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The Cumulative Effects of Acute Alcohol Consumption, Individual Differences and Situational Perceptions on Sexual Decision Making*

ANTONIA ABBEY, PH.D.†, **CHRISTOPHER SAENZ, M.A.**, and **PHILIP O. BUCK, PH.D., M.P.H.**†

Departments of Community Medicine and Psychology, Wayne State University, 4201 St. Antoine, Detroit, Michigan 48201

Abstract

Objective—Past alcohol administration research has produced mixed findings regarding the role of acute alcohol consumption on sexual decision making. The purpose of this study was to evaluate a more complex theoretical model that places alcohol's acute effects in context, through the inclusion of background measures as well as affective and cognitive responses to the specific situation.

Method—College students (90 men, 90 women) completed a survey that included measures of individual difference characteristics and past experiences; approximately 1 month later, they participated in an alcohol administration study. Participants were randomly assigned to one of three drink conditions (sober, placebo, alcohol), after which they read a story about a couple that wanted to have sex, but had no condoms available.

Results—In hierarchical multiple regression analyses, acute alcohol consumption significantly predicted participants' perceived likelihood that they would have sex without a condom in such a situation; an earlier step included gender, impulsivity, self-reported alcohol expectancies, frequency of heavy drinking, lifetime number of sexual partners and frequency of condom use. There was no significant effect associated with the expectancy that one had consumed alcohol. Neither was there a significant interaction between drink condition and self-reported alcohol expectancies.

Conclusions—Through the inclusion of measures of individual differences and responses to the specific situation, this study provides a more nuanced understanding of the factors that affect college students' sexual decision making, compared with laboratory studies that examine the effects of acute alcohol consumption in isolation. Alcohol consumption explained a significant yet relatively small amount of variance. Researchers need to consider the broader context to understand how intoxication influences sexual decision making.

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†Correspondence may be sent to Antonia Abbey at the Department of Community Medicine, address above, or via aabbey@med.wayne.edu. Philip O. Buck is now with the Department of Psychology, University of Missouri-Columbia, Columbia, MO..

CONCERNS ABOUT escalating rates of HTV/AIDS and other sexually transmitted diseases (STDs) have heightened researchers' interest in identifying factors that influence sexual decision making. Many adolescents and young adults have multiple sexual partners, do not discuss past risk behavior with prospective partners and use condoms inconsistently, thereby placing themselves at heightened risk for contracting HIV and other STDs. Several large national and regional studies have found that approximately 80% of college students have engaged in sexual intercourse, approximately 25% have had six or more sexual partners and less than 25% use condoms consistently with all partners (Douglas et al., 1997; Lewis et al., 1996).

Intoxication was identified early in the AIDS epidemic as a contributor to risky sexual decision making (Leigh and Stall, 1993). Heavy drinking and sexual risk taking frequently co-occur. This is a particularly serious problem on college campuses where, depending on the type of school and location, approximately 20% to 50% of students are likely to be heavy drinkers (Vicary and Karshin, 2002). Of a national sample of college students, 10% reported that during the current academic year there had been at least one occasion when they had not used protection during sexual intercourse after drinking alcohol (Wechsler et al., 2002).

Over the past decade, researchers have moved from simply documenting the general association between alcohol consumption and risky sexual activities to posing more sophisticated research questions and employing methods that better address issues of causality (for reviews of this literature, see Cooper, 2002; George and Stoner, 2000). Conflicting findings have required the development of more sophisticated theories that focus on both the types of individuals and the situations in which alcohol is most likely to influence sexual behavior. Relevant theory and research is briefly reviewed below, followed by a description of the current study.

Pharmacological models

Beginning at moderate doses, alcohol impairs a variety of higher-order cognitive processes, including abstraction, conceptualization, planning and problem solving (Curtin and Fairchild, 2003; Fillmore et al., 2000). Intoxication narrows the perceptual field so that only the most salient cues are noticed and peripheral cues are minimized or ignored (Steele and Josephs, 1990; Taylor and Leonard, 1983). Intoxicated individuals appear to be stimulus bound and focus on immediate superficial cues, rather than covert or distal cues (Taylor and Leonard, 1983). In the area of sexual decision making, it seems reasonable to hypothesize that instigatory cues (e.g., one's own sexual arousal) are usually more salient and compelling than inhibitory cues (e.g., potential disease or norms about casual sex) (Agocha and Cooper, 1999; MacDonald et al., 2000).

