Sexual Attitudes Moderate the Effects of Alcohol Intoxication on Women's Risk Judgments

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Abstract

This study evaluated the effects of alcohol intoxication, sexual attitudes, and sexual victimization history on the cognitive processes underlying undergraduate women's risk judgments. Participants were 116 unmarried, undergraduate women between the ages of 21 and 29. The sample was diverse ethnically and composed primarily of heterosexual women. Stimuli were written vignettes describing social situations that varied on dimensions of sexual victimization risk and potential impact on women's popularity. Participants were assigned randomly to an alcohol or a no-alcohol condition, and completed an explicit classification task in which they rated how risky each situation was in terms of their having an unwanted sexual experience. They then completed the Sexual Experiences Survey (SES) and the Sociosexuality Scale (SS); SES responses were used to quantify the severity of victimization experiences, and SS responses were used to measure endorsement of positive attitudes toward casual, impersonal sex. Although there was no main effect for condition, higher sociosexuality predicted use of higher thresholds for judging situations as risky. Importantly, sociosexuality interacted with condition such that higher sociosexuality predicted lower sensitivity to risk

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information in the alcohol condition but not in the no-alcohol condition. More severe victimization history predicted increased use of popularity impactwhen judging risk. This study emphasizes the importance of identifying specific cognitive processes affected by alcohol that may explain why women have difficulty processing contextual cues signaling risk in social situations. It demonstrates also the relevance of examining individual difference factors that may exacerbate the relationship between intoxication and cognitive processing of risk-relevant information.

Keywords
risk perception, alcohol use, sexual attitudes, sexual victimization

There is ample evidence that alcohol use plays a key role in sexual assaults on college campuses. An estimated 50% of acquaintance sexual assaults among college students involve alcohol use by the victim, perpetrator, or both (for comprehensive reviews, see Abbey, 2002; Abbey, Zawacki, Buck, Clinton, & McAuslan, 2004; Testa & Parks, 1996). Importantly, longitudinal work with college women has demonstrated that alcohol use (Greene & Navarro, 1998), heavy episodic drinking, and exposure to heavy drinking contexts (Testa, Hoffman, & Livingston, 2010) heighten risk for sexual assault among college women.

Research suggests that alcohol may increase the likelihood of victimization by disrupting both women's capacity to detect risk as well as their ability to resist unwanted sexual advances (e.g., Davis, Stoner, Norris, George, & Masters, 2009; Testa, VanZile-Tamsen, Livingston, & Buddie, 2006). For instance, intoxicated women, relative to nonintoxicated women, reported less awareness of and discomfort with cues of assault risk (Davis, Stoner, et al., 2009) and they perceived behaviors that heighten their sexual vulnerability (e.g., consensual sexual activity) as less risky (Testa, Livingston, & Collins, 2000). Acute alcohol intoxication also has been shown to decrease women's ability to generate (Pumphrey-Gordon & Gross, 2007) and select (Testa et al., 2006) resistant responses to sexually risky situations.

Conceptual frameworks such as alcohol myopia theory (Steele & Josephs, 1990; Steele & Southwick, 1985), appraisal-disruption model of stress responding (Sayette, 1993), and the cognitive appraisal model of women's sexual decision making (Norris, Masters, & Zawacki, 2004) have been used to explain how alcohol might increase women's victimization risk by impairing their ability to perceive and respond to social situations. Despite these useful theoretical frameworks, few studies have identified *specific* cognitive

processes affected by alcohol that might explain why women have difficulty processing and responding to contextual cues signaling risk in dating and social situations. For instance, in sexually risky situations, alcohol might make it more difficult for women to detect cues of risk, or it could cause them to judge situations in general as less risky. Signal detection theory (Green & Swets, 1966) identifies two cognitive processes: perceptual sensitivity and decisional bias. These processes may be negatively influenced by alcohol intoxication. Perceptual sensitivity is the ability to distinguish levels of risk. In contrast, decisional bias is the boundary or threshold at which an individual judges a situation to be risky. To illustrate how these separate processes might be affected by alcohol, consider a woman who is confronted with unwanted sexual advances from a man. A sober woman might be better able to discriminate and use cues in the environment that signal risk, thereby allowing her to make a judgment of risk that corresponds closely to the actual level of risk in the situation. An intoxicated woman, however, might be less sensitive to such information, the result being reflected in an inaccurate judgment of risk (i.e., underestimation or overestimation of risk). But alcohol also could have an effect on a woman's risk judgments by altering her decisional threshold, or bias, for judging risk. Relative to a sober woman, an intoxicated woman might show a conservative bias when judging risk, such that she needs more risk cues before deciding that a situation is risky, the result being that she identifies fewer situations as risky, even when many risk cues are present (i.e., underestimation of risk).

