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How Does Alcohol Intoxication Impair Risk Detection of Sexual Assault? Testing an Integration  
of Alcohol Myopia and Social Information Processing Theories

A dissertation submitted in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy in Psychology

by

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## ABSTRACT

Sexual assault among young adults is a highly prevalent public health concern. Alcohol is often implicated as a risk factor for sexual assault through its impairing effects on an individual's ability to process and respond to social cues in the environment. The effect of alcohol myopia can result in greater focus of attention on salient environmental cues. The relationship between alcohol intoxication and resulting behavior may depend on what type of information is most salient. The current study examined the effects of alcohol on social information processing as it relates to sexual assault risk detection. **Method:** Participants were 48 young adult women ( $M_{\text{age}} = 22.10$ ,  $SD = 1.79$ ; 70.8% White, non-Hispanic). Participants completed computer surveys, consumed either an alcoholic beverage to a BAC of .06% ( $n = 24$ ), or a non-alcoholic control beverage ( $n = 24$ ), completed a measure of social information processing interpretation bias (Emotional Stroop task) and a sexual assault risk detection task (latency of responding to a sexual assault vignette as risky). **Results:** Participants in the alcohol condition identified the man had gone too far in his sexual advances in the sexual assault vignette significantly earlier, and displayed a relative bias towards processing sexual assault cues longer in the modified emotional Stroop task compared to participants in the no alcohol condition. Sexual assault cue Stroop times were not associated with sexual assault response latency. **Discussion:** Contrary to hypotheses, intoxicated participants showed a relative increase (rather than a decrease) in the cognitive processing of sexual assault risk cues and a shorter (rather than longer) response latency for the sexual assault vignette, compared to non-intoxicated participants. Although Stroop sexual assault scores were unrelated to vignette response latency, if sexual assault risk cues were most salient for intoxicated participants, alcohol myopia theory suggests they would be more likely to attend to those cues. Thus, if sexual assault risk cues were primed by the Stroop task, the effects of

intoxication may have related to increased responding in the sexual assault vignette. If replicated, findings suggest priming certain cues could improve recognition and response to risky social situations for intoxicated individuals.

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## TABLE OF CONTENTS

I. INTRODUCTION.....	1
A. ALCOHOL-RELATED SEXUAL ASSAULT.....	2
B. THEORIES OF ALCOHOL’S EFFECTS.....	3
C. ALCOHOL AND RISK DETECTION.....	6
D. ALCOHOL MYOPIA AND INFORMATION PROCESSING.....	10
E. ALCOHOL MYOPIA, SOCIAL INFORMATION PROCESSING AND RISK DETECTION.....	13
F. CURRENT STUDY.....	15
II. METHOD.....	16
A. PARTICIPANTS.....	16
B. MATERIALS.....	18
C. PROCEDURE.....	23
D. DATA ANALYTIC PLAN.....	28
III. RESULTS.....	30
A. PRELIMINARY ANALYSES.....	30
B. HYPOTHESIS 1.....	31
C. HYPOTHESIS 2.....	32
D. HYPOTHESIS 3.....	32
E. EXPLORATORY ANALYSES.....	33
IV. DISCUSSION.....	34
A. PREVENTION IMPLICATIONS AND FUTURE RESEARCH.....	43
B. LIMITATIONS.....	44

C. CONCLUSIONS.....	45
V. REFERENCES.....	47
VI. TABLES .....	54
VII. FIGURES.....	63
VIII. APPENDIX .....	66
IX. RESEARCH COMPLIANCE LETTER .....	80

## Introduction

Alcohol-related sexual assault among young adults in college presents a significant public health concern. Sexual assault may be defined as any unwanted sexual contact including but not limited to attempted or completed rape, sexual contact obtained through drugs, force, or coercion, or other unwanted sexual touching (citation for this definition?). Rates of sexual assault for women have remained consistently high through the years despite prevention efforts. Specifically, a recent study of 7,603 first year college students surveyed between 2011 and 2013 indicated that 23% of female respondents and 11% of male respondents had experienced an unwanted sexual experience since beginning college (Conley et al., 2017). As many as 19-35% of college women will experience sexual assault while enrolled in college, with as many as 43% experiencing sexual assault in their lifetime (Breiding, 2014; Coker, Follingstad, Bush, & Fisher, 2016; Krebs, Lindquist, Warner, Fisher, & Martin, 2009).