Several studies have found pharmacological effects of alcohol that support cognitive impairment theories, although, both across and between studies, results are not fully consistent (Fromme et al., 1999; Monahan et al., 1999). Gordon and colleagues (1997), for example, asked male heterosexual, single participants to role-play their response to a potential partner who did not want to use a condom. Intoxicated men were less skilled in

negotiating condom use than were sober men. In a conceptually similar study with women, however, this effect was not replicated (Maisto et al., 2002). MacDonald and colleagues (1996) asked male college students to watch a video in which an attractive woman was willing to have sex with a man but condoms were not available. They found that intoxicated and sober participants reported being equally sexually aroused and equally certain that having sex in this circumstance would be foolish and irresponsible. Intoxicated men, however, were more likely than sober men to report that they would have sex in this situation. The findings from this study and others (Murphy et al., 1998) suggest that intoxicated participants may be aware of potential risks but not worried about them. These results may be explained by Sayette's (1999) appraisal-disruption model of alcohol's effects. Sayette argues that stressful situations usually create anxiety, which, in turn, inhibits risky behavior. Intoxication “impairs initial appraisal of stressful information by diminishing the power of a stressor to activate associated information stored in memory” (p. 269). Thus, alcohol's effects on higher-order cognitive processing may diminish anxiety about having unprotected sex.

Alcohol expectancy models

In American society, alcohol and sex are frequently linked, and commonly held beliefs about alcohol include that it increases sexual arousal, makes it easier to act on sexual feelings and enhances the quality of sexual experiences (Abbey et al., 1999; Dermen and Cooper, 1994). Although data have not been completely consistent, there is a long history of studies demonstrating expectancy effects with sexual outcome measures (for a review, see George and Stoner, 2000). In studies focused on risky sexual behavior as the outcome measure, one experiment reported evidence for placebo effects (Monahan et al., 1999; Murphy et al., 1998), whereas several others did not (e.g., Fromme et al., 1999; Gordon et al., 1997; MacDonald et al., 1996, 2000).

Some authors have argued that it is important to measure participants’ pre-existing alcohol expectancies, rather than assuming that all participants equally share common societal beliefs about alcohol's effects. Among participants who believe they have consumed alcohol, only those who strongly believe that alcohol affects a specific domain of behavior should show the predicted effects. In support of this hypothesis, George and colleagues (2000) conducted a laboratory study with college men in which no one drank alcohol, but some participants believed that they did. They found that individuals who thought they had consumed alcohol and who strongly believed that alcohol enhanced sexual behavior spent more time viewing erotica than did those with weak alcohol expectancies. In a survey of college students, Corbin and Fromme (2002) found that, for those participants who had strong sexual alcohol expectancies, alcohol consumption was negatively associated with condom use the first time they had intercourse with a regular partner. The same effect was not found for most recent intercourse with a regular partner, suggesting that alcohol consumption and alcohol expectancies play a larger role early in a sexual relationship.

Individual difference measures and situational influences

Alcohol's relationship to risky sexual decision making may be at least partially due to personality characteristics that contribute to both drinking and sexual risk taking (Santelli et al., 2001). Sensation seeking and impulsivity, for example, are positively correlated with both heavy alcohol consumption and sexual risk taking, and some survey researchers have found that such traits underlie the relationship between alcohol consumption and risky sexual behavior (e.g., Justus et al., 2000). In contrast, in a survey of adolescents' sexual risk taking, Cooper and colleagues (1994) found that alcohol consumption prior to sexual intercourse was negatively associated with condom use, even after controlling for adventure seeking and religiosity.

Affective and cognitive responses to the immediate situation are also likely to influence sexual decision making. Past theory and empirical research on alcohol consumption and risky sexual behavior have suggested a number of situational influences, including failure to recall potential negative consequences and a lack of concern or affect associated with negative consequences (Fromme et al., 1999; MacDonald et al., 1996; Monahan et al., 1999; Sayette, 1999). When faced with this type of decision, college students are strongly influenced by their perception of a potential sex partner's trustworthiness (Hammer et al., 1996); thus, this might be a particularly salient cue when drinking. The importance of sexual arousal as an instigatory cue has also been demonstrated in several alcohol administration studies (Abbey et al., 2003; George and Stoner, 2000; MacDonald et al., 2000).

