and “I am less likely (to ask a partner) to use a condom.” The three disinhibition items include “I am more likely to have sex on a first date” and “I am more likely to do sexual things that I wouldn’t do when sober.” Participants responded on a Likert scale of 1 = *strongly disagree* to 6 = *strongly agree*. Final scores for each subscale were calculated using the mean of subscale variables, with ranges of 1.00-6.00 on each subscale.

Perceived Sexual Risk—Assessment of sexual risk was measured by asking participants how likely it would be for each of eight risks to happen to them. Sample questions include “having sex with a new partner without a condom,” “getting a sexually transmitted disease (STD), like herpes, chlamydia, or gonorrhea,” and “getting pregnant when you didn’t mean to.” Response options included 0 = *Not at all likely or 0%* to 6 = *Very likely or 100%*. Perceived risk was calculated from the mean of all responses ($\alpha = .73$), ranging from 0.00-4.75.

Alcohol-Related Sexual Behavior—Sexual behavior involving alcohol was measured by a modified version of the Alcohol-Related Sexual Behavior Scale (Cooper, Shapiro, & Powers, 1998; Lewis, Lee, Patrick, & Fossos, 2007). Sex was defined for participants as consensual sexual experiences including penile-vaginal intercourse, penile-anal intercourse, and/or oral intercourse. Participants were first asked how many times they had sex in the past three months (based on a scale of 0 = *none* to 15 = *15+ times*, response range 0-15). They were then asked how many times they consumed alcohol before or during sex (0 = *none* to 15 = *15+ times*, response range 0-13), how often they used condoms during sex after consuming alcohol (0 = *none* to 15 = *15+ times*, response range 0-15), and how many drinks they consumed, on average, before sex in the past three months (0 = *0 drinks* to 25 = *25+ drinks*, response range 0-15).

Sexual Behavior and Condom Use—The Sexual Behavior Measure (SBM; Bryan, Aiken, & West, 1997) was used to assess sexual behavior in the past three months. Specifically, participants were asked to report how frequently they have had sexual intercourse and how often they have used condoms. Response options for frequency of intercourse included 0 = *never* to 5 = *almost every day*. Condom use was coded in 10% increments from 0 = *0% of the time* to 10 = *100% of the time* (response range 0-10).

Alcohol-Related Sexual Consequences—A modified version of the sex-related alcohol negative consequences subscale (Larimer, Lydum, Anderson, & Turner, 1999; Wood, Read, Palfai, & Stevenson, 2001) of the Young Adult Alcohol Problem Screening Test (YAAPST; Hurlbut & Sher, 1992) was used to assess frequency of sex-related alcohol negative consequences in the last three months. Participants were asked four questions

related to engagement of risky sexual behavior because of drinking: (a) Has drinking ever gotten you into sexual situations which you later regretted?, (b) Because you had been drinking, have you ever neglected to use birth control or neglected to protect yourself from sexually transmitted diseases?, (c) Because you had been drinking, have you ever had sex when you didn't really want to?, and (d) Because you had been drinking, have you ever had sex with someone you wouldn't ordinarily have sex with? Responses were coded 0 (*No, never*) or (*Yes, but not in the past three months*), 1 (*1 time in the past three months*), 2 (*2 times in the past three months*), and 3 (*3 or more times in the past three months*). Scores represent the sum of these four items ($\alpha = .77$), with response ranges 0.00-9.00.

Protective Behavioral Drinking Strategies—The Protective Behavioral Strategies Survey (PBSS; Martens et al., 2005) was used to assess the strategies utilized to prevent alcohol-related negative consequences. Participants were presented 15 items and asked how often they engaged in each behavior while partying. The PBSS is comprised of three subscales: stopping or limiting drinking, manner of drinking, and serious negative consequences. Examples of stopping or limiting drinking strategies include “stop drinking at a predetermined time,” “put extra ice in your cup,” and “alternate alcohol and non-alcohol drinks.” Strategies incorporated in manner of drinking include “avoid drinking games” and “avoid trying to “keep up” or “out-drink” others.” Finally, strategies to avoid serious negative consequences include “use a designated driver” and “know where your drink has been at all times.” Response options were based on a Likert scale of 0 = *Never (0%)* to 4 = *Always (100%)*. For the current study, a total score was calculated by taking the average of all items ($\alpha = .81$), with responses ranging from 0.00-4.00.

Data Analysis

Preliminary analyses revealed some normal and non-normal distributions. We used hierarchical multiple regression analyses to evaluate sex-related alcohol expectancies (enhancement, sexual risk, and disinhibition), perceived sexual risks, and condom use.. In addition to unique main effects of these variables we were interested in evaluating potential interactions between gender and PBS and between typical drinking and PBS. Main effects for gender, relationship status, typical drinks per week, and PBS were entered at Step 1. Two-way product terms evaluating the potential interactions were entered at Step 2. Gender and relationship status were dummy coded (men = 1, women = 0; relationship = 1, no relationship = 0). All predictors were mean centered to facilitate interpretation of parameter estimates (Cohen, Cohen, West, & Aiken, 2003).

Our analyses revealed non-normal distributions for alcohol-related sexual consequences ($S = 1.56$, $K = 2.92$), number of drinks during sex ($S = 1.12$, $K = 1.21$), and frequency of alcohol-related sexual encounters ($S = 1.62$, $K = 2.79$). A significant proportion of participants endorsed “0” alcohol-related sexual consequences (81.3%), number of drinks during sex (35.0%), and frequency of alcohol-related sexual encounters (34.9%) in the past three months.: Thus, zero-inflated binomial regression (ZINB) was selected as the analysis strategy to examine these non-normally distributed outcomes (Atkins & Gallop, 2007; Heilbron, 1994; Hilbe, 2007; Simons, Neal, & Gaher, 2006).