Recent research on the influence of alcohol on men's sexual perception highlights the importance of distinguishing between these two potential processes. Farris, Treat, and Viken (2010) found that alcohol affected men's sexual perception by making them less sensitive to women's affective cues, such that they had greater difficulty discriminating friendliness from sexual interest when intoxicated than when sober. In other words, they sometimes confused friendliness for sexual interest, and they sometimes confused sexual interest for friendliness. Alcohol also was associated with a lower threshold for judging that affective cues conveyed sexual interest rather than friendliness (i.e., they showed a systematic bias to overestimate sexual interest). That is, in addition to increasing difficulty discriminating women's affective responses, alcohol increased the tendency to judge women as sexually interested. Importantly, there was specificity to these changes in cognitive processing, as sensitivity to and bias for clothing style (conservative to provocative) were not affected by alcohol consumption. That is, alcohol did not reduce men's ability to process *all r*elevant dating cues, only those cues related to women's affect, even though detection of clothing style was more difficult than detection of affect. These findings clarify the potential etiological variables underlying

men's sexual misperception; as a consequence, they inform preventative interventions targeting sexual aggression.

Individual difference factors, such as beliefs about how alcohol affects one's sexual behavior, have been shown to moderate the link between intoxication and cognitive processing of and responses to sexually risky situations (e.g., Davis, George, et al., 2009; Davis, Hendershot, George, Norris, & Heiman, 2007; Davis, Norris, George, Martell, & Heiman, 2006). One factor that also may moderate this relationship is sexual attitudes. Previous studies have shown that sober women's risk judgments are influenced by such attitudes. Women higher in sociosexuality (i.e., those reporting more positive attitudes toward casual, impersonal sex) rated hypothetical dating and social situations as less risky than women lower in sociosexuality (i.e., those reporting less positive attitudes about this type of sex; Yeater, Viken, Hoyt, & Dolan, 2009; Yeater, Viken, McFall, & Wagner, 2006). Women higher in rape myth acceptance, relative to women lower in rape myth acceptance, relied significantly less on risk-relevant information when making risk judgments for a similar set of situations (Yeater, Treat, Viken, & McFall, 2010). Thus, endorsement of these attitudes appears to interfere with women's ability to process information that may help them reduce their victimization risk. In intoxicated women, these attitudes may act as a behavioral disinhibitor, making detection of and responses to risk cues even more difficult.

Another individual difference variable that presumably could moderate the relationship between alcohol consumption and women's risk judgments is sexual victimization history. Indeed, there have been calls within the research literature to investigate this possibility (e.g., Stoner et al., 2007), as such a finding would point to one possible explanation for why previously victimized women are at increased risk for revictimization (Gidycz, Coble, Latham, & Layman, 1993; Messman-Moore & Long, 2003). Prior victimization has been conceptualized as a background variable that may negatively affect a woman's ability to appraise risk (Nurius & Norris, 1996). There is empirical support for this theory in the broader literature, with some work demonstrating an association between deficient risk recognition and a history of sexual victimization (e.g., Soler-Baillo, Marx, & Sloan, 2005; Wilson, Calhoun, & Bernat, 1999; Yeater et al., 2010). It is unclear, however, whether a history of victimization moderates the relationship between alcohol intoxication and risk judgments. Related work supports such a possibility. For instance, Davis et al. (2012) found that alcohol effects on men's sexual entitlement cognitions were stronger for men who reported a history of childhood sexual abuse.

The social situations faced by women are complex, and to date little work has examined processing of risk in the context of other competing

considerations. Doing so is important, as examining women's processing of other types of contextual features in these situations would allow us to distinguish specific deficits for processing risk information from general deficits in information processing. One aspect of these situations that appears relevant is information pertaining to social acceptance or popularity. For example, college women reported social pressure to party and "hook up" with men to be accepted and found men's sexual advances to be the basis for their self-esteem and social status (Armstrong, Hamilton, & Sweeney, 2006). Concern over being rejected by men also negatively affected undergraduate women's use of active resistance strategies in response to a sexual assault (Norris, Nurius, & Dimeff, 1996; Turchik, Probst, Chau, Nigoff, & Gidycz, 2007). Finally, women with more severe victimization histories, relative to women with less severe victimization histories, demonstrated increased reliance on popularity-impact information when judging risk for hypothetical social situations (Yeater et al., 2010).

Overview of the Study

The current study extends previous work on the effects of alcohol intoxication on undergraduate women's risk judgments by (a) measuring *sensitivity* to risk-relevant and popularity-impact information and *decisional threshold* for identifying high-risk situations, and (b) examining the potentially moderating influences of sexual attitudes (i.e., sociosexuality) and victimization history on the association between alcohol intoxication and risk judgments. Undergraduate women were assigned randomly to either an alcohol group or a no-alcohol group; a placebo condition was not included given the difficulties in maintaining a placebo manipulation for the necessary duration and the target Breathe Alcohol Content (BrAC) of this study (Martin, Earleywine, Finn, & Young, 1990).

To measure sensitivity and decisional bias, we used an explicit risk classification task in which participants rated the riskiness of a set of vignettes that varied in their degree of sexual victimization risk and popularity impact. In Yeater et al. (2010), sexual violence research experts provided normative ratings of the riskiness of each situation, as they would be expected to provide reasonably accurate judgments of risk. It was expected that women who are sensitive to risk-relevant information would make risk judgments that are similar to expert judgments. In Yeater et al. (2010), undergraduate women provided normative judgments of the popularity impact of each situation, because, as members of the population of college-aged women depicted in the vignettes, they would be more aware of the consequences of the woman's behavior on her popularity than would experts.