Overview of study and hypotheses

The goal of this study was to simultaneously examine the effects of acute alcohol consumption, individual difference variables and situational influences on college students' sexual decision making. Students read a story about a sexual situation in which a young man and woman spent time together at a party, went back to the man's house and wanted to have intercourse although no condom was available. We hypothesized that there would be main effects of acute alcohol consumption such that participants who drank alcohol would be more likely than those who did not to report that they would have sex without a condom if they were in that situation. We also hypothesized that there would be an interaction between self-reported alcohol expectancies and expectancy set such that participants who thought they drank alcohol (whether they did or not), and who strongly believed that alcohol increased sexual risk taking, would be more likely than other participants to indicate that they would have sex in this situation.

One month prior to the laboratory session, participants completed a survey that included several individual difference measures: self-reported alcohol expectancies, impulsivity, frequency of heavy drinking, frequency of condom use and number of sexual partners. Each of these variables was expected to be significantly related to the decision to have unprotected sex if one was in the situation described in the story. Acute alcohol consumption in the session was hypothesized to have significant effects even when these measures were previously included in hierarchical multiple regression analyses. In addition, participants' cognitive and affective responses to this specific sexual situation were assessed. These

responses were also expected to be significantly related to the decision to have unprotected sex if in this situation, over and above the previously entered variables.

This study extends past research in several ways. Most laboratory studies that have examined the acute effects of alcohol consumption have not simultaneously considered the effects of personality traits and past experience along with responses to the specific situation. By including such background measures as impulsivity, frequency of heavy drinking and frequency of condom use, as well as situational variables (e.g., sexual arousal and concern about negative consequences), more complex models can be examined regarding the interplay between acute alcohol consumption and other factors. Furthermore, most alcohol administration studies that have examined sexual decision making (for an exception, see Fromme et al., 1999) have included participants of only one gender (Gordon et al., 1997; MacDonald et al., 1996; Maisto et al., 2002; Monahan et al., 1999; Murphy et al., 1998). There are many reasons to expect gender differences in response to risky sexual situations. Women are more concerned than men about such consequences of unprotected sex as pregnancy, STDs and HIV/AIDS (Amaro, 1995). Men are more interested in pursuing casual sexual relationships than are women, and men report having more sex partners and more one-night stands than women do (Oliver and Hyde, 1993). The sexual double standard has not been eliminated, and for women there are still more social costs associated with casual sexual relationships than for men (Crawford and Popp, 2003). This line of research suggests an interaction between gender and drink condition; the negative consequences associated with unprotected sex were expected to be more salient for sober women than for sober men. For both men and women, intoxicated individuals were expected to focus less on inhibitory cues than sober individuals; however, drink condition was expected to have the largest impact on women's willingness to have unprotected sex.

Method

Participants

An equal number of male and female college students (N = 180) at a large urban university participated in the study. They were recruited from lists provided by the registrar's office and through flyers posted on campus. Most (65%) of the participants were white, 18% were African American, 8% were Asian or Pacific Islander, 4% were Arabic or Middle Eastern, 1% were Hispanic and the remainder (4%) were of another ethnic background. Participants were required to be at least 21 years of age (mean [SD] = 24.0 [3.0]). On average, participants reported having consumed 32.8 (40.0) drinks in the past 30 days.

Procedure

Information was collected from participants at three different points: (1) a telephone screening to determine that they met the criteria for the study, (2) a mail survey that included various background measures and (3) an alcohol administration session during which participants reacted to a hypothetical risky sexual situation.

Telephone screening—Potential participants were contacted by telephone and asked if they were interested in completing a survey on health topics. They were told that individuals

who chose to return the survey would be paid $25 and would be eligible for future Community Medicine studies. Participants were then asked several questions to evaluate their eligibility for an alcohol administration study: they were required to be at least 21 years of age, to have consumed at least one alcoholic drink in the past 30 days, to have consumed at least four drinks on one occasion in the past 12 months, to have no history of alcohol or drug misuse and to have no health problems or medication use that contraindicated alcohol consumption (National Institute on Alcohol Abuse and Alcoholism, 1989). Due to the study's focus on a young, heterosexual college couple's sexual risk taking, participants were also required to be between the ages of 21 and 35, single and heterosexually active.

Survey administration—Individuals who met the above criteria and were interested in completing the survey were mailed an information sheet describing the study, a self-administered questionnaire, a payment sheet and two stamped envelopes. Questionnaires and payment sheets were mailed back separately in different envelopes. Questionnaires used an identification number; no names or other identifying information were included. Upon return of a payment sheet and verification that an envelope containing a questionnaire had also been returned, participants were mailed a $25 money order.