Zero-inflated count models are accompanied by simultaneous tests for two dimensions of a distribution: the count portion and the logistic portion. The count portion includes positive integers and zero, predicting the negative binomial distribution of sex-related consequences, number of drinks during sex, and frequency of alcohol-related sexual behavior. The logistic part of the model examines the likelihood of predicting a zero-value (or absence of alcohol-related sexual consequences, zero drinks during sex, and no occurrences of sex while drinking) beyond what would be expected in a negative binomial distribution.

Results

Descriptive Information

Means, standard deviations, and zero-order correlations are presented in Table 1. Correlations indicated that number of drinks per week was positively associated with sex-related expectations, perceived risk, sexual behaviors, and alcohol-related sexual consequences, and negatively associated with drinking PBS. Expectancy subscales were positively associated among themselves, as were the sexual behavior subscales. Protective strategies were negatively associated with all variables except for the high-risk behavior of having sex after alcohol and condom use.

Sex-Related Alcohol Expectancies

Results for all three dependent variables are presented in Table 2. The regression evaluating enhancement expectancies indicated that gender, typical drinking behavior and PBS accounted for a small proportion of variance ($R^2 = .06$). Results further indicated that women, students who consumed less alcohol, and students who used more PBS perceived fewer sexual enhancement expectancies related to alcohol use. Results at Step 2 revealed that only the two-way interaction between typical drinking and PBS was significant. Figure 1 presents the predicted cell means, which were derived from the regression equation with higher and lower values represented as one standard deviation above and below the respective centered means (Aiken & West, 1991; Cohen et al., 2003). As illustrated, at high levels of typical drinking, the negative relationship between enhancement expectancies and PBS remained high and did not vary; however, at lower levels of typical drinking, greater use of PBS was associated with lower levels of enhancement expectancies. The regression evaluating sexual risk expectancies indicated that gender, relationship status, and PBS accounted for a small proportion of variance ($R^2 = .05$), such that men and students in a relationship or who used more PBS had lower sexual risk expectancies. For disinhibition expectancies, gender, typical drinking behavior, and PBS accounted for variance ($R^2 = .13$), indicating that men, students who consumed less alcohol, and students who used more PBS perceived fewer sexual disinhibition expectancies related to alcohol use. The two-way interactions were not significant for either sexual risk or disinhibition expectancies.

Perceived Sexual Risks and Condom Use

Hierarchical multiple regression analyses were also used to evaluate perceived sexual risk and actual condom use as a function of gender, relationship status, typical drinking behavior, and PBS (see Table 3). Again, main effects for gender, relationship status, typical drinks per week, and PBS were entered at Step 1 and two-way product terms evaluating the potential

interactions were entered at Step 2. For perceived sexual risks, results indicated that typical drinking behavior and PBS accounted for a small proportion of variance ($R^2 = .05$). Results further indicated that students who consumed less alcohol and students who used more PBS had lower levels of perceived sexual risks. The interactions between PBS and typical drinking behavior and PBS and gender were non-significant. For condom use, only relationship status was related to actual use, such that not being in a relationship was associated with greater frequency of condom use. The independent and interactive influences of alcohol use, gender, and PBS were not significantly related to actual condom use.

Actual Sexual Risks

We evaluated the relationships between predictors (gender, relationship status, typical drinking behavior, and PBS) and sex-related behaviors (alcohol-related sexual consequences, number of drinks during sex, frequency of alcohol-related sexual behavior) using ZINB (results presented in Table 4). Main effects for gender, relationship status, typical drinks per week, and PBS were entered at Step 1 and two-way product terms evaluating the potential interactions were entered at Step 2.

For alcohol-related sexual consequences, the count portion of the model revealed greater drinks per week and fewer PBS predicted more consequences. The incidence rate ratios of 1.03 for drinks per week and -0.54 for PBS signify a 3% increase and 46% decrease in alcohol-related sexual consequences, respectively. The logistic portion of the model indicated that being male, being in a relationship, and consuming fewer drinks per week predicted the endorsement of no alcohol-related sexual consequences. The odds ratios of 2.67 for gender, 3.41 for relationship status, and 0.94 for drinks per week signify a 167% increase, 241% increase, and 6% increase in reporting no alcohol-related sexual consequences, respectively.

For number of drinks during sex, the count portion of the model revealed not being in a relationship, greater drinks per week, and fewer PBS predicted more drinks during sex. The incidence rate ratios of 0.84 for relationship status, 1.03 for drinks per week, and .82 for PBS signify a 16% decrease, 3% increase, and 18% decrease in drinks during sex, respectively. Results at Step 2 revealed a significant two-way interaction between typical drinks per week and drinking PBS. Interactions were plotted following procedures described by Aiken and West (1991) and others (Cohen et al., 2003; Jaccard & Turrisi, 2003). Regression lines between typical drinks per week and drinking PBS with drinks during sex were plotted for low, medium, and high levels of typical weekly drinking. The twenty-fifth percentile was chosen as the low value (4), the fiftieth percentile was used as the medium value (8), and the seventy-fifth percentile was chosen to represent the high value (15) for typical drinking. Drinking PBS is presented as a continuous variable. Figure 2 shows that greater use of drinking PBS was associated with consuming fewer drinks prior to sex, especially for those who typically consumed lower amounts of alcohol in a typical week. The logistic portion of the model indicated that not being in a relationship and consuming fewer drinks per week predicted the absence of drinks during sex. The odds ratios of 0.21 for relationship status and 0.93 for drinks per week signify a 79% and 7% decrease in

reporting no drinks during sex, respectively. Relationship status is noteworthy given that participants who were not in a relationship were less likely to consume alcohol during sex (logistic portion), but when they did, actually consumed more alcohol (count portion) than their peers in relationships.

