Effects of Alcohol and Blood Alcohol Concentration Limb on Sexual Risk-Taking Intentions*

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ABSTRACT. Objective: Although there have been numerous investigations of alcohol's relationship to sexual risk taking, the vast majority of these studies have not examined whether the biphasic nature of alcohol intoxication differentially influences risky sexual decisions. Thus, a laboratory study was conducted to investigate the effects of alcohol consumption and blood alcohol concentration (BAC) limb on sexual risk-taking intentions. **Method:** Participants ($N = 150$; 51.3% male) were randomly assigned to consume alcoholic drinks (target peak BAC = .08%) or nonalcoholic drinks and then completed a hypothetical sexual risk assessment involving an opposite-gender new partner while on either the ascending BAC limb or descending BAC limb. **Results:** Alcohol intoxication resulted in increased sexual risk-taking intentions

indirectly through its influence on perceived intoxication and, subsequently, sexual arousal. An interaction of beverage condition and BAC limb condition indicated that alcohol's effects on perceived intoxication varied significantly by limb, with those on the ascending limb reporting greater perceived intoxication than those on the descending limb. **Conclusions:** Findings suggest that future research and prevention efforts would be better informed through a more comprehensive consideration of BAC limb effects on sexual risk behaviors. Moreover, results indicate that prevention programs should address in-the-moment states, such as perceived intoxication and sexual arousal, in interventions targeting risky sexual decision-making processes. (*J. Stud. Alcohol Drugs* 70: 499-507, 2009)

IN THE UNITED STATES, approximately 19 million new sexually transmitted infections occur each year (Centers for Disease Control and Prevention, 2006). Unprotected heterosexual contact is increasingly a source of HIV transmission: The proportion of U.S. AIDS cases attributed to heterosexual contact increased from 3% in 1985 to 32% in 2005 (Centers for Disease Control and Prevention, 2007). Although the risk of heterosexual transmission of HIV and other sexually transmitted infections can be greatly reduced through the consistent, correct use of male latex condoms (National Institute of Allergy and Infectious Diseases, 2009), consistent condom use during sexual activity may be hampered by a number of factors, including alcohol intoxication (e.g., Abbey et al., 2005). To address this serious public health concern, research regarding the role of alcohol in decisions to engage in unprotected sex is highly warranted.

It is likely that many risky sexual decisions are made after individuals have stopped consuming alcohol and their blood alcohol concentrations (BACs) have started to descend;

therefore, it is important to elucidate the influence of BAC limb on sexual decision making. However, to date, only one published study has examined the biphasic effects of alcohol (i.e., ascending versus descending response differences occurring at equivalent BAC levels) on sexual risk-taking intentions. To address this knowledge gap, the present study investigated the influence of alcohol intoxication on men's and women's sexual risk-taking intentions on both the ascending and descending BAC limbs. Moreover, because extant research indicates that perceived intoxication and sexual arousal are not only subject to the biphasic effects of alcohol but are also related to sexual risk-taking intentions, we investigated the role of these two in-the-moment states in alcohol's limb-specific effects on unprotected sex intentions.

Alcohol's effects on sexual risk taking

Cross-sectional survey research indicates that alcohol consumption is often linked to riskier sexual behaviors, including sex with multiple partners, sex with casual partners, unprotected sexual intercourse, and intentions to engage in unprotected sexual intercourse (for a review, see Cooper, 2002). Despite the relative infrequency of laboratory experiments investigating alcohol and sexual risk behavior (Hendershot and George, 2007), those that have been published have established that alcohol intoxication can play a causal role in increasing sexual risk-taking intentions.