Alcohol administration session—Approximately 1 month after returning the survey, students were telephoned and asked to participate in a study of alcohol's effects on social perceptions. They were asked to abstain from alcohol for 24 hours and from food for 4 hours prior to their scheduled session. Upon arrival at the laboratory, participants were seated in a private room and given a breath analysis test (Alco-Sensor IV, Intoximeters, Inc., St. Louis, MO) to confirm that their blood alcohol concentration (BAC) was zero. In addition to reviewing the informed consent form, the experimenter verified health screening information, women were asked to take a urine pregnancy test. Participant were randomly assigned to one of three drink conditions: sober, placebo or alcohol. Using a double-blind placebo procedure (Rohsenow and Marlatt, 1981), a bartender poured drinks from apparently unopened bottles in front of participants to enhance the credibility of the deception. Participants in the alcohol condition were given a dose of 80-proof Absolut vodka (2.00 g/kg body weight for men and 1.85 g/kg for women) calculated to induce a peak BAC of 0.080% (equal to approximately four standard drinks). This BAC was chosen because past research suggests that it is sufficient to impair a number of cognitive functions (Peterson et al., 1990). An antiplacebo condition, in which participants are told they did not drink alcohol when they actually did drink alcohol, was not included because it typically fails at BACs higher than about 0.040% or 0.050% (Hull and Bond, 1986; Martin and Sayette, 1993). The vodka was mixed in a 3:1 ratio with lime-flavored Canada Dry tonic water and poured evenly into three cups. Participants in the sober and placebo conditions were given an amount of tonic calculated to equal the total fluid content in the alcohol formula above. Sober participants' drinks were poured only from a tonic bottle. For placebo participants, however, flattened tonic was poured from a vodka bottle. Participants' drinks were then given a squirt of liquid from a lime-juice container. In the sober and intoxicated conditions, this container held lime juice. In the placebo condition, this container was filled with vodka. A squirt of vodka gives placebo drinks the taste and smell of alcohol but does

not provide enough alcohol to affect participants' BACs (Sayette et al., 1992). Participants were given 5 minutes to consume each beverage, followed by a 5-minute absorption period.

After the absorption period, participants were given a breath analysis test. Placebo and alcohol condition participants were told that they had a BAC of 0.079%; participants in the sober condition were told they had a zero BAC reading. Participants then read the stimulus story and completed the questionnaire on the computer. When finished, they were given another BAC test. In the placebo and alcohol conditions, participants were told that they had a BAC of 0.081%; participants in the sober condition were told they had a zero BAC. This BAC feedback was intended to reinforce drink condition instructions and to enhance the perception that intoxication levels were stable. Participants completed several other tasks (not relevant to this study) and then answered feedback questions to determine if they had suspicions or concerns about any aspect of the study. Participants were fully debriefed. Students who received alcohol remained at the laboratory until they were at a BAC of 0.030% and a responsible party drove them home, or until they were at a BAC of 0.005% and were released. Participants were paid $12 an hour.

Stimulus materials—Participants were instructed to read the story carefully and to imagine that the situation was really happening to them. The 1,330-word vignette was phrased in the second person and was gender specific (e.g., "you and Andrea," "you and Jeff"). The story was as follows: Two college students have been in several classes together and know many of the same people. They plan to meet each other at a party after finishing finals. At the party, they spend most of their time together drinking and dancing; Jeff has four drinks, and Andrea has three. They decide to go to Jeff's apartment. After watching TV and talking, they begin kissing, progress to touching and stroking and eventually want to have sex but realize that there is no condom available. Andrea mentions that she is on the pill, so the focus is on STD/HIV risk rather than pregnancy prevention. The story was developed initially through focus groups with male and female students to ensure that it was perceived as the type of situation in which most students could imagine finding themselves and that the characters seemed like typical college students. It was then pilot tested, revised and pilot tested again to verify that college students thought it was realistic, interesting and moderately sexually arousing. A separate pilot test was conducted with a preliminary version of the vignette to ensure that intoxicated participants could follow the story. Both intoxicated and sober students scored higher than 85% on a multiple-choice test that assessed their knowledge of the information in the vignette.

Measures

Data analyses included measures from the self-administered mail survey (impulsivity, heavy drinking, alcohol expectancies, number of sexual partners and condom use) and the questionnaire completed during the alcohol administration session.