For frequency of alcohol-related sexual behavior, the count portion of the model revealed being in a relationship and greater drinks per week predicted more alcohol-related sexual encounters. The incidence rate ratios of 1.48 for relationship status and 1.02 for drinks per week signify a 48% and 2% increase in frequency of alcohol-related sex, respectively. Results at Step 2 again revealed a significant two-way interaction between typical drinks per week and drinking PBS. Figure 3, following the same plotting techniques as above, also shows that greater use of drinking PBS was associated with fewer alcohol-related sexual encounters, especially for those who typically consumed lower amounts of alcohol in a typical week. The logistic portion of the model indicated not being in a relationship and consuming fewer drinks per week predicted having no alcohol-related sexual encounters. Overall, using more PBS was related to fewer drinks during sex, though it was not related to abstaining during sex or frequency or absence of alcohol-related sexual encounters. The odds ratios of 0.22 for relationship status and 0.83 for drinks per week signify a 78% and 17% decrease in reporting no alcohol-related sexual behavior, respectively.

Discussion

The purpose of this study was to extend the research on the relationships between alcohol use, PBS, and sexual behaviors in college men and women. We examined alcohol-related sexual expectancies as well as both perceptions of sexual risks and actual sexual behaviors, including alcohol-related sexual consequences, number of drinks during sex, frequency of alcohol-related sexual behavior, and condom use. Findings indicated that PBS were related to lower expectancies of sexual risk and sexual disinhibition, and among lighter drinkers, lower expectancies of sexual enhancement. PBS were also related to decreased perceptions of sexual-related risks. This is consistent with previous research indicating that PBS use is associated with less drinking and fewer alcohol-related consequences (e.g., Martens et al., 2004).

However, a causal direction remains unclear. It could be that a drinker who does not expect sexual enhancement benefits of alcohol may be more likely to implement PBS strategies, and that choosing to implement strategies minimizes one's perception of risk. The research on risk perception and its influences on behavior is mixed. Previous experience of negative alcohol-related consequences did not increase the perceived likelihood of experiencing consequences in the future (Logan et al., 2012). Related to marijuana use, abstainers perceived greater risk of experiencing a future social or academic marijuana-related consequence if they were to use marijuana than students who reported use of marijuana (Kilmer, Hunt, Lee, & Neighbors, 2007). These studies suggest that lower risk perception may not necessarily be related to a less risky pattern of behavior.

While greater perceived risks can positively influence behavior e.g., increasing condom use (Randolph et al., 2009), inaccurately low perceptions of risk may undermine behavior

change. Given that risk perceptions can be generally low (Pinkerton et al., 2000) and specifically low for lighter drinking students (Klein et al., 2007), in prevention and intervention efforts, it is important to emphasize the potential positive impact of PBS while warning against a false sense of security when these are employed. This also highlights the value of considering the perceptions of the context in which PBS are being implemented (i.e., if a particular situation is deemed “safe” or “less risky”). Future studies can examine more closely the relationship between risk perception and use of PBS.

Our findings indicate that while greater use of PBS was associated with lower incidences of some actual sex behaviors (the number of alcohol-related sexual consequences and consuming fewer drinks during sex), increased PBS was not related to the absence of sexual consequences, abstaining during sex, frequency of alcohol-related sexual behavior, or general condom use. These findings have important implications in that encouraging use of PBS should likely occur alongside efforts that also emphasize the need for behavioral precautions. In doing so, this could reduce the likelihood that a prevention or intervention effort may be inaccurately lowering perceptions of risk to the point where behavioral precautions are being overlooked. Additionally, our findings that use of PBS reduced the number of alcohol-related sexual consequences in the overall sample, but did not predict the absence of those consequences, suggests that PBS may reduce but not prevent alcohol-related sexual consequences. In other words, it is possible that for some students, the motivation and perceived benefit of using PBS may not be realized until consequences have been experienced. Future research can examine the impact of experiencing a consequence on subsequent utilization of PBS and on self-efficacy to employ PBS, as well as additional sex-related risk-taking behaviors in the same and future situations.

Further, while gender was predictive of expectancies (with women endorsing fewer alcohol-related enhancement expectancies and greater sexual risk and disinhibition expectancies), it was not predictive as a main effect or part of an interaction of actual or perceived sex-related consequences. The single exception was that being male was associated with a greater likelihood of endorsing no alcohol-related sexual consequences, though there were no gender differences in the mean number of consequences endorsed. These findings add to the limited literature on PBS and alcohol-related sexual consequences by gender (e.g., Lewis et al., 2010) by highlighting the similar risks for men and women when combining alcohol and sexual behaviors.

Relationship status had a complex and nuanced association with alcohol use and sexual behaviors and consequences. Results suggested that being in a relationship was associated with fewer alcohol-related sexual risk expectancies though a greater frequency of alcohol-related sexual behaviors. Not being in a relationship was associated with both protective factors (e.g., endorsing zero alcohol-related sexual behaviors, endorsing zero drinks during sex, endorsing no alcohol-related sexual consequences) and risk factors (e.g., a greater quantity of drinks during sex). In other words, students who were not in a relationship were less likely to drink during sex; however, among those that did drink, they consumed significantly more than respondents in relationships. Similarly, while these unattached students were less likely to have engaged in any alcohol-related sexual behaviors, those that had were more likely to experience alcohol-related sexual consequences. These findings

extend previous research suggesting stronger relationships between consumption and behaviors for students not in a relationship (Patrick et al., 2014) by identifying this nuanced relationship of greater and lower risk in the same population, with clear implications for intervention strategies. Targeted screening might identify and highlight students at risk (e.g., any alcohol-related sexual experiences among those not in relationships) for additional PBS strategies.