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In a series of three experiments regarding risky sexual intent, MacDonald et al. (1996) investigated the effects of acute intoxication on intentions to have unprotected intercourse with a casual partner using a video analogue. Results indicated that intoxicated participants exhibited stronger intentions to have unprotected intercourse than did sober controls. Maisto and colleagues (2002, 2004a,b) similarly found that acute alcohol intoxication increased men's and women's risky sex intentions during role playing of risky sexual situations. Using a written hypothetical risky sexual scenario, Abbey et al. (2005) reported that alcohol consumption significantly increased participants' intentions of engaging in unprotected sex in such a situation. In sum, extant experimental research using a variety of stimulus material has provided consistent evidence that alcohol consumption increases heterosexual risk-taking intentions.

One of the strengths of experimental methods is the capacity to capture in-the-moment mechanisms that may play a crucial role in the moments preceding a risky sexual decision (George et al., 2009). In particular, alcohol administration experiments have provided evidence that perceptions of two acute states—level of intoxication and level of sexual arousal—play an important role in alcohol's effects on risky sexual intentions. Maisto et al. (2002) found that women who reported a greater perceived level of intoxication also exhibited poorer condom negotiation skills in a role-playing scenario. This finding was replicated in a subsequent experiment (Maisto et al., 2004a). In a similar study with men, alcohol consumption itself, rather than perceived intoxication, was predictive of men's condom negotiation skill level (Maisto et al., 2004b). Maisto et al. (2004a) concluded that at least for women, perceived intoxication plays an important role in behavioral skills related to sexual risk taking. Because perceived intoxication appears relevant to women's sexual risk (and perhaps less so for men), the present study investigates the role of perceived intoxication in men's and women's sexual risk-taking intentions.

Although sexual arousal logically represents an important motivational state involved in sexual risk behavior, its role in alcohol-related sexual risk taking has only recently been examined. Three separate studies have investigated the joint influence of being both sexually aroused and intoxicated (Abbey et al., 2005; George et al., 2009; MacDonald et al., 2000). Abbey et al. (2005) found that men's and women's perceived sexual arousal predicted their risky sex intentions over and above alcohol's effects. MacDonald et al. (2000) found that alcohol consumption increased sexual risk-taking intentions only for men who reported higher levels of sexual arousal. In a three-study investigation, George et al. (2009) found that, for both men and women, alcohol intoxication did not directly increase sexual risk-taking intentions; rather, alcohol consumption resulted in increased perceptions of sexual arousal, which in turn increased sexual risk-taking intentions. Based on these findings, we investigated the

role of perceived sexual arousal as an indirect pathway through which alcohol might influence sexual risk-taking intentions.

Biphasic alcohol effects

Insufficient attention has been paid to biphasic alcohol effects on sexual risk-related behavior. Biphasic effects have been demonstrated in numerous nonsexual domains (Newlin and Thomson, 1990), including cognitive functioning (Jones and Vega, 1972; Pihl et al., 2003), motor functioning (Savoie et al., 1988), and mood (Martin et al., 1993). Generally, ascending effects are characterized by heightened cognitive and motor impairment, euphoric mood, and stimulation; descending effects are characterized by reduced cognitive and motor impairment, dysphoric mood, and fatigue.

Prior research examining biphasic alcohol effects indicates that individuals' subjective perceptions of intoxication vary by BAC limb. Martin and Earleywine (1990) found that on the ascending limb, individuals' perceptions of peak intoxication occurred sooner than did actual peak BACs when the alcohol was consumed in a short timeframe (10 minutes). Additionally, they reported that, on the descending limb, perceived intoxication ratings declined more quickly than did actual BACs. These findings imply that even with similar BAC levels, ratings of intoxication may vary dramatically depending on whether one's BAC is rising or falling. For example, an individual who reports a certain level of intoxication at .06% on the ascending limb would report feeling less intoxicated at .06% on the descending limb (George and Stoner, 2000). Because subjective intoxication has been demonstrated to positively influence one's subjective level of sexual arousal (Wilson and Lawson, 1978), it is also important to examine possible indirect limb effects on sexual arousal through perceived intoxication.