Impulsivity—Eysenck and Eysenck's (1977) 13-item measure of impulsivity was used. Sample questions include, "How often do you do things on the spur of the moment?" and "How often do you speak before thinking things out?" Responses were made on 5-point

scales, with options ranging from “never” (1) to “very often” (5). Cronbach's coefficient alpha was 0.75.

Heavy drinking—Frequency of heavy drinking was assessed by asking participants how often they consumed five or more drinks on an occasion (Hilton, 1988). Responses were made on a 5-point scale, with response options ranging from “never” (1) to “nearly every time” (5).

Alcohol expectancies—Dermen and Cooper's (1994) sexual risk and sexual disinhibition alcohol expectancy measures were used. A sample sexual-risk item is, “After a few drinks of alcohol, I am less likely to take precautions before having sex,” and a sample sexual-disinhibition item is, “After a few drinks of alcohol, I am more likely to have sex on a first date.” The two 4-item scales were strongly correlated ($r = 0.69$, $p < .001$) and thus were combined into a single measure. Responses were made on 5-point scales, with options ranging from “not at all” (1) to “very much” (5). Cronbach's coefficient alpha was 0.90.

Number of sexual partners—Participants were asked how many consensual sexual partners of the opposite gender they had in their lifetime.

Condom use—Frequency of condom use was measured with three items that assessed how often participants used condoms with new or casual partners, with regular or primary partners and overall. Responses were made on 7-point scales, with options ranging from “never” (1) to “always” (7). Cronbach's coefficient alpha was 0.78.

Responses to the vignette—After reading the story, participants were asked how sexually arousing it was and how much they trusted their partner. Participants were asked to list the number of possible negative consequences associated with having sexual intercourse without a condom in this situation. This was divided by the total number of consequences mentioned to assess the proportion of negative consequences. Participants were asked how much they were worried about any of these negative consequences, how irresponsible it would be to have sex without a condom in this situation (MacDonald et al., 1996) and how mad they would be at themselves later if they had sex without a condom. All responses (except the listing of negative consequences) were made on 7-point scales, with options ranging from “not at all” (1) to “very much” (7).

Dependent measure—Participants were asked how likely it was that they would have sex without a condom if they were in this situation. Responses were made on a 7-point scale, with options ranging from “not at all” (1) to “very much” (7).

Statistical analysis plan

Hierarchical multiple regression analysis was used because it allows for the simultaneous inclusion of multiple predictor variables, as well as assessment of incremental changes in the explained variance of the dependent measure: participants’ perceived likelihood of having sex without a condom. Based on our conceptual model, the first step included gender and the personality, attitude and experiential measures that were assessed prior to the laboratory session. The second step included two orthogonal drink contrasts (Pedhazur, 1997): a

receive-alcohol contrast and an expect-alcohol contrast. The receive-alcohol contrast tested the pharmacological effects of alcohol by comparing the alcohol condition with the sober and placebo conditions, whereas the expect-alcohol contrast tested the expectancy effects of alcohol by comparing the placebo condition with the sober condition. Thus, the effects of acute alcohol consumption were evaluated after taking into account the effects of the background measures, including frequency of heavy drinking and condom use. The third step included participants' affective and cognitive responses to the story, which temporally followed the experimental manipulation. The fourth step included two-way interaction effects: self-reported alcohol expectancy by drink condition interactions and gender by drink condition interactions.

Results

BACs and manipulation checks

Participants who consumed alcohol had a mean (SD) BAC of 0.069% (0.018) just before they began reading the stimulus materials and a mean (SD) BAC of 0.071% (0.016) just after they completed the questionnaire. There were no gender differences in BACs (F = 0.70 for men, 0.84 for women, 1/58 df, p's = NS).

On 7-point scales, participants rated the situation described in the vignette as very realistic (mean [SD] = 6.15 [1.03]) and interesting (5.52 [1.43]), confirming that they found the situation personally relevant. After completing the study materials, participants were asked several questions to confirm that placebo participants believed they drank alcohol. There was a main effect of drink condition on participants' estimates of their highest BAC (F = 3,672.95, 2/177 df; $p < .001$). Follow-up Tukey tests indicated that BAC estimates were comparable for alcohol (mean [SD] = 0.082 [0.006]) and placebo (mean [SD] = 0.082 [0.008]) participants and that both of these groups' ratings were significantly different from those made by sober participants (mean [SD] = 0.000 [0.000]; $p < .001$). There was also a main effect of drink condition on participants' perceptions of how intoxicated they felt they were when they completed the questionnaire (F = 233.79, 2/177 df; $p < .001$). Using a response scale with options that ranged from "not at all intoxicated" (1) to "extremely intoxicated" (5), alcohol participants reported feeling more intoxicated (mean [SD] = 3.83 [0.76]) than did placebo (mean [SD] = 2.45 [0.98]) or sober (mean [SD] = 1.00 [0.00]) participants. The scores of placebo and sober participants were also significantly different from each other (all p's < .05). This pattern of results is consistent with what has been reported in other alcohol administration studies (e.g., Gordon et al., 1997; Maisto et al., 2002).