Because prevention and intervention strategies that have a skills training component typically include suggestions for implementation of PBS (Larimer & Crounse, 2002), our findings suggest that a discussion of expectancies and perceived risk of sexual consequences may be an important addition. Given the findings in the current study as well as previous work (Gilmore et al., 2013) that college students may employ sex-related PBS (e.g., condom use) independent from alcohol-related PBS (e.g., limiting consumption), further research could explore whether sexual-related PBS would have a different impact on perceived and actual risk. Given the relationship between drinking behaviors and sexual risk, there are important implications for typically light to moderate drinkers who increase their consumption on occasion but who might otherwise have (accurate) lower risk perceptions. Prior research has demonstrated increased drinking in specific but rare situations such as 21st birthday and spring break (Lee, Lewis, & Neighbors, 2009; Lewis et al., 2010). In these situations, the discrepancy between perceived and actual risk may be most pronounced given the associations between low drinking and low perceived (and actual) risk temporarily replaced with higher drinking.

While this study extended prior research by including actual sexual-related risk with the associations between consumption, perceptions, and expectancies, a number of limitations exist. The surveys were cross-sectional so causal relationships cannot be inferred. Respondents were sampled from a single university and were more likely to identify as Caucasian and female, limiting potential generalizability. Alcohol-related sexual consequences were limited to four items and may not have adequately included the wide range of potential consequences. Further, behaviors and consequences were assessed retrospectively (e.g., over the past three months) while perceptions were assessed at the present time, highlighting greater importance for future longitudinal studies to evaluate perceived and actual risk from the same time period. While temporally we assessed past month PBS as a predictor of current expectancies, the reciprocal relationship between the two variables suggests that assessing expectancies as a predictor of PBS would be equally valid. Further, while the measures of behaviors, consequences, and perceptions are well standardized in this population, the assessment wording varies on each scale, precluding a direct comparison.

Another limitation is that responses were self-report and relied on estimates of behavior and perceptions spanning a three month period. Future studies of event-specific behaviors and strategies could clarify additional or diminished risk associated with changes in drinking patterns. We included only students who were sexually active and reported alcohol consumption within the past three months. PBS and the relationship with sex-related perceptions and risks among students who typically abstain or have not yet engaged in sexual intercourse could be considered in future studies. Finally, while these students were

all sexually active and relationship status was considered, there could be different risks based on individual relationship variables (i.e., if someone is in a monogamous relationship with one partner or if a student is “hooking up” with a number of people), number of partners a person has had during the assessment window, and, if the student is in a monogamous relationship, the stability, security, or trust in that relationship and their partner. Further, other examples of sexual protective behaviors (e.g., other types of birth control) and risk behaviors (e.g., multiple partners) were not assessed but could impact differences in perceived and actual risk factors. The relationship between these factors and risk perception (along with use of PBS) could be examined in future studies.

In spite of these limitations, the current findings have important implications in understanding the relation between sex-related expectancies, perceived risks, and actual risks. Our findings that use of PBS was associated with lower expectancies and perceived risk without a concurrent reduction in actual risky behaviors, particularly among non-heavy drinkers in risky situations, highlights the urgency of addressing sex-related risks in addition to general alcohol consequences in prevention and intervention programs. Further research is needed to determine the most effective methods of narrowing the gap between underestimating perceived risks when there is no change in actual risks.

Acknowledgments

Data collection and manuscript preparation was supported by National Institute on Alcohol Abuse and Alcoholism Grant K01AA016966 awarded to M. A. Lewis. Manuscript preparation was supported by National Institute on Alcohol Abuse and Alcoholism Grant 1F31AA018238-01A1 awarded to D. E. Logan and National Institute on Alcohol Abuse and Alcoholism Grant 2T32AA007459 awarded to P. Monti.

References

- Aiken, LS.; West, SG. Multiple regression: Testing and interpreting interactions. Thousand Oaks, CA US: Sage Publications, Inc.; 1991.
- American College Health Association. American College Health Association-National College Health Assessment II: Reference Group Data Report Undergraduate Students Spring 2013. Hanover, MD: American College Health Association; 2013.
- Atkins DC, Gallop RJ. Re-thinking how family researchers model infrequent outcomes: A tutorial on count regression and zero-inflated models. *Journal of Family Psychology*. 2007; 21:726–735. [PubMed: 18179344]
- Baer JS, Carney MM. Biases in the perceptions of the consequences of alcohol use among college students. *Journal of Studies on Alcohol*. 1993; 54:54–60. [PubMed: 8355500]
- Benton SL, Schmidt JL, Newton FB, Shin K, Benton SA, Newton DW. College student protective strategies and drinking consequences. *Journal of Studies on Alcohol and Drugs*. 2004; 65:115–121.
- Benton SL, Downey RG, Glider PJ, Benton SA. College students' norm perception predicts reported use of protective behavioral strategies for alcohol consumption. *Journal of Studies on Alcohol and Drugs*. 2008; 69:859–865. [PubMed: 18925344]
- Bryan AD, Aiken LS, West SG. Young women's condom use: The influence of acceptance of sexuality, control over the sexual encounter, and perceived susceptibility to common STDs. *Health Psychology*. 1997; 16:468–479.10.1037/0278-6133.16.5.468 [PubMed: 9302544]
- Clapp JD, Shillington AM, Segars LB. Deconstructing contexts of binge drinking among college students. *The American Journal of Drug and Alcohol Abuse*. 2000; 26:139–154.10.1081/ADA-100100596 [PubMed: 10718169]
- Cohen, J.; Cohen, P.; West, SG.; Aiken, LS. Applied multiple regression/correlation analysis for the behavioral sciences (3rd ed). Mahwah, NJ US: Lawrence Erlbaum Associates Publishers; 2003.