The vast majority of laboratory studies regarding alcohol and sexual risk, including those reviewed previously, have focused on the ascending limb of the BAC curve or have not specified BAC limb at all. Because it is likely that many risky sexual decisions are made after individuals have stopped consuming alcohol and their BACs have started descending, research regarding the influence of BAC limb on sexual decision making is imperative.

One recent study examined differential limb effects on heterosexual male social drinkers' perceptions of potential sexual partners and sexual behavior intentions (Kruse and Fromme, 2005). In this study, alcohol intoxication did not directly influence partner perceptions or sexual behavior intentions on either BAC limb. Rather, alcohol moderated the relationship between risk perceptions and sexual intentions differentially by limb. Compared with sober men, intoxicated men on the ascending limb relied more heavily on their perceptions of their partner's risk when estimating their likelihood of having sex, discussing risks, and using a condom.

Intoxicated men on the descending limb were less likely than sober men to allow their partner's perceived risk to influence their intentions to have sex. Although possible mechanisms underlying these results were not examined, these findings nonetheless underscore the importance of testing for biphasic alcohol effects on risky sexual perceptions and intentions. Thus, the present study examines the influence of biphasic limb effects on sexual risk-taking intentions and extends previous research by investigating whether biphasic alcohol effects on sexual risk-taking intentions apply to women as well as men.

Study overview and hypotheses

The present study used experimental methods to examine the biphasic influence of alcohol intoxication on men's and women's reported likelihood of engaging in heterosexual risk-taking behavior. Our hypothesized model is presented in Figure 1. Consistent with the majority of extant research, we hypothesized that intoxicated participants would endorse greater unprotected sexual intentions than sober participants. We also hypothesized that intoxicated participants, particularly those on the ascending limb, would report greater perceived intoxication, which in turn would predict greater perceived sexual arousal and, subsequently, greater unprotected sex intentions. Finally, in a replication of previous

findings (Abbey et al., 2005; George et al., 2009, Study 1), we hypothesized that men would report greater endorsement of unprotected sex intentions than would women.

Method

Participants

Participants ($N = 150$) were recruited from a large, urban university and the community at large through flyers, newspaper advertisements, and letters, which stated that the study involved "social drinking and decision-making." Potential participants called the laboratory and were screened to determine whether they were eligible to participate. Inclusion criteria were that the individual had to be (1) between the ages of 21 and 35, (2) interested in dating opposite-gender partners, (3) not currently in a committed dating relationship, and (4) a moderate social drinker. Exclusion criteria were current problem drinking, a history of problem drinking, and/or currently taking medications or having a health condition contraindicating alcohol consumption. Participants received \$15 per hour for their participation in the study.

Approximately one half (51.3%; $n = 77$) of participants were male. Participants' mean (SD) age was 25.2 (3.8) years. Participants were predominantly white (75.4%); 5.6% were black, 6.3% were Asian American, 3.5% were Native

FIGURE 1. Hypothesized model; solid lines represent positive relationships. Beverage condition = alcoholic or control beverage.

American, and 9.1% were multiracial or other. Additionally, Hispanic/Latino ethnic identity was reported by 7.6% of participants. Approximately two thirds (60.0%) were employed. Participants reported consuming an average of 11.28 (9.41) drinks per week and reported an average of 3 (2.42) sexual partners in the past year. Average reported frequency of sex without a condom and alcohol use before sex in the past 12 months on a scale of 0 (never) to 6 (all of the time) was 2.71 (2.62) and 2.41 (1.40), respectively.

Procedure

Pre-experimental instructions. During the screening phone call, participants were instructed to bring photo identification, not to drive to the laboratory, not to eat or consume caloric drinks for 3 hours before their appointments, and not to drink alcohol or use recreational or over-the-counter drugs for 24 hours before their appointments.