Preliminary data analyses

Participants did not differ across drink conditions on any of the background survey variables, indicating that randomization was successful. Table 1 presents the correlations between the measures included in the hierarchical regression analysis. As can be seen in the table, all of the predictor variables, except partner trust, were significantly correlated with participants' perceived likelihood of having sex without a condom in this situation. From the background survey, impulsivity, frequency of heavy drinking, alcohol expectancies

regarding sexual risk taking and lifetime number of consensual sexual partners were positively correlated with the likelihood of having sex without a condom in the situation depicted in the vignette. Participants' frequency of condom use with their own sexual partners was negatively correlated with the perceived likelihood of having sex without a condom in this situation. Participants' sexual arousal in response to the story was positively correlated with the likelihood of having sex without a condom. Self-generated number of negative consequences associated with having unprotected sex, being worried about these negative consequences, feeling that having sex under these circumstances would be irresponsible and being mad at oneself later for having sex were all negatively correlated with the perceived likelihood of having sex without a condom.

As can be seen in Table 2, there were significant mean differences in women's and men's responses to many of the study's measures. Men reported more frequently engaging in heavy drinking and had stronger sexual alcohol expectancies than did women. In their responses to the vignette, women, compared with men, generated more negative consequences associated with having sex without a condom in this situation, worried more about these negative consequences, thought having sex without a condom would be more irresponsible, would be more mad at themselves if they had sex without a condom and were less likely to think they would have sex without a condom.

Hierarchical multiple regression analysis

Table 3 presents the results of the hierarchical multiple regression analysis. On the first step, participants' perceived likelihood of having sex without a condom was significantly positively related to being male, sexual alcohol expectancies and number of sexual partners; it was significantly negatively related to frequency of condom use ($F = 10.78$, 6/173 df; $p < .001$). In combination, these measures explained 27% of the variance in perceived likehood of having sex without a condom. On the second step, being intoxicated when responding to the stimulus materials (receive alcohol contrast) was significantly positively related to the perceived likelihood of having sex without a condom, explaining an additional 2% of the variance after inclusion of the background measures ($F = 8.66$, 8/171 df; $p < .001$). On the third step, participants' perceived likelihood of having sex without a condom was significantly positively related to their sexual arousal; it was significantly negatively related to the number of self-generated negative consequences associated with having sex in this situation, being worried about these negative consequences and being mad at oneself about having sex in this situation ($F = 12.75$, 14/165 df; $p < .001$). These affective and cognitive responses to the situation explained an additional 23% of the variance, for a total of 52% of the variance accounted for by this set of predictor variables. On the fourth step, none of the two-way interactions was significant.

Discussion

The initial hypotheses were partially suppotted. Participants who consumed alcohol during the study were more likely than other participants to report that they would have unprotected sex with a partner of unknown risk status. In bivariate analyses, all of the background variables were significantly related to participants' likelihood of having sex in this situation.

When simultaneously considered, however, impulsivity and frequency of heavy drinking were no longer significant. This left gender, self-reported alcohol expectancies, number of sexual partners and frequency of condom use as significant predictors of likelihood of having sex without a condom. Although both gender and alcohol consumption had main effects as anticipated, the hypothesized interaction between them was not found. Both female and male drinkers were more likely to report that they would have sex without a condom than were female and male sober and placebo participants. Although rates of heavy drinking are higher in college men than women, they are nonetheless alarmingly high for both genders (O'Malley and Johnston, 2002). Both women and men need to be included in alcohol administration studies so the knowledge gained can inform the development of prevention and treatment programs that will be relevant and effective for both genders.