We used multilevel regression methods to estimate three participant-specific parameters of women's risk-judgment processes: sensitivity to normative risk in the situations, sensitivity to popularity impact in the situations, and the threshold or decision boundary for risk. Essentially, this approach regressed risk judgments for each vignette on the normative-risk and popularity-impact information for each vignette, separately but simultaneously for each participant. Participant-specific utilizations of normative-risk and popularity-impact information when making explicit risk judgments were indexed by the regression slopes. Participant-specific thresholds were indexed by the intercept. Our methods reflect recent developments showing that signal detection theory models can be represented as a special case of the general linear model (DeCarlo, 1998).

Hypotheses

Based on the previous review, we predicted that (a) intoxicated women, relative to sober women, would show higher thresholds for judging the vignettes as risky and lower sensitivity to risk-relevant information when judging risk and (b) sexual attitudes and victimization history would moderate the strength of the alcohol effect on women's thresholds for and sensitivity to risk-relevant information when making risk judgments. Because alcohol intoxication might influence women's sensitivity to popularity-impact information either by making this information more salient or by making it harder to detect (because the cues presumably could be more complex than risk-relevant cues), we made no explicit predictions regarding the direction of the effect of alcohol on women's sensitivity to this information when making risk judgments.

Method

Participants

Participants were 116 undergraduate women selected from the psychology subject pool and greater student body at a medium-sized, southwestern university. Eligible women were between the ages of 21 and 29; reported at least three drinking episodes in the past 30 days in which, during one of these episodes, they consumed three or more drinks, had no medical contraindications for alcohol use, and did not meet past or current *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV*; American Psychiatric Association, 1994) criteria for substance abuse or dependence. The vignettes describe common situations faced by young, heterosexual,

unmarried women. Thus, women above the age of 29 and those who reported no past or current sexual activity were ineligible to participate. In addition, lesbian (n =3) or married (n = 4) women also were excluded from the analyses. One participant's data also were dropped because she gave the same risk rating to all vignettes.

The sample included 58.4% of women who were in their senior year of college. The sample also was 88.5% heterosexual, 11.5% bisexual, and 100% unmarried. Mean age was 22.47 (SD = 1.91). The sample was diverse ethnically, including 56.6% White, 29.2% Hispanic/Latino, 3.5% Asian, 2.7% Native American, 1.8% African American, and 6.2% "Other." Participants reported an average of 7.33 (SD = 6.34, range = 1-30) lifetime sexual partners, and an average of 7.27 (SD = 4.27, range = 2-20) drinking episodes in the past 30 days.

Self-Report Measures

Demographics Questionnaire. This self-report measure asked participants for their age, marital status, ethnic membership, academic status, number of lifetime sexual partners, and number of drinking episodes in the past 30 days.

Sociosexuality Scale (SS). The SS (Bailey & Kirk, 2000) is a 20-item self-report measure of participants' willingness to engage in casual sexual activity. It consists of 7 items from the Sociosexuality Orientation Inventory (SOI; Simpson & Gangestad, 1991), and 13 items from Eysenck's (1976) study of the genetics of sexual behavior. Higher scores on the SS indicate greater acceptance of permissive sexual beliefs and behaviors. The full scale of the SS has an alpha coefficient of .85 for women (Bailey & Kirk, 2000); a factor analysis of the SS found only one factor accounting for the shared item variance. The first 15 items of the SS typically are given in yes–no response format. The SS was modified in the present study from the "yes–no" format to a 4-point Likert-type rating format (1 = *strongly agree*, 2 = *agree*, 3 = *disagree*, 4 = *strongly disagree*). Scores were created by summing participants' responses to the items. In the current study, the internal consistency of the SS was .90.

Sexual Experiences Survey (SES). The SES (Koss, Gidycz, & Wisniewski, 1987) is a 10-item self-report questionnaire developed to measure various degrees of severity of sexual victimization (i.e., unwanted sexual contact, sexual coercion, attempted rape, and rape) since the age of 14. The SES uses behaviorally specific definitions of sexual assault, and asks participants to indicate whether the event did or did not occur. Koss and Gidycz (1985)

reported that the SES had an internal consistency of $\alpha = .74$, a 1-week test–retest reliability of $r = .93$, and a correlation of $r = .73$ with interview responses, suggesting that the SES is a reasonable measure of self-reported sexual victimization.

As is common when using the SES (e.g., Gidycz et al., 1993; Yeater et al., 2010), participants were assigned to a severity category based on the most severe victimization experience they reported having since the age of 14 (0 = *no unwanted experiences*, 1 = *unwanted sexual contact*, 2 = *sexual coercion*, 3 = *attempted rape*, and 4 = *rape*). With respect to frequency of sexual victimization, 37.5% of our participants reported no history of sexual victimization, 12.5% reported unwanted sexual contact, 15.8% reported sexual coercion, 13.3% reported attempted rape, and 20.8% reported rape.