Initial procedures. Each participant was assigned two same-gender staff members who conducted the study procedures—an experimenter and an alcohol administrator. At arrival, each participant was escorted to a private room, where the experimenter administered an initial breath test with an Intoxilyzer 5000 (CMI Inc., Owensboro, KY) to ascertain a zero reading. After confirming pre-experimental instruction compliance, the experimenter obtained informed consent. Female participants were given a pregnancy test (OSOM hCG-Urine Test, Genzyme Diagnostics, San Diego, CA) to ascertain that they were not pregnant. Participants were then left alone to complete background questionnaires, such as demographic measures.

Beverage administration. Participants were randomly assigned to one of two beverage conditions (alcoholic or control beverage) and one of two BAC limb conditions (ascending BAC limb or descending BAC limb). All participants were informed of the actual content of their drinks. Each participant was weighed to determine the amount of 100-proof vodka needed to achieve a peak BAC of .08% (dosage = 0.82 g/kg body weight for men; 0.68 g/kg for women). Drinks consisted of one part vodka to four parts orange juice. Control participants drank a volume of orange juice equivalent to what they would have received in the alcohol condition. Beverages were divided into three equal portions, and participants consumed each portion over a period of 3 minutes for a total of 9 minutes. The experimenter regularly informed the participants of the amount of time elapsed so that they could pace their consumption evenly over the 9-minute period.

To ensure that participants assigned to the ascending limb condition completed the risk assessment while on the ascending limb of alcohol intoxications, their BACs were tested every 3 minutes until they reached a criterion level ($BAC \geq .045\%$), at which point they began the experimental protocol. For the descending limb manipulation, participants

were considered to be descending if their BAC pattern contained a clearly discernible peak, followed by three consecutive descending BAC readings.

While waiting to reach descending limb criteria, participants engaged in affectively neutral activities, which included watching a nature documentary or reading magazines that had been screened to ensure the absence of sexual content. For alcohol participants in the ascending limb condition, their mean BACs were .073% (.011%); mean BACs for descending limb participants who received alcohol were .072% (.009%). The average BACs for the ascending and descending limb conditions were not significantly different ($t = 0.38$, 72 df, $p > .05$). Ascending limb participants took, on average, 16.7 (9.5) minutes after drinking to reach their criterion BAC; for descending limb participants, an average of 102.8 (34.5) minutes elapsed after beverage consumption before their BACs began to drop.

A yoked control design was used to reduce error variance in intoxication levels (George et al., 2004; Giancola and Zeichner, 1997), such that control participants were yoked to an alcohol participant who had already participated. Control participants underwent breath alcohol analysis and began the dependent measures at the same time intervals as did the alcohol participant to whom they had been yoked. This yoking procedure was used for both ascending and descending limb conditions.

Sexual risk assessment. After BAC criteria were met and a sexual arousal induction procedure was completed, participants read a hypothetical scenario (described below) involving a sexual encounter with a new partner in which no condom was available. Participants completed measures regarding their likelihood of engaging in a variety of unprotected sexual behaviors in this hypothetical situation.

Detoxification and debriefing. After completing the sexual risk assessment, control participants were debriefed, paid, and released. Alcohol participants were escorted to another room, where they remained until their BAC dropped to .03% or below, at which point they were debriefed, paid, and released. All experimental procedures and protocols were approved by the University of Washington Institutional Review Board.

Measures and materials

Perceived intoxication. After the BAC criterion had been reached but before beginning the sexual risk assessment, participants rated their perceived level of intoxication through a single item: "On a scale of 1-10, how intoxicated do you feel right now?" with 1 = no effect and 10 = extremely intoxicated.

Sexual risk-taking assessment. Participants read a 1,000-word hypothetical sexual risk scenario written in the second person that described a first-time sexual encounter with a new acquaintance. Before the main study, the vignette was

pilot-tested for realism on 115 participants (51% women) as part of their participation in a different study. Participants rated to what extent the vignette depicted a realistic situation that might happen to them on a Likert-type scale ranging from 1 (very unrealistic) to 5 (very realistic). On average, pilot participants found the scenario description to be highly realistic (mean = 4.0 [1.2]). Realism ratings did not significantly differ by gender.