Sexual victimization has been linked to a vast array of negative health outcomes for assault survivors. Approximately 50% of victims of a sexual assault will suffer negative physical or psychological consequences including increased rates of posttraumatic stress disorder (PTSD), depression, anxiety disorders, increased frequency of alcohol use, alcohol use disorders, and an increased likelihood of revictimization compared to women who have not experienced sexual assault (Holmes, Resnick, Kilpatrick, & Best, 1996; Kaysen, Neighbors, Martell, Fossos, & Larimer, 2006; Marx, Nichols-Anderson, Messman-Moore, Miranda, & Porter, 2000; Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993). Women who experience multiple sexual assaults may also be at increased risk for additional negative consequences. For example, in a sample of 2000 college women, compared to non-victims and women who experienced a single

victimization, those who experienced multiple sexual assaults reported greater use of illicit substances and non-medical use of prescription drugs (Walsh et al., 2014).

Given the elevated rates of sexual assault in college and associated mental health consequences, continued research is needed to help reduce the incidence of sexual assault. Although the blame for the occurrence of sexual assault lies entirely with the perpetrator, further research examining the underlying mechanisms which may contribute to risk for sexual assault is hoped to inform prevention efforts and empower individuals and bystanders to reduce sexual assault rates. Although many men also experience sexual victimization in college (approximately 5-15%), the current study focused on women due to higher victimization rates and the specific aim of identifying alcohol's role in sexual assault (Conley et al., 2017). Because alcohol use has not been not found to be associated with elevated rates of sexual assault victimization in male college students, but has been strongly correlated with female sexual assault, women were the primary focus of the current study.

### **Alcohol-Related Sexual Assault**

Alcohol consumption is a commonly identified risk factor for sexual assault due, in part, to reported associations between frequency of alcohol consumption and sexual assault rates. Higher rates of sexual assault are reported among college women who drink alcohol compared to women who do not drink (Fisher, Cullen, & Turner, 2000; Parks, Hsieh, Bradizza, & Romosz, 2008). The odds of experiencing sexual assault in college are higher for women on days they are drinking. Among a sample of 179 college women who were followed across a four year longitudinal study, Parks, Hsieh, Bradizza, and Romosz (2008) discovered that the odds of experiencing sexual aggression was 19.44 times greater on a day of heavy drinking (with an average 7.46 drinks) compared to non-drinking days.

Alcohol consumption at the time of sexual assault is also commonly reported. As many as half of all sexual assault cases reported in college involved alcohol use by either the victim, perpetrator, or both (Abbey, 2002). Two studies have reported the majority of women who experience rape also report consuming alcohol prior to the assault. Among a sample of college women, 88% of those reporting rape within an eight month time period reported using alcohol at the time of their sexual assault (Messman-Moore, Ward, & Brown, 2009). Furthermore, in a large national sample including 23,980 college women across 119 universities, approximately 5% reported they were the victim of rape within the school year, with 72% of those who reported rape also reporting intoxication at the time of the assault (Mohler-Kuo, Dowdall, Koss, & Wechsler, 2004). Additionally, intoxication may be related to features of the sexual assault. Victim's reported alcohol use prior to a sexual assault is associated with increased reported severity of the sexual assault (Ullman, Karabatsos, & Koss, 1999). Given the associations between alcohol use and sexual assault occurrence, it is important to consider how alcohol intoxication may contribute to sexual assault risk

### **Theories of Alcohol's Effects**

Given the consistency of evidence suggesting relationships between alcohol use, intoxication, and sexual assault, it is critical to understand the mechanisms by which alcohol may contribute to increased risk for sexual assault. The effects of alcohol intoxication have the potential to alter attention, mood, and interpretation of environmental cues. These complex psychological and physiological effects of alcohol combine to potentially influence risk for negative outcomes in social situations.