Vignettes

In previous work (Yeater, McFall, & Viken, 2011; Yeater et al., 2010; Yeater et al., 2006), 71 written vignettes were developed that describe a wide range of problem situations that undergraduate women might face when interacting socially with men (see Yeater et al., 2010, for a description of this process). The vignettes depict different contexts (e.g., date, party, bar) and types of relationships with the man (e.g., boyfriend, acquaintance, stranger), but the majority describe a familiar man, given the relatively low frequency of assault by a stranger. The vignettes also depict various risk factors for assault (e.g., presence of alcohol, social isolation, dating a man who exhibits characteristics associated with sexual aggression) and situational features associated with victimization (e.g., man making verbal threats to obtain sex, touching the woman without her consent, attempting to get the woman intoxicated).

As noted, the normative ratings for these vignettes were collected in previous work (Yeater et al., 2010). Sexual violence research experts evaluated how risky each situation was in terms of the woman having an unwanted sexual experience (1 = *not risky*, 5 = *completely risky*), defined as one in which the woman is verbally or physically coerced into having sexual contact of any kind with a man. Undergraduate women evaluated how much the woman's behavior in each situation was likely to influence her popularity (1 = *none*, 5 = *quite a lot*). Popularity was defined as how much the woman was valued, liked, or socially accepted. Inter-coder agreement for the risk and popularity-impact dimensions was high, and the normative ratings for the two dimensions were not significantly correlated (see Yeater et al., 2010, for examples of a low victimization risk, low popularity-impact vignette and a high victimization risk, high popularity-impact vignette).

Table 1. Example Vignettes.

You go out to dinner with a guy that you've dated a few times. The two of you have kissed and touched on previous dates. You invite him back to your room after the date. The two of you start to kiss, you get caught up in the moment, and before you know it, you both have most of your clothes off. You don't want to have sex with him yet, but you can tell that he really wants to have sex by the types of comments that he is making to you.

All of your close friends are either dating or in a long-term relationship. You haven't had a date in several months and are feeling kind of hopeless about finding someone that you like. A guy that you've had a crush on for some time finally asks you out on a date. When he brings you home, you invite him in to watch TV. He kisses you and you start to touch each other. You think that this feels good, but do not want to go any farther than kissing and touching. He then starts to unbutton your shirt.

You are out dancing with friends. A guy who is very cute and popular on campus starts flirting with you and dances with you several times during the evening. You like this guy but has heard that he is a "player." However, he's really nice to you during the evening and acts like a gentleman. At the end of the evening, he asks you to come back to his room.

Given that only a subset of the 71 vignettes could be used during alcohol administration, we selected situations that were rated in previous research as being common, difficult to deal with, and serious with respect to their consequences if dealt with ineffectively (Yeater et al., 2011). In the Yeater et al. (2011) study, a separate sample of undergraduate women rated the vignettes on these three different dimensions: (a) *commonness* (How common do you think this situation is for college women [1 = *not common*, 5 = *extremely common*]?), (b) *difficulty* (How difficult would it be for you to handle this situation [1 = *not difficult*, 5 = *extremely difficult*]?), and (c) *seriousness* (How serious are the consequences to you for dealing ineffectively with this situation [1 = *not serious*, 5 = *extremely serious*]?). The median was calculated for each of these dimensions, and 15 vignettes falling above the median on all three dimensions were chosen for the risk-judgment task. Example vignettes are provided in Table 1.

Procedure

The study was conducted in compliance with the university's Institutional Review Board. Participants who met eligibility criteria were scheduled for a time to complete the study. They were asked to abstain from drinking alcohol and using illegal substances at least 24 hr before participation and from

eating 3 hr prior to participation. A total of two participants were scheduled for each available time slot. Time slots then were assigned randomly to the alcohol or no-alcohol condition.

Upon arrival, participants provided informed consent and showed identification to verify that they were between the ages of 21 and 29. Their BrAC was measured using an Alco-Sensor III breathalyzer (Intoximeters, Inc., St. Louis, MO) to ensure that it was .000. Participants' weight and height then were recorded, followed by the completion of a stick urine pregnancy test. When two participants were present, one waited in a separate room while these data were collected on the other.

Participants then were taken to a laboratory room designed to simulate a bar. Those assigned to the alcohol condition were administered a dose of alcohol calculated to increase their BrAC to .08 mg/dL. A computer program developed by John J. Curtin, PhD (version 2.1.0, 2001) was used to determine the amount of alcohol needed for each participant to reach this target BrAC. This program takes into account age, height, weight, alcohol proof, length of drinking period, and ratio of alcohol to orange juice to arrive at this estimate. Two drinks containing 80 proof vodka using a 3:1 ratio of orange juice to vodka were prepared at a bar in front of participants. Participants were instructed to consume each drink within 5 min. Those assigned to the no-alcohol condition consumed an equivalent amount of orange juice within the same time frame. While consuming their drinks, participants watched a comedy show containing no sexual content (i.e., "The Lucy Show"). This show has been used in other alcohol challenge studies (e.g., Testa et al., 2000) and was used to distract participants from engaging in sexual or alcohol-related conversation, which could affect their risk judgments.