Participants received instructions to envision themselves acting as the protagonist of the story at their current level of intoxication (Davis et al., 2004). In the story, the protagonist (i.e., the participant) attends a party with a platonic friend, Kathleen. On arrival at the party, Kathleen introduces the participant to an attractive opposite-gender friend, referred to as Dan (for female participants) or Ellen (for male participants). The participant and Dan/Ellen engage in conversation and flirting. As the party winds down, Dan/Ellen invites the protagonist home, where the couple begins kissing and engaging in foreplay. Each indicates a desire for intercourse, but they realize that no condom is available. To emphasize HIV/sexually transmitted infection risk over pregnancy risk, the story stipulated that the female character used birth control. Participants in the present study also reported finding this scenario to be a highly realistic situation ("I feel that the scenario depicted a realistic situation that might happen to me"; 1 = not at all, 5 = very much; mean = 3.99 [1.10]). These ratings did not differ by experimental condition.

The vignette was eroticized (i.e. made sexually explicit) to increase the likelihood that it would be sexually arousing. In addition, immediately before reading the vignette, participants completed a sexual arousal induction protocol in which they viewed two 3-minute erotic film clips depicting explicit heterosexual intercourse. A within-subjects analysis of variance confirmed that the arousal induction procedure successfully increased self-reported arousal from before viewing to after viewing ($F = 774.56$, 1/146 df, $p < .001$). See George et al. (2006) for further detail.

Perceived sexual arousal. Participants rated their perceived level of sexual arousal on a four-item 7-point Likert scale (e.g., 1 = no sexual arousal at all; 7 = extremely

sexually aroused). Items were the following: (1) "Overall, how much sexual arousal did you feel during the story?" (Heiman, 1977); (2) "To what extent did you feel sensation in your genitals during the story?" (Heiman and Rowland, 1983); (3) "How much sexual warmth (in your genitals, breasts, and body) did you feel during the story?" (Meston and Heiman, 1998); (4) "To what extent did you feel sexually absorbed in the sensory components of the story?" (Koukounas and McCabe, 2001). Items were averaged to form a sexual arousal scale ($\alpha = .96$; mean = 4.16 [1.59]).

Unprotected sexual intentions. At the end of the story, participants were prompted to provide estimates of their intentions to engage in sexual behaviors after it was established that no condom was available. Participants estimated their likelihood of engaging in unsafe sex with the partner in the vignette through the following three questions: "How likely are you to rub your penis/clitoris against Dan/Ellen's penis/clitoris?" (mean = 3.61 [1.38]); "How likely are you to allow Dan to put his penis inside of you/to put your penis inside of Ellen?" (mean = 2.88 [1.47]); "How likely are you to have sex with Ellen/Dan even if he/she does not have a condom?" (mean = 2.56 [1.42]). Responses ranged from 1 (not at all likely) to 5 (very likely). The mean of these items was computed to create an unprotected sexual intentions scale with good reliability ($\alpha = .83$; mean = 3.02 [1.24]).

Results

Overview of data analytic strategy

First, correlations between measured variables were conducted to assess bivariate relations. Second, to test for the hypothesized interaction between beverage condition and BAC limb condition on perceived intoxication, an analysis of variance (ANOVA) was performed. Based on these preliminary analyses, a path analysis model was tested to examine the theoretical model.

Correlations. Bivariate correlations between the measured variables appear in Table 1. Point biserial correlations indicated that gender was significantly correlated with per-

TABLE 1. Phi, point biserial, and Pearson product moment bivariate correlations between variables

Variable	1	2	3	4	5	6	7
1. Participant gender	—	-.03	-.07	-.01	-.05	-.18*	.35†
2. Beverage condition		—	.03	.05	.79‡	.13	.16
3. Limb condition			—	.01	.08	.12	.10
4. Beverage $\times$ Limb				—	.13	.08	.10
5. Perceived intoxication					—	.26†	.18*
6. Perceived sexual arousal						—	.33‡
7. Unprotected sex intentions							—

Notes: Phi was computed to describe the relationship between two dichotomous variables. Point biserial correlations were computed for correlations involving one dichotomous variable and one continuous variable. Pearson product moment correlations were computed to describe the relationship between two continuous variables. Beverage condition = alcoholic or control beverage.