- Collins R, Parks GA, Marlatt G. Social determinants of alcohol consumption: The effects of social interaction and model status on the self-administration of alcohol. *Journal of Consulting and Clinical Psychology*. 1985; 53:189–200.10.1037/0022-006X.53.2.189 [PubMed: 3998247]
- Cooper M, Shapiro CM, Powers AM. Motivations for sex and risky sexual behavior among adolescents and young adults: A functional perspective. *Journal of Personality and Social Psychology*. 1998; 75:1528–1558.10.1037/0022-3514.75.6.1528 [PubMed: 9914665]
- Cooper M. Alcohol use and risky sexual behavior among college students and youth: Evaluating the evidence. *Journal of Studies on Alcohol*. 2002; (SUPPL14):101–117.
- Cooper ML. Does drinking promote risky sexual behavior?: A complex answer to a simple question. *Current Directions in Psychological Science*. 2006; 15:19–23.10.1111/j.0963-7214.2006.00385.x
- Cowley AD. “Let’s get drunk and have sex”: The complex relationship of alcohol, gender, and sexual victimization. *Journal of Interpersonal Violence*. 2014; 29:1258–1278. [PubMed: 24255066]
- Del Boca FK, Darkes J, Greenbaum PE, Goldman MS. Up close and personal: Temporal variability in the drinking of individual college students during their first year. *Journal of Consulting and Clinical Psychology*. 2004; 72:155–164.10.1037/0022-006X.72.2.155 [PubMed: 15065951]
- Delva J, Smith MP, Howell RL, Harrison DF, Wilke D, Jackson D. A study of the relationship between protective behaviors and drinking consequences among undergraduate college students. *Journal of American College Health*. 2004; 53:19–26.10.3200/JACH.53.1.19-27 [PubMed: 15266726]
- Dermen KH, Cooper M. Sex-related alcohol expectancies among adolescents: I. Scale development. *Psychology of Addictive Behaviors*. 1994a; 8:152–160.10.1037/0893-164X.8.3.152
- Dermen KH, Cooper ML. Sex-related alcohol expectancies among adolescents: II. Prediction of drinking in social and sexual situations. *Psychology of Addictive Behaviors*. 1994b; 8:161–168.10.1037/0893-164X.8.3.161
- Dermen KH, Cooper ML. Inhibition conflict and alcohol expectancy as moderators of alcohol's relationship to condom use. *Experimental and Clinical Psychopharmacology*. 2000; 8:198–206.10.1037/1064-1297.8.2.198 [PubMed: 10843303]
- Dermen KH, Cooper ML, Agocha VB. Sex-related alcohol expectancies as moderators of the relationship between alcohol use and risky sex in adolescents. *Journal of Studies on Alcohol*. 1998; 59:71–77. [PubMed: 9498318]
- George WH, Stoner SA, Norris J, Lopez PA, Lehman GL. Alcohol expectancies and sexuality: A self-fulfilling prophecy analysis of dyadic perceptions and behaviors. *Journal of Studies on Alcohol*. 2000; 61:168–176. [PubMed: 10627112]
- Gilmore AK, Granato HF, Lewis MA. The use of drinking and condom-related protective strategies in association with condom use and sex-related alcohol use. *Journal of Sex Research*. 2013; 50:470–479. [PubMed: 22420842]
- Glassman T, Werch C, Jobli E. Alcohol self-control behaviors of adolescents. *Addictive Behaviors*. 2007; 32:590–597.10.1016/j.addbeh.2006.06.003 [PubMed: 16876961]
- Goldman MS, Roehrich L. Alcohol expectancies and sexuality. *Alcohol Health & Research World*. 1991; 15:126–132.
- Haines MP, Barker G, Rice RM. The personal protective behaviors of college student drinkers: Evidence of indigenous protective norms. *Journal of American College Health*. 2006; 55:69–75.10.3200/JACH.55.2.69-76 [PubMed: 17017302]
- Hasking P, Shortell C, Machalek M. University students' knowledge of alcoholic drinks and their perception of alcohol-related harm. *Journal of Drug Education*. 2005; 35:95–109.10.2190/9Y34-F5XR-AQV5-KEL8 [PubMed: 16312108]
- Heilbron D. Zero-altered and other regression models for count data with added zeros. *Biometrical Journal*. 1994; 36:531–547.
- Hilbe, JM. *Negative Binomial Regression*. Cambridge, UK: Cambridge University Press; 2007.
- Hingson RW, Heeren T, Zakocs RC, Kopstein A, Wechsler H. Magnitude of alcohol-related mortality and morbidity among U. S. college students ages 18–24. *Journal of Studies on Alcohol*. 2002; 63:136–144. [PubMed: 12033690]
- Hurlbut SC, Sher KJ. Assessing alcohol problems in college students. *Journal of American College Health*. 1992; 41:49–58. [PubMed: 1460173]