After a 15-min absorption period, participants were administered a second breathalyzer test (Testa et al., 2000) and shown their actual readings. Participants in the no-alcohol condition then were given the risk-judgment task. If the BrAC of participants in the alcohol condition was below .07 mg/dL, their BrAC was measured every 2 min until it approximated this threshold. Once it was reached, they were given the risk-judgment task (*M* BrAC = .07, *SD* = .007). Participants in both conditions read each vignette and rated how risky the situation was in terms of them having an unwanted sexual experience (1 = *not risky*, 5 = *completely risky*). An unwanted sexual experience was defined as one in which they would feel bad about, be hurt by, or regret later. A broad definition of unwanted sex was used instead of one that included words such as sexual coercion or assault, as research shows that women often adhere to stereotypes of rape (i.e., stranger rape) when considering risk for unwanted sexual experiences (e.g., Hickman & Muehlenhard, 1997). These words also were excluded to avoid participant priming (Wilson

et al., 1999). Participants' mean risk ratings ranged from 3.12 to 4.04 (SD = 1.08-1.21).

Because alcohol intoxication could influence participants' responses to the self-report questionnaires, participants in the alcohol condition were given a detoxification period of 30 to 60 min prior to completing the Demographics Questionnaire, the SS, and SES. They also watched "The Lucy Show" during the period and were asked to refrain from talking to one another. Participants in the no-alcohol condition completed the self-report questionnaires immediately following the risk-judgment task; participants in the alcohol condition completed them once their BrAC reached .04 mg/dL. Upon completion of the questionnaires, participants were debriefed and compensated for their participation either monetarily (US$5 per hour of participation) or with research credit (1 credit per hour of participation). The alcohol condition took approximately 4 hr to complete, whereas the no-alcohol condition took approximately 2 hr to complete.

Results

Data first were checked to ensure that there were no significant relationships between condition and either victimization history or sociosexuality. A Spearman's correlation revealed no significant association between condition and sexual victimization history (r_s = –.024, p = .80). In addition, a t test examining differences in sociosexuality scores between conditions was nonsignificant (alcohol M = 32.54, SD = 7.82 vs. control M = 33.66, SD = 7.99, t = 0.76, p = .45).

Hierarchical linear modeling (HLM; Raudenbush & Bryk, 2002) with robust standard errors was used to fit a two-level, linear regression model to 116 participants' explicit judgments of 15 vignettes on a 5-point risk scale. In the Level 1 equation, standardized victimization risk and popularity-impact normative ratings for each vignette were included as predictors of participants' explicit risk judgments across the 15 vignettes. The partial slopes at Level 1 estimated each participant's utilization of victimization risk and popularity-impact information when making explicit risk judgments for those vignettes. The intercept at Level 1 indicated for each participant the perceived risk of a situation that was average in victimization risk and popularity impact in this sample of vignettes. Overall, therefore, the Level-1 equation specified the link between the normative data and each participant's judgments, and it contained three parameters: (a) the perceived risk of an average situation, (b) the utilization of victimization risk information when making risk judgments, and (c) the utilization of popularity-impact information when making risk judgments. At Level 2, these three indices of each participant's performance

across the 15 vignettes were predicted by participant-level variables and their interactions. In the Level-2 equation, three main effect predictors of variation in the three Level-1 parameters were examined: (a) alcohol condition (effect-coded), (b) victimization history (centered), and (c) sociosexuality (centered). We also included all two-way interactions, as well as the three-way interaction as predictors. The partial slopes at Level 2 described the association between individual differences variables and the three Level-1 parameters. For example, γ_{02} indicated the association between Sociosexuality and the perceived risk of an average situation.

Level-1 Model

$$\text{Risk Judgment}_{ij} = \beta_{0j} + \beta_{1j} \times (\text{Risk Norm}_{ij}) + \beta_{2j} \times (\text{Popularity Norm}_{ij}) + r_{ij}.$$

Level-2 Model

$$\beta_{0j} = \gamma_{00} + \gamma_{01} \times (\text{Condition}_j) + \gamma_{02} \times (\text{Sociosexuality}_j) + \gamma_{03} \times (\text{Sexual Victimization}_j) + \gamma_{04} \times (\text{Condition} \times \text{Sociosexuality}_j) + \gamma_{05} \times (\text{Condition} \times \text{Sexual Victimization}_j) + \gamma_{06} \times (\text{Sociosexuality} \times \text{Sexual Victimization}_j) + \gamma_{07} \times (\text{Condition} \times \text{Sociosexuality} \times \text{Sexual Victimization}_j) + u_{0j},$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11} \times (\text{Condition}_j) + \gamma_{12} \times (\text{Sociosexuality}_j) + \gamma_{13} \times (\text{Sexual Victimization}_j) + \gamma_{14} \times (\text{Condition} \times \text{Sociosexuality}_j) + \gamma_{15} \times (\text{Condition} \times \text{Sexual Victimization}_j) + \gamma_{16} \times (\text{Sociosexuality} \times \text{Sexual Victimization}_j) + \gamma_{17} \times (\text{Condition} \times \text{Sociosexuality} \times \text{Sexual Victimization}_j) + u_{1j},$$

$$\beta_{2j} = \gamma_{20} + \gamma_{21} \times (\text{Condition}_j) + \gamma_{22} \times (\text{Sociosexuality}_j) + \gamma_{23} \times (\text{Sexual Victimization}_j) + \gamma_{24} \times (\text{Condition} \times \text{Sociosexuality}_j) + \gamma_{25} \times (\text{Condition} \times \text{Sexual Victimization}_j) + \gamma_{26} \times (\text{Sociosexuality} \times \text{Sexual Victimization}_j) + \gamma_{27} \times (\text{Condition} \times \text{Sociosexuality} \times \text{Sexual Victimization}_j) + u_{2j}.$$