Also as hypothesized, participants' perceptions that they would be likely to have sex without a condom if they were in this situation related systematically to other judgments that participants made about the situation. The more sexual arousal that participants experienced, the more likely they were to report they would have sex without a condom. The more negative consequences they could imagine associated with having sex without a condom, the more worried they were about these negative consequences; the more angry they would be with themselves for having sex without a condom, the less likely participants were to report they would have sex without a condom. As found in other studies (MacDonald et al., 1996; Murphy et al., 1998), however, these affective and cognitive responses were not significantly affected by acute alcohol consumption. Intoxicated participants were as likely as sober participants to generate negative consequences and worry about these negative consequences. Nonetheless, they were more willing to have sex without protection. Despite the appeal of theories that attribute alcohol's effects on risky sexual decisions to impaired executive cognitive functioning, the precise cognitive processes through which alcohol consumption contributes to risky decision making have not been adequately identified. Neuropsychological measures need to be included in more alcohol administration studies to pinpoint these cognitive mechanisms (cf., Bartholow et al., 2003).

There was no evidence for a main effect of the expect-alcohol contrast or an interaction of drink condition with self-reported sexual expectancies. As noted in the introduction, only one risky sexual decision-making experiment has found placebo effects (Monahan et al., 1999; Murphy et al., 1998), whereas many others have not (e.g., Fromme et al., 1999; Gordon et al., 1997; MacDonald et al., 1996, 2000). In contrast, self-reported alcohol expectancies had main effects on participants' judgments. Similar alcohol expectancy main effects have been reported in alcohol administration studies (e.g., Gordon et al., 1997) and survey research (e.g., Dermen and Cooper, 2000). The alcohol expectancy questions clearly ask about effects experienced when drinking alcohol; however, they may also be tapping general risk-taking propensities that are distinct from those assessed by the measure of impulsivity that was used. Impulsivity questions (Eysneck and Eysneck, 1977) were phrased in general terms, whereas the measure of alcohol expectancies focused specifically on sexual situations. A domain-specific impulsivity measure that focused on individuals' tendency to make impulsive sexual decisions would presumably be a stronger predictor of sexual risk taking than the general impulsivity measure used in this study. In addition, because the vignette used in this study depicted alcohol consumption by both characters, pre-existing

alcohol expectancies may have been activated for all participants, not just for those who thought they consumed alcohol.

As with all laboratory research in this domain, the ability to generalize the findings is limited by the use of a proxy measure of risky sexual behavior, although the significant correlation between participants' past condom use and hypothetical willingness to have sex without a condom suggests that this measure tapped actual behavior. Furthermore, instigating cues for engaging in risky sex may have been less salient in this research paradigm, compared with a real-world sexual encounter. Although participants thought the materials were very realistic and moderately sexually arousing, it would be valuable to replicate these findings with research paradigms that increase the realism of the experimental procedures and the salience of the instigating cues. The great strength of all experimental research is that it establishes causality. Like most recent alcohol administration studies, a target BAC of 0.080% was used to ensure that participants were intoxicated at a level that produces significant impairment. The trade-off was that this BAC is too high to allow inclusion of an antiplacebo condition, in which participants are given alcohol without their knowledge. This study included a large, ethnically diverse sample of college students who consumed alcohol on a regular basis and were sexually active; thus, they represent a population that needs to be targeted in risk-reduction interventions on college campuses.

In conclusion, by including information about participants' attitudes and past experiences, as well as affective and cognitive responses to the situation, this study provides a more nuanced understanding of the factors that affect college students' sexual decision making than do laboratory studies that examine the effects of acute alcohol consumption in isolation. Although acute alcohol consumption had a significant effect on risky sexual decision making, it explained a relatively small amount of variance. For alcohol research findings to provide valuable information to be integrated into prevention and treatment programs, the full range of individual, social and situational factors that influence intoxicated decision making needs to be evaluated. In the focus groups that were conducted in preparation for this study, for example, participants shared numerous stories about unprotected casual sex when intoxicated and "caught up in the moment." Particularly disturbing from a prevention perspective was participants' sense of the inevitability of these drunken unprotected sexual encounters and their seeming inability to learn from these experiences (i.e., either to drink less or to always carry a condom). People may protect their self-esteem by telling themselves that an unprotected casual sexual encounter occurred by chance and that it will not happen again. A continuing challenge for prevention and treatment programs is to make people come to terms with the cumulative risk associated with these actions.