- Jaccard, J.; Turrise, R. Interaction effects in multiple regression. 2nd. Thousand Oaks, CA: Sage; 2003. Sage University Papers Series on Quantitative Applications in the Social Sciences
- Johnston, LD.; O'Malley, PM.; Bachman, JG.; Schulenberg, JE. Monitoring the Future national survey results on drug use, 1975–2012: Volume II, College students and adults ages 19–50. Ann Arbor: Institute for Social Research, The University of Michigan; 2013.
- Jones BT, Corbin W, Fromme K. A review of expectancy theory and alcohol consumption. *Addiction*. 2001; 96:57–72.10.1080/09652140020016969 [PubMed: 11177520]
- Kilmer JR, Hunt SB, Lee CM, Neighbors C. Marijuana use, risk perception, and consequences: Is perceived risk congruent with reality? *Addictive Behaviors*. 2007; 32:3026–3033.10.1016/j.addbeh.2007.07.009 [PubMed: 17822856]
- Klein W, Geaghan T, MacDonald T. Unplanned sexual activity as a consequence of alcohol use: A prospective study of risk perceptions and alcohol use among college freshmen. *Journal of American College Health*. 2007; 56:317–323.10.3200/JACH.56.3.317-324 [PubMed: 18089515]
- LaBrie JW, Kenney SR, Lac A, Garcia JA, Ferraiolo P. Mental and social health impacts the use of protective behavioral strategies in reducing risky drinking and alcohol consequences. *Journal of College Student Development*. 2009; 50:35–49.10.1353/csd.0.0050 [PubMed: 25382937]
- Larimer ME, Cronce JM. Identification, prevention, and treatment revisited: Individual-focused college drinking prevention strategies 1999–2006. *Addictive Behaviors*. 2007; 32:2439–2468.10.1016/j.addbeh.2007.05.006 [PubMed: 17604915]
- Larimer ME, Lydum AR, Anderson BK, Turner AP. Male and female recipients of unwanted sexual contact in a college student sample: Prevalence rates, alcohol use, and depression symptoms. *Sex Roles*. 1999; 40:295–308.
- Lee CM, Lewis MA, Neighbors C. Preliminary examination of Spring Break alcohol use and related consequences. *Psychology of Addictive Behaviors*. 2009; 23:689–694.10.1037/a0016482 [PubMed: 20025375]
- Lee CM, Patrick ME, Neighbors C, Lewis MA, Tollison SJ, Larimer ME. Exploring the role of positive and negative consequences in understanding perceptions and evaluations of individual drinking events. *Addictive Behaviors*. 2010.10.1016/j.addbeh.2010.03.003
- Leigh BC. The relationship of sex-related alcohol expectancies to alcohol consumption and sexual behavior. *British Journal of Addiction*. 1990; 85(7):919–928.10.1111/j.1360-0443.1990.tb03722.x [PubMed: 2397319]
- Lewis MA, Lee CM, Patrick ME, Fossos N. Gender-specific normative misperceptions of risky sexual behavior and alcohol-related risky sexual behavior. *Sex Roles*. 2007; 57:81–90.10.1007/s11199-007-9218-0
- Lewis MA, Rees M, Logan DE, Kaysen DL, Kilmer JR. Use of drinking protective behavioral strategies in association to sex-related alcohol negative consequences: The mediating role of alcohol consumption. *Psychology of Addictive Behaviors*. 2010; 24:229–238.10.1037/a0018361 [PubMed: 20565149]
- Logan DE, Henry T, Vaughn M, Luk JW, King KM. Rose-Colored Beer Goggles: The Relationship between Experiencing Consequences and Perceived Likelihood and Valence. *Psychology of Addictive Behaviors*. 2012; 26:311–317. [PubMed: 21639598]
- Mallett KA, Lee CM, Neighbors C, Larimer ME, Turrise R. Do we learn from our mistakes? An examination of the impact of negative alcohol-related consequences on college students' drinking patterns and perceptions. *Journal of Studies on Alcohol*. 2006; 67:269–276. [PubMed: 16562409]
- Martens MP, Taylor KK, Damann KM, Page JC, Mowry ES, Cimini M. Protective Behavioral Strategies when drinking alcohol and their relationship to negative alcohol-related consequences in college students. *Psychology of Addictive Behaviors*. 2004; 18:390–393.10.1037/0893-164X.18.4.390 [PubMed: 15631613]
- Martens MP, Ferrier AG, Sheehy MJ, Corbett K, Anderson DA, Simmons A. Development of the Protective Behavioral Strategies Survey. *Journal of Studies on Alcohol*. 2005; 66:698–705. [PubMed: 16329461]
- Martens MP, Pederson ER, LaBrie JW, Ferrier AG, Cimini M. Measuring alcohol-related protective behavioral strategies among college students: Further examination of the Protective Behavioral