Table 2 presents all findings. The average perceived risk of the average situation, γ_{00}, was 3.535 (on a 1-5 scale), which necessarily differed significantly from zero, $t(108) = 65.391$, $p < .001$, $d = 12.59$ (see Oishi, Lun, & Sherman, 2007, for further information on computation of effect sizes in multilevel models). Significant positive coefficients for victimization risk and popularity impact, γ_{10} and γ_{20}, indicated that risk judgments increased as victimization risk increased, $b = .131$, $t(108) = 4.504$, $p < .001$, $d = .87$, and as popularity impact increased, $b = 0.108$, $t(108) = 5.082$, $p < .001$, $d = .98$. The average participant's reliance on risk and popularity information when making

Table 2. Multilevel Modeling Results for Conditional Model.

Fixed Effect	Coefficient	SE	t Ratio	Approx. df	p
For risk intercept, β_0					
Intercept, γ_{00}	3.535	0.054	65.391	108	<.001
Condition, γ_{01}	0.035	0.054	0.645	108	.520
Sociosexuality, γ_{02}	−0.037	0.006	−5.772	108	<.001
Sexual victimization, γ_{03}	0.020	0.036	0.561	108	.576
Condition × Sociosexuality, γ_{04}	0.007	0.006	1.118	108	.266
Condition × Sexual Victimization, γ_{05}	−0.023	0.036	−0.648	108	.518
Sociosexuality × Sexual Victimization, γ_{06}	0.001	0.004	0.238	108	.812
Condition × Sociosexuality × Sexual Victimization, γ_{07}	−0.000	0.004	−0.015	108	.988
For risk utilization, β_1					
Intercept, γ_{10}	0.131	0.029	4.504	108	<.001
Condition, γ_{11}	−0.029	0.029	−0.999	108	.320
Sociosexuality, γ_{12}	−0.001	0.003	−0.427	108	.670
Sexual victimization, γ_{13}	0.009	0.020	0.447	108	.656
Condition × Sociosexuality, γ_{14}	−0.010	0.003	−2.992	108	.003
Condition × Sexual Victimization, γ_{15}	0.006	0.020	0.292	108	.771
Sociosexuality × Sexual Victimization, γ_{16}	−0.002	0.003	−0.872	108	.385
Condition × Sociosexuality × Sexual Victimization, γ_{17}	0.004	0.003	1.493	108	.138
For popularity utilization, β_2					
Intercept, γ_{20}	0.108	0.021	5.082	108	<.001
Condition, γ_{21}	−0.011	0.021	−0.507	108	.613
Sociosexuality, γ_{22}	−0.002	0.003	−0.833	108	.407
Sexual victimization, γ_{23}	0.032	0.014	2.249	108	.027
Condition × Sociosexuality, γ_{24}	−0.000	0.003	−0.121	108	.904
Condition × Sexual Victimization, γ_{25}	0.005	0.014	0.378	108	.706
Sociosexuality × Sexual Victimization, γ_{26}	−0.004	0.002	−1.963	108	.052
Condition × Sociosexuality × Sexual Victimization, γ_{27}	0.004	0.002	1.838	108	.069

risk judgments in this sample of vignettes was similar and substantial in magnitude.

Sociosexuality emerged as the only significant predictor of average perceived risk, $b = -.037$, $t(108) = -5.772$, $p < .001$, $d = -1.11$; as Sociosexuality increased, the judged riskiness of the average situation declined sharply. Sociosexuality interacted with alcohol condition in reliably predicting utilization of risk information when making risk judgments, $b = -.010$, $t(108) = -2.992$, $p = .003$, $d = .58$, such that, as sociosexuality scores increased, alcohol had stronger effects in decreasing utilization of risk information. For instance, those with sociosexuality scores 1 *SD* above the mean showed significantly lower risk utilization in the alcohol condition than in the no-alcohol condition, $b = -.104$, $t(108) = -2.472$, $p < .05$, $d = -.48$. Alcohol condition did not significantly influence risk utilization for women with sociosexuality scores 1 *SD* below the mean, however, $b = .046$, $t(108) = 1.338$, n.s., $d = .26$. An alternative perspective on this interaction is gleaned by examining the correlations between sociosexuality and risk utilization in the two drink conditions. This decomposition revealed a strong negative association between sociosexuality and risk utilization in the alcohol condition, $r(53) = -.52$, $p < .001$, and a moderate positive association in the no-alcohol condition, $r(59) = .37$, $p < .01$. In contrast, neither the hypothesized main effect of alcohol nor the moderation effect of victimization history on utilization of risk information was reliable. The effect of alcohol was conditioned by sociosexuality. Finally, sexual victimization history positively predicted utilization of popularity-impact information when judging risk, $b = .032$, $t(108) = 2.249$, $p < .05$, $d = .43$, such that previously victimized women made greater use of popularity cues when judging risk. No other effects were reliable.