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Table 1

Correlation matrix (N = 180)

	1	2	3	4	5	6	7	8	9	10	11	12
1. Impulsivity	–	–	–	–	–	–	–	–	–	–	–	–
2. Heavy drinking	.24†	–	–	–	–	–	–	–	–	–	–	–
3. Alcohol expectancies	.25†	.38†	–	–	–	–	–	–	–	–	–	–
4. Number sex partners	.04	.05	.22†	–	–	–	–	–	–	–	–	–
5. Condom use	−.18*	−.06	−.19*	−.08	–	–	–	–	–	–	–	–
6. Sexual arousal	−.08	.04	.11	.04	−.13	–	–	–	–	–	–	–
7. Partner trust	−.02	−.03	−.07	−.02	−.11	−.01	–	–	–	–	–	–
8. Negative consequences	−.10	−.09	−.20†	.10	.16*	−.11	−.23†	–	–	–	–	–
9. Worried neg. conseq.	−.09	−.09	−.10	−.22†	.09	.01	−.10	.18*	–	–	–	–
10. Irresponsible sex	−.05	−.17*	−.21†	−.05	.02	−.02	−.16*	.32†	.40†	–	–	–
11. Mad at self	.01	−.16*	−.12	−.13	.11	−.07	−.07	.24†	.48†	.53†	–	–
12. Have unprotected sex	.20†	.26†	.39†	.26†	−.27†	.19*	.13	−.37†	−.47†	−.45†	−.49†	–

Note: Worried neg. conseq. = worried about negative consequences.

*$p < .05$

†$p < .01$.

Table 2

Gender differences (N = 180)

Variable	Men Mean (*SD*)	Women Mean (*SD*)	*t* (178 df)
Impulsivity[a]	2.80 (0.41)	2.85 (0.45)	0.77
Heavy drinking[a]	2.89 (1.21)	2.36 (1.07)	3.12†
Alcohol expectancies[a]	2.63 (0.90)	2.05 (0.80)	4.58†
Number sex partners	11.51 (14.06)	9.20 (9.42)	1.30
Condom use[b]	5.14 (1.53)	4.90 (1.54)	1.06
Sexual arousal[b]	4.00 (1.54)	4.07 (1.69)	0.28
Partner trust[b]	5.06 (1.30)	4.70 (1.44)	1.74
Negative consequences[c]	0.58 (0.22)	0.65 (0.22)	2.18*
Worried neg. conseq.[b]	4.97 (1.48)	5.49 (1.64)	2.24*
Irresponsible sex[b]	5.22 (1.65)	6.31 (1.30)	4.93†
Mad at self[b]	3.59 (1.87)	5.10 (1.92)	5.35†
Have unprotected sex[b]	4.60 (1.95)	3.52 (1.94)	3.71†

Notes: Worried neg. conseq. = worried about negative consequences.

[a] Range = 1-5.

[b] Range = 1-7.

[c] Proportion of negative consequences out of total number of consequences mentioned.

* p <.05

† p < .0l.

Table 3

Hierarchical multiple regression analysis predicting likelihood of having sex without a condom (N = 180)

Variable	B (SE)	β	R^2 change
Step 1			.27
Gender	0.77 (0.29)	0.19†	
Impulsivity	0.44 (0.32)	0.10	
Heavy drinking	0.18 (0.12)	0.10	
Alcohol expectancies	0.41 (0.17)	0.18†	
Number sex partners	0.03 (0.01)	0.18†	
Condom use	−0.28 (0.09)	−0.22†	
Step 2			.02
Receive alcohol contrast	0.37 (0.19)	0.13*	
Expect alcohol contrast	0.01 (0.16)	0.00	
Step 3			.23
Sexual arousal	0.15 (0.07)	0.12*	
Partner trust	0.05 (0.08)	0.04	
Negative consequences	−1.41 (0.55)	−0.15*	
Worried neg. conseq.	−0.28 (0.08)	−0.22†	
Irresponsible sex	−0.16 (0.09)	−0.13	
Mad at self	−0.19 (0.07)	−0.20†	
Step 4			.01
Expectancies × Receive Alcohol	−0.05 (0.22)	−0.01	
Expectancies × Expect Alcohol	0.29 (0.20)	0.11	
Gender × Receive Alcohol	−0.21 (0.29)	−0.06	
Gender × Expect Alcohol	−0.01 (0.30)	0.00	

Notes: Worried neg. conseq. = worried about negative consequences. For gender, positive beta weights are associated with being male. For the receive alcohol contrast, positive beta weights arc associated with being in the alcohol condition; for the expect alcohol contrast, positive beta weights are associated with being in the placebo condition.

*$p < .05$

†$p < .01$.