- Strategies Scale. *Psychology of Addictive Behaviors*. 2007a; 21:307–315.10.1037/0893-164X.21.3.307 [PubMed: 17874881]
- Martens MP, Ferrier A, Cimini MD. Do protective behavioral strategies mediate the relationship between drinking motives and alcohol use in college students? *Journal of Studies on Alcohol and Drugs*. 2007b; 68:106–114. [PubMed: 17149524]
- Martens MP, Martin JL, Hatchett E, Fowler RM, Fleming KM, Karakashian MA, Cimini M. Protective behavioral strategies and the relationship between depressive symptoms and alcohol-related negative consequences among college students. *Journal of Counseling Psychology*. 2008; 55:535–541.10.1037/a0013588 [PubMed: 22017560]
- Mohler-Kuo M, Dowdall GW, Koss MP, Wechsler H. Correlates of rape while intoxicated in a national sample of college women. *Journal of Studies on Alcohol*. 2004; 65:37–45. [PubMed: 15000502]
- Neal DJ, Fromme K. Hook ‘em horns and heavy drinking: Alcohol use and collegiate sports. *Addictive Behaviors*. 2007a; 32:2681–2693.10.1016/j.addbeh.2007.06.020 [PubMed: 17662537]
- Neal DJ, Fromme K. Event-level covariation of alcohol intoxication and behavioral risks during the first year of college. *Journal of Consulting and Clinical Psychology*. 2007b; 75:294–306. [PubMed: 17469887]
- Orchowski LM, Mastroleo NR, Borsari BB. Correlates of alcohol-related regretted sex among college students. *Psychology of Addictive Behavior*. 2012; 26:782–790.
- Oswalt SB, Cameron KA, Koob JJ. Sexual regret in college students. *Archives of Sexual Behavior*. 2005; 34:663–669. [PubMed: 16362250]
- Park C. Positive and negative consequences of alcohol consumption in college students. *Addictive Behaviors*. 2004; 29:311–321.10.1016/j.addbeh.2003.08.006 [PubMed: 14732419]
- Park CL, Grant C. Determinants of positive and negative consequences of alcohol consumption in college students: Alcohol use, gender, and psychological characteristics. *Addictive Behaviors*. 2005; 30:755–765.10.1016/j.addbeh.2004.08.021 [PubMed: 15833579]
- Patrick ME, Maggs JL. Does drinking lead to sex? Daily alcohol-sex behaviors and expectancies among college students. *Psychology of Addictive Behaviors*. 2009; 23:472–481.10.1037/a0016097 [PubMed: 19769431]
- Patrick ME, Maggs JL, Lefkowitz ES. Daily associations between drinking and sex among college students: A longitudinal measurement burst design. *Journal of Research on Adolescence*. 2014.10.1111/jora.12135
- Pinkerton SD, Wagner-Raphael LI, Craun CA, Abramson PR. A quantitative study of the accuracy of college students' HIV risk estimates. *Journal of Applied Biobehavioral Research*. 2000; 5:1–25.10.1111/j.1751-9861.2000.tb00061.x
- Randolph ME, Torres H, Gore-Felton C, Lloyd B, McGarvey EL. Alcohol use and sexual risk behavior among college students: Understanding gender and ethnic differences. *The American Journal of Drug and Alcohol Abuse*. 2009; 35:80–84.10.1080/00952990802585422 [PubMed: 19253158]
- Simons JS, Neal DJ, Gaher RM. Risk for marijuana-related problems among college students: An application of zero-inflated negative binomial regression. *The American Journal of Drug and Alcohol Abuse*. 2006; 32:41–53.10.1080/00952990500328539 [PubMed: 16450642]
- Sugarman DE, Carey KB. The relationship between drinking control strategies and college student alcohol use. *Psychology of Addictive Behaviors*. 2007; 21:338–345.10.1037/0893-164X.21.3.338 [PubMed: 17874884]
- Walters ST, Roudsari BS, Vader AM, Harris T. Correlates of protective behavior utilization among heavy-drinking college students. *Addictive Behaviors*. 2007; 32:2633–2644.10.1016/j.addbeh.2007.06.022 [PubMed: 17669596]
- White HR, Fleming CB, Catalano RF, Bailey JA. Prospective associations among alcohol use-related sexual enhancement expectancies, sex after alcohol use, and casual sex. *Psychology of Addictive Behaviors*. 2009; 23:702–707.10.1037/a0016630 [PubMed: 20025377]
- Wood MD, Read JP, Palfai TP, Stevenson JF. Social influence processes and college student drinking: The mediational role of alcohol outcome expectations. *Journal of Studies on Alcohol*. 2001; 62:32–43. [PubMed: 11271962]

Figure 1.

Two-way interactions between levels of typical weekly drinking (drinks) and perceived enhancement ratings for low and high levels of protective behavioral strategy (PBS) use.

Figure 2. Interactions between drinking protective behavioral strategy (PBS) use and drinks before/during sex at low, medium, and high levels of typical weekly drinking.

Figure 3.

Interactions between drinking protective behavioral strategy (PBS) use and frequency of alcohol-related sex at low, medium, and high levels of typical weekly drinking.

Table 1

Means, Standard Deviations, and Zero-order Correlations

Variable	M	SD	1	2	3	4	5	6	7	8	9	10
1. Drinks per week	10.22	9.16	-									
<i>Expectancies</i>												
2. Enhancement	3.37	1.24	.14**	-								
3. Risk	2.72	1.35	.12**	.29***	-							
4. Disinhibition	3.07	1.37	.28***	.42***	.63***	-						
<i>Perceptions</i>												
5. Sex risks	1.36	0.89	.19***	.14**	.36***	.26***	-					
<i>Behaviors</i>												
6. Sex after alcohol	2.60	3.14	.25***	.09*	-.02	.11*	.17***	-				
7. --with condoms	1.12	2.13	.20***	.07	-.08	.14**	-.08	.56***	-			
8. Drinks during sex	2.65	2.76	.49***	.14**	.09*	.25***	.24***	.45***	.36***	-		
<i>Consequences</i>												
9. Sex problems	0.51	1.39	.32***	.12**	.17***	.30***	.21***	.17***	.16***	.43***	-	
<i>Strategies</i>												
10. Alcohol PBS	2.01	0.60	-.37***	-.13**	-.15*	-.29***	-.18***	-.10*	-.06	-.25***	-.25***	-