Discussion

To the best of our knowledge, this is the first study in this area to distinguish sensitivity and bias processes in women's judgments of victimization risk under conditions of acute alcohol intoxication. Thus, the current results contribute to the expanding literature on alcohol's effects on information processing as described in conceptual frameworks such as alcohol myopia theory (Steele & Josephs, 1990; Steele & Southwick, 1985) and the appraisal-disruption model of stress responding (Sayette, 1993). Notably, it also is one among only a handful of studies that have examined the influence of individual difference factors on the link between alcohol consumption and women's cognitive processing of sexually risky situations.

Despite finding no main effect for condition, several novel findings emerged from this work. First, women reporting higher sociosexuality judged

risk to be substantially lower in the situations than women reporting lower sociosexuality. That is, women with more positive attitudes toward casual, impersonal sex, relative to women with less positive attitudes about such sex, exhibited a higher threshold for judging a situation as risky. This is consistent with past work (Yeater et al. 2009; Yeater et al., 2006) showing that higher sociosexuality was associated with lower risk ratings when using a larger, more diverse set of vignettes than could be accommodated in this alcohol challenge study. The increased threshold for recognizing risk among women high in sociosexuality also is consistent with the association between socio-sexuality and the selection of more acquiescent responses to sexually coer-cive situations (Yeater et al., 2006). There was no overall effect of sociosexuality on women's reliance on (or sensitivity to) risk-relevant infor-mation when judging risk, suggesting that recognition and use of risk cues are not a problem for them in general, and that deficits in cue utilization cannot explain the differences in mean risk ratings described above.

Second, sociosexuality interacted with alcohol condition such that more pos-itive attitudes toward casual, impersonal sex predicted significantly less reliance on risk-relevant information in the alcohol condition but not in the no-alcohol condition. This finding partially supported our prediction that sexual attitudes would moderate the strength of the alcohol effect on women's risk judgments. Women with sociosexuality scores 1 *SD* above the mean relied significantly more on valid risk cues when in the no-alcohol condition than women in the alcohol condition. By comparison, women with sociosexuality scores 1 *SD* below the mean did not significantly differ in their use of risk cues, regardless of whether they were in the alcohol or no-alcohol condition. We are aware of no previous studies investigating this interaction between sexual attitudes and alco-hol consumption in predicting risk judgments. However, Yeater et al. (2009) found that sociosexuality had a significantly stronger negative effect on risk ratings for more challenging and difficult social situations than for easier ones. This would be consistent with the current results if intoxication were considered to be a factor that increases the difficulty of making accurate risk judgments. In addition, Yeater and Viken (2010**)** found significant interactions between the presence of alcohol in hypothetical sexually coercive situations (alcohol present or absent), and both participants' reported level of disinhibition and their reported number of sexual partners (two variables associated with sociosexual-ity). For more disinhibited women and those with a higher number of sexual partners, the presence of alcohol was associated significantly with the choice of more acquiescent responses to the situations. However, for women low in disin-hibition and those with a fewer number of sexual partners, the presence or absence of alcohol did not significantly influence their response choices. Thus, the pattern of greater vulnerability to the influence of alcohol was present even

in disinhibited women's hypothetical judgments of how they would respond to these situations. Finally, related work exploring the association between alcohol use and high-risk sexual behavior (e.g., intercourse without using a condom) found that personality characteristics, including sociosexuality, extraversion, and impulsivity/sensation seeking better accounted for risky sexual behavior than did alcohol use (Miller et al., 2004; Vélez-Blasini, 2008).

When in the no-alcohol condition, however, high sociosexuality women showed modestly higher utilization of risk information than low sociosexuality women. Research on sociosexuality shows that it is associated with two broad personality dimensions called extraversion and lack of constraint (Gangestad & Simpson, 1990). Thus, women higher in sociosexuality presumably would have more experience with the situations described in the vignettes (due to being extroverted and disinhibited), allowing them, when sober, to gauge the level of risk depicted in them.

When intoxicated, however, the disinhibitory effects of alcohol, in combination with a tendency to respond impulsively, may overwhelm these apparent perceptual advantages for detecting risk. In contrast, women lower in sociosexuality may be more cautious and rely more on risk cues when intoxicated, because alcohol consumption is a known risk factor for victimization. In real-life situations, the processing difficulties exhibited by women higher in sociosexuality may make responding to risk cues more difficult, thereby heightening their risk for sexual assault. Yeater et al. (2010) found that women trained to attend to risk cues in a category learning task showed increased reliance on valid cues in a risk-judgment task, and that the effect of training was particularly strong for women with individual characteristics associated with reduced use of these cues (victimization history and rape myth endorsement). It may be that similar training procedures could help to modify the use of risk information by high sociosexuality women.