* $p < .05$; † $p < .01$; ‡ $p < .001$.

ceived sexual arousal and unsafe sexual intentions, with male participants reporting greater unprotected sexual intentions but lower perceived sexual arousal than female participants. Pearson product moment correlations revealed that perceived intoxication, perceived sexual arousal, and unprotected sexual intentions were all related to one another in the expected direction.

ANOVA. A univariate ANOVA was conducted to test for the main and interactive effects of beverage condition and BAC limb condition on participants' perceived intoxication. The analysis revealed that the main effects of both beverage condition ($F = 247.05$, 1/144 df, $p < .001$) and BAC limb condition were significant ($F = 4.32$, 1/144 df, $p < .05$) in the expected directions (alcohol vs control: mean = 5.14 [2.32] vs 1.00 [0.00]; ascending limb vs descending limb: mean = 3.25 [2.79] vs 2.82 [2.46]). As predicted, these main effects were qualified by a significant two-way interaction of Beverage Condition $\times$ BAC Limb Condition ($F = 4.32$, 1/144 df, $p < .05$). Sober participants did not differ significantly in their perceived intoxication, regardless of BAC limb (mean = 1.00 [0.00]). For participants who received alcohol, however, those on the ascending limb (mean = 5.68 [2.17]) reported greater feelings of intoxication than did those on the descending limb (mean = 4.58 [2.37]).

Model testing. Path analysis using Mplus statistical modeling software for Windows (Version 4.0, Muthén and Muthén, 1998-2007) with maximum likelihood estimation was used to test the theoretical model (Figure 1). Based on our hypotheses and the preliminary analyses, the following path model was tested: The outcome response of unprotected sex intentions was regressed on perceived sexual arousal, participant gender, and beverage condition. Additionally, perceived sexual arousal was regressed on perceived intoxication, participant gender, and beverage condition, whereas perceived intoxication was regressed on alcohol condition, limb condition, and the interaction of alcohol and limb condition. Estimation of these effects allowed for assessing the effect of the two-way interaction in the presence of lower level effects and replicating the two-way interaction effect found in the preliminary analysis of variance.

The hypothesized model fit the data very well ($\chi^2 = 4.945$, 6 df, $p = .55$; comparative fit index [CFI] = 1.000; Tucker-Lewis index [TLI] = 1.013; root mean square error of approximation [RMSEA] = .000, standardized root mean square residual [SRMR] = .030). Inspection of the path coefficients indicated that the path from beverage condition to perceived sexual arousal was not significant; the path from beverage condition to unprotected sexual intentions also was

FIGURE 2. Final model with standardized estimates; all paths in the figure are significantly different from zero ($p < .05$). Beverage condition = alcoholic or control beverage.

not significant. Thus, these paths were fixed to zero, and the model was rerun. This final model, shown in Figure 2, also fit the data well ($\chi^2 = 8.576$, 8 df, $p = .38$; CFI = .997; TLI = .995; RMSEA = .022; SRMR = .039). Chi-square difference testing (Satorra and Bentler, 2001) comparing the hypothesized model with the final model indicated that the final model fit the data as well as the hypothesized model ($\Delta\chi^2 = 3.631$, 2 df, $p = \text{ns}$). All of the paths that were free to vary in the final model remained significant. The model accounted for 28% of the variance in unprotected sex intention, 9% of the variance in self-reported sexual arousal, and 64% of the variance in perceived intoxication.