Note. Ns ranged from 517 to 524 due to missing data.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

PBS = Protective Behavioral Strategies

Table 2
Hierarchical Regression Results for Sexual-Related Alcohol Expectancies

Predictor	Enhancement					Sexual Risk					Disinhibition				
	B	SE	B	β	R ²	B	SE	B	β	R ²	B	SE	B	β	R ²
Step 1															
Gender	-.44	.11		-.18***	.056	.31	.12		.11*	.051	.26	.12		.10*	.133
Relationship Status	-.11	.11		-.05		-.29	.12		-.11*		-.19	.12		-.07	
Drinks per Week	.02	.01		.13**		.01	.01		.04		.03	.01		.17***	
Protective Behavioral Strategies	-.26	.01		-.13**		-.21	.11		-.10*		-.45	.10		-.20***	
Step 2															
Gender × PBS	.31	.19		.10	.017	-.09	.21		-.03	.002	.04	.20		.03	.000
Drinks × PBS	.02	.01		.10*		.01	.01		.05		-.00	.01		-.01	

Note. *n* = 521.

* *p* < .05.

** *p* < .01.

*** *p* < .001.

Drinks = Typical Number of Drinks per Week; PBS = Protective Behavioral Strategies. Reference groups: Gender = male; Relationship = In a relationship.

Table 3
Hierarchical Regression Results for Perceived Sexual Risk and Actual Condom Use

	Perceived Risk					Condom Use				
	Predictor	B	SE	B	R ²	B	SE	B	β	R ²
Step 1	Gender	.04	.08	.02	.050	.73	.45	.08		.042
	Relationship Status	.02	.08	.01		-1.60	.44	-.18***		
	Drinks per Week	.01	.01	.14**		.01	.03	.01		
	Protective Behavioral Strategies	-.18	.07	-.12*		.26	.38	.04		
Step 2	Gender × PBS	.13	.14	.15	.004	-.74	.74	-.07		.002
	Drinks × PBS	.01	.01	.11		.02	.04	.02		

Note. n = 521 (Perceived Risk) and 417 (Condom Use).

*
p< .05.
**
p< .01.

p< .001.

Drinks = Typical Number of Drinks per Week; PBS = Protective Behavioral Strategies. Reference groups: Gender = male; Relationship = In a relationship.

Table 4

ZINB Regression Results

Predictor	Alcohol-related sexual consequences				Drinks during sex				Frequency of alcohol-related sex			
	B	SE	Z	Ratio [95% CI]	B	SE	Z	Ratio [95% CI]	B	SE	Z	Ratio [95% CI]
Counts Portion of the Model												
Gender	.15	.25	0.60	1.16 [0.71,1.92]	.06	.06	0.93	1.06 [0.94,1.19]	-.14	.11	-1.23	0.87 [0.70,1.08]
Relationship Status	-.15	.32	-0.48	0.86 [0.45,1.62]	-.18	.06	-2.94**	0.84 [0.74,0.94]	.39	.11	3.44**	1.48 [1.18,1.85]
Drinks per Week	.03	.01	2.08*	1.03 [1.00,1.05]	.03	.00	9.12***	1.03 [1.02,1.03]	.02	.01	3.32**	1.02 [1.01,1.03]
Protective Behavioral Strategies	-.62	.22	-2.76**	-0.54 [-0.35,0.84]	-.19	.05	-3.63***	0.82 [0.74,0.92]	-.09	.10	-0.95	0.91 [0.76,1.10]
PBS×Gender	.22	.54	0.40	1.24 [0.43,3.55]	-.03	.11	-0.32	0.97 [0.78,1.19]	.29	.18	1.63	1.34 [0.94,1.92]
PBS×Drinks	.04	.02	1.86	1.03 [1.00,1.08]	.02	.00	3.46**	1.02 [1.01,1.02]	.02	.01	2.43*	1.02 [1.00,1.04]
Logistic Portion of the Model												
Gender	.98	.38	2.59*	2.67 [1.27,5.60]	.36	.22	1.62	1.44 [0.93,2.23]	.28	.36	0.79	1.33 [0.66,2.69]
Relationship Status	1.22	.40	3.06**	3.41 [1.56,7.48]	-1.57	.26	-6.08***	0.21 [0.13,0.34]	-1.50	.38	-3.99***	0.22 [0.11,0.47]
Drinks per Week	-.06	.02	-2.94**	0.94 [0.90,0.98]	-.07	.01	-4.61***	0.93 [0.91,0.96]	-.19	.07	-2.52*	0.83 [0.72,0.96]
Protective Behavioral Strategies	-.11	.33	-0.32	0.90 [0.47,1.71]	.03	.20	0.13	1.03 [0.69,1.52]	-.08	.31	-0.26	0.92 [0.51,1.69]
PBS×Gender	-.24	.68	-0.35	0.79 [0.21,3.00]	-.37	.39	-0.93	0.69 [0.32,1.50]	-.27	.56	-0.49	0.76 [0.25,2.29]
PBS×Drinks	.03	.04	0.93	1.03 [0.96,1.11]	-.03	.02	-1.11	0.97 [0.93,1.02]	.01	.06	0.12	1.01 [0.89,1.14]

Note. ns ranged from 517 to 524 due to missing data

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Ratio = zero-inflated odds ratios are presented for the logistic portion of the model and negative binomial incidence rate ratios are presented for the counts portion of the model. Both sets of ratios are exponentiated coefficients from the respective portion of the model. Drinks = Typical Number of Drinks per Week; PBS = Protective Behavioral Strategies. Reference groups: Gender = male; Relationship = In a relationship.