We found no overall effect of alcohol condition on women's reliance on or bias for risk-relevant information when judging risk. Thus, our prediction that intoxication would result in reduced sensitivity to and higher thresholds for risk-relevant information when judging risk was not supported. As discussed, the effect of intoxication was dependent on the characteristics of the woman. The lack of an overall effect for condition is not entirely unexpected however, as some research investigating women's processing of sexual risk in alcohol challenge studies also has failed to find significant differences between alcohol and no-alcohol conditions (e.g., Davis, George, et al., 2009; Pumphrey-Gordon & Gross, 2007). These studies often have used different stimuli and measures of risk appraisal; thus, method variance may account, in part, for some of the discrepancies in the extant literature.

More severe victimization history did not predict use of higher thresholds for judging situations as risky, which is consistent with past work with these stimuli investigating average risk ratings similar to those in the current study (Yeater et al., 2009; Yeater et al., 2006), but inconsistent with a study using dichotomous judgments of risk in a classification task (Yeater et al., 2010). Also, victimization history did not predict lower sensitivity to risk cues as was true in the Yeater et al. (2010) study, or moderate the relationship between intoxication and risk judgments. Thus, we found only partial support for our prediction that the individual difference variables of sexual victimization history and sexual attitudes would moderate the strength of the alcohol effect on women's reliance on and bias for risk-relevant information when making risk judgments.

However, Yeater et al. (2010) used a larger set of vignettes that varied more widely with respect to victimization risk, perhaps accounting for these disparate findings. In addition, as is typical for alcohol challenge studies, our sample was relatively small and participants were not selected for victimization history, so there may not have been enough victimized women to test these hypotheses adequately. Consistent with the Yeater et al. study, victimization history was associated with increased reliance on popularity cues when making risk judgments. That is, more severely victimized women, relative to less severely victimized women, used these cues more when making judgments of risk. This finding supports theories of others who have posited also that women may have difficulties with risk appraisal because social aspects of risky situations, such as fear of losing the social acceptance of men, hinder their ability to judge risk accurately (e.g., Armstrong et al., 2006; Norris et al., 1996; Turchik et al., 2007).

Given the cross-sectional nature of the data, it is unknown whether reliance on these cues increases women's risk for victimization, or whether victimization increases attention to these aspects of social situations. It is noteworthy that Yeater et al. (2010) found that participants trained to attend to valid risk cues in a category learning procedure showed very low reliance on popularity cues, suggesting that this may be one potential intervention for previously victimized participants who rely on these cues when determining risk.

In reviewing our findings, several limitations of the study and considerations for future work come to mind. With respect to our use of alcohol administration procedures, the inclusion of a placebo condition would have permitted us to parse expectancy effects from the pharmacological effects of alcohol for the risk-judgment task. Future work including a placebo condition is important, as studies examining the effects of placebos on women's sexual decision making have reported mixed findings, including expectancy

set effects, no expectancy set effects, and paradoxical compensatory effects among women, such that women become more, rather than less, attentive to cues of risk (Testa et al., 2006). In addition, although participants were prevented from socializing with each other during the procedure, the presence of another individual presumably could have influenced their responses. Furthermore, having participants complete their self-report questionnaires during a session separate from the beverage administration would have eliminated the possibility that prior intoxication influenced their responses to the measures. It is important to note, however, that condition was unrelated to sexual victimization history and sociosexuality. Including a separate session also would have allowed for an assessment, independent of the alcohol administration procedure, of additional individual difference variables that might be potential moderators of the link between intoxication and women's processing of risky situations. Such measures might include rape myth acceptance, alcohol problems, and sex-related alcohol expectancies, among others.

With respect to the stimuli used in the study, selecting vignettes for the explicit risk classification task that vary more widely with respect to victimization risk would allow for better characterization and differentiation of cognitive processes of sensitivity and decisional bias. In addition, although we chose vignettes that were common, difficult to deal with, and serious with respect to their consequences if dealt with ineffectively, we did not base our stimuli selection exclusively on their relevance to alcohol intoxication or situations associated with alcohol use. Thus, future research might endeavor to use such an approach when selecting stimuli.

These findings have implications for future work. For instance, prospective studies might examine whether sociosexuality predicts sexual victimization, as well as whether these sexual attitudes change as a consequence of being victimized. In addition, cognitive training programs might be developed that provide high sociosexuality women with explicit instruction on victimization risk cues and trial-by-trial feedback on their risk judgments. Finally, this study focused on the early stages of perception of and decision making about victimization risk. In sexually risky situations, women must also respond effectively. Given research linking risk appraisal to participation in high-risk behaviors (e.g., McCoy, Gibbons, Reis, Gerrard, Luus, & Suffka, 1992), the relationship between women's risk judgments and their response choices to risky situations is an important area for future work. This seems particularly relevant given evidence that alcohol's effects on women's responses to sexually risky situations are mediated, at least partially, through risk recognition (Testa et al., 2006). In future research, alcohol challenge studies that assess both women's risk perception and their response choices

would provide one way of delineating the relationship between early perceptual processing and women's behavior in risky situations.

Declaration of Conflicting Interests

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