Following procedures outlined by Bryan et al. (2007), a series of indirect effects tests were examined. We tested the indirect effects of gender on unprotected sex intentions working through self-reported sexual arousal. We also separately tested the indirect effects of alcohol condition, limb condition, and their interaction on unprotected sex intentions through perceived intoxication and self-reported sexual arousal. The indirect effects of gender ($z = -2.04$, $p < .05$) and alcohol condition ($z = 2.70$, $p < .01$) were significant; however, the indirect effects of limb condition ($z = 1.67$, $p < .10$) and the two-way interaction of alcohol and limb condition ($z = 1.67$, $p < .10$) only approached significance.

Discussion

Although previous research indicates significant associations between alcohol consumption and involvement in risky sexual situations, much of this research has not acknowledged that risky sexual behaviors may occur at different stages of intoxication. Most experimental research regarding alcohol and risky sex confines its assessment of this relationship to the ascending limb. Although this technique wisely avoids the possible confound of limb effects on risky sex measures, it precludes assessment of limb effects on risky sexual behavior. Moreover, because many risky sexual decisions likely occur while on the descending limb (George et al., 2008; Kruse and Fromme, 2005), extant research likely does not adequately capture important alcohol-related factors in these real-world situations. To address this knowledge gap, the present study investigated the biphasic effects of alcohol consumption, perceived intoxication, and perceived sexual arousal on men's and women's unprotected sex intentions.

The hypotheses of this study were largely supported. Consistent with our predictions, alcohol intoxication resulted in increased sexual risk taking; however, it did not do so directly. Instead, alcohol's effects occurred indirectly through its influence on perceived intoxication and, subsequently, sexual arousal. This finding both replicates and extends prior research (e.g., George et al., 2009). As in prior studies, when perceived sexual arousal was included as a predictor of risky sex intentions, alcohol consumption had no direct influence on sexual risk-taking intentions and instead increased risky

sexual intentions only through increased subjective sexual arousal. The current work extends these findings by elucidating perceived intoxication's influence on perceptions of sexual arousal. Although the positive relationship between perceived intoxication and perceived sexual arousal has been established in prior studies (e.g., Wilson and Lawson, 1978), this is the first study in which this linkage has been related to sexual risk-taking intentions.

Although it has not received much attention in research on HIV-related risk taking, sexual arousal is a potent motivational state that logically plays an influential role in risky sexual encounters (Ariely and Loewenstein, 2006). Because of its influence on sexual arousal, perceived intoxication also appears to be a relevant motivational state regarding sexual risk taking. Gerrard et al. (1996) noted that prevention behaviors related to sexual risk are more complex than most other precautionary decisions and behaviors because of the emotional and motivational states involved in these decision-making processes. Until the mid-1990's, research regarding judgment and decision making had virtually ignored the role of emotions, motivations, and other "hot processes" in favor of focusing on the more cognitive, deliberative, "cold processes" involved in decision making (Peters et al., 2006).

Within the past 10 years, however, research has begun to emerge regarding the influence of motivation and emotion in decision making, indicating an acknowledgment that decisions may often be more irrational than rational. The current findings provide support for the crucial role of in-the-moment motivational states such as perceived intoxication and sexual arousal on sexual intentions. Moreover, the importance of these hot processes highlights the possible inadequacies of health behavior models and interventions programs that assume that risky sexual decisions are made in a deliberate, rational fashion, indicating a need for further research in this area (Seal and Palmer-Seal, 1996).

The current work also provides evidence regarding the importance of alcohol's biphasic effects on unprotected sexual intentions. An interaction of beverage condition and limb condition indicated that alcohol's effects on perceived intoxication varied significantly by limb, with those on the ascending limb reporting greater perceived intoxication than those on the descending limb. Thus, individuals whose BACs were still rising reported greater perceived intoxication followed by greater perceived sexual arousal and greater unprotected sex intentions than did those individuals whose BACs were falling. Individuals on the descending limb may thus be less likely to engage in sexual risk taking than their ascending counterparts because of their relatively lower levels of perceived intoxication and arousal.

Acute tolerance, in which an individual becomes tolerant to the effects of alcohol within a particular drinking episode (e.g., Kalant et al., 1971), may underlie this effect. That is, because individuals on the descending limb have acclimated to alcohol's effects during this particular drinking situa-

tion, they perceive themselves as less intoxicated, resulting in lower sexual risk-taking intentions than their ascending counterparts, who have not yet become tolerant to alcohol's acute effects.

Moreover, these findings intuitively fit with the typical biphasic effects of alcohol in that the stimulant effects associated with the ascending limb are congruent with increased sexual risk taking while descending-limb sedative effects are congruent with decreased engagement in risky sex. Future research could further explore the ways in which alcohol's biphasic effects may specifically influence subjective experiences of intoxication during risky sexual events.

These limb-dependent findings may partially explain some of the inconsistencies reported in survey work examining the alcohol-risky sex relationship (Dermen and Cooper, 2000; Morrison et al., 2003). That is, most event-level examinations of alcohol's influence on risky sexual behavior do not isolate the BAC limb during which the risky sexual behavior occurs but rather assess only the presence and amount of alcohol intoxication (e.g., Brown and Vanable, 2007). However, real-world risky sexual decisions may occur on either the ascending or descending alcohol limb, depending on the situation. (And, of course, sexual partners themselves may differ in whether their BAC is rising or falling at the time they decide whether to engage in unprotected sex.) Although the indirect effects of BAC limb and the interaction of limb and beverage condition on unprotected sexual intentions only approached significance, the findings of this study reveal that alcohol's biphasic nature should be considered in examinations of alcohol's influence on sexual risk.

HIV prevention and education efforts must also address the role of gender, given its significant role as a predictor of unprotected sex intentions. Compared with women, men reported a higher likelihood of engaging in unprotected sexual activity. This is consistent with previous findings (Abbey et al., 2005; George et al., 2009) and may reflect the increased negative physical and social consequences of engaging in unprotected sex within a casual relationship for women relative to men (Amaro, 1995; Crawford and Popp, 2003). Unexpectedly, women reported higher unprotected sex intentions indirectly through greater perceived sexual arousal, suggesting that perceived sexual arousal is especially pivotal in determining women's unprotected sex decisions. These findings indicate that HIV prevention and education programs must be designed in ways that address gender-specific issues regarding sexual risk.

Although necessitated by ethical and practical concerns, one limitation of this study is the use of an experimental laboratory analogue that can only approximate sexual risk taking in more naturalistic settings. That noted, participants reported that the scenario was a very realistic situation that could happen to them in the real world. Additionally, because of the alcohol administration protocol, underage drinkers, problem drinkers, and abstainers were not included in this

study. Therefore, our findings may not necessarily generalize to these groups. Importantly, however, given participants' typical drinking habits, alcohol consumption before sexual activities, and unprotected sexual intercourse, data from this higher risk sample are quite relevant to understanding alcohol-involved sexual risk behavior. Finally, although the absence of a placebo condition hinders our ability to disentangle alcohol's pharmacological and expectancy effects, extant research generally has not found placebo effects on risky sexual outcomes, suggesting that the physiological effects of alcohol trump expectancy set effects in terms of sexual risk taking (e.g. Maisto et al., 2004a).

Results of this study highlight the need for further investigation of ascending versus descending BACs as they pertain to alcohol-facilitated risky sexual behaviors. In particular, alcohol's indirect effect on unprotected sexual intentions through two potent motivational states—perceived intoxication and sexual arousal—suggests that prevention and intervention programs should target state-specific sexual decision-making processes as a means of reducing sexual risk behavior for both men and women. The current research provides evidence-based insights capable of informing such revisions of program content aimed at better preparing individuals for the decisional dynamics at play during the heat of the moment.

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