Some individuals may choose to consume alcohol based on the expected effects that will be achieved from intoxication. Alcohol expectancies are beliefs about the effects of intoxication

for an individual that are commonly studied in relation to drinking patterns (Brown, Christiansen, & Goldman, 1987). Alcohol outcome expectancies may be positive (such as enhancing a social situation or increasing feelings of sexuality) or negative (such as feeling physically ill). Both positive and negative expectancies of alcohol's effects are consistently related to patterns of drinking behavior (see Monk & Heim, 2013 for a review of alcohol expectancies and drinking behavior). Of note, positive expectancies for alcohol to enhance sexuality has been associated with increased frequency of drinking. Among a sample of 350 undergraduate college women, those with increased scores on the expectancy of alcohol to increase sex drive and sexual affect also reported increased alcohol use (Benson, Gohm, & Gross, 2007). Among this sample, women who reported an unwanted sexual experience were also more likely to endorse sexual expectancies of alcohol compared to those who did not report a sexual assault experience. Benson and colleagues (2007) suggest that these increased levels of drinking as a result of greater positive social and sexual outcome expectancies may increase risk for negative consequences such as sexual assault. Therefore, evidence suggests the beliefs that one has about the expected effects of alcohol, and beliefs about alcohol's effects on sexuality particularly, may result in differences in hazardous drinking, experiences while drinking, and subsequently higher risk for sexual assault.

Alcohol myopia theory provides one explanation for how alcohol may relate to decreased attention to risk while drinking to intoxication. Alcohol myopia theory proposes that alcohol intoxication results in a narrowing focus effect such that not all environmental stimuli are attended to and processed equally (Steele & Josephs, 1990). This narrowed focus effect results in selective processing of only the most salient environmental cues in a given situation. An individual who expects alcohol to enhance a social or sexual situation may display a bias for

positive social and sexual cues above and beyond the processing of potential cues of risk. Consistent with alcohol myopia theory, research shows that in a hypothetical sexual situation, intoxicated participants reported lower perceptions of the risk associated with unprotected sex compared to participants who did not consume alcohol or participants who consumed a placebo beverage (Fromme, D'Amico, & Katz, 1999). The increased attention to salient cues of a positive sexual interaction may override attention to more distal risks and negative consequences. These effects were also seen compared to a placebo condition, suggesting the myopic effects are a direct result of physiological intoxication, rather than purely based on expected effects of alcohol. In a potentially risky social interaction, a woman may be more likely to attend to the positive cues such as enjoying a positive social interaction or the potential of meeting a new partner above and beyond the less immediately salient risk for unwanted contact.

Social information processing theory adds a further layer of organization for understanding behavior in a social situation. Social information processing theory describes the stages by which social information is noticed and interpreted, and how this interpretation can influence behavioral responding (McFall, 1982). Recent research applications of this theory in a sexual assault context propose six stages of social information processing (Ambrose & Gross, 2016): (1) encoding, or recognition of external and internal cues, (2) interpretation of cues, (3) goal clarification (determining desired end goal of the situation), (4) response generation of possible behaviors, (5) response evaluation, and (6) response enactment.

Given the interrelated and complex nature of processing social information, if alcohol impairs any stage of processing, resulting behavior may be influenced. For example, the myopic effects of alcohol creating a reduced attention for negative cues may result in certain risk cues being ignored in favor of more salient positive situational cues. Social information processing

theory would suggest this increased attention to positive cues may influence situational interpretation, and in turn the generation of possible behavioral responses if primarily positive cues are attended to and interpreted.

Taken together, the stages of social information processing theory provide a conceptual framework for organizing and understanding the relationship between the cognitive, physiological, and psychological effects of intoxication, cue processing, and resulting behavior. If an individual is selectively processing and interpreting social information, they may make behavioral choices that are less effective at mitigating risk.

### **Alcohol and Risk Detection**

Based on this theoretical framework, alcohol may contribute to risk for sexual assault through its impairing effects on accurately detecting and interpreting all relevant social cues of risk. To test this theory, risk detection in sexual assault is commonly studied by measuring how participants respond to hypothetical scenarios describing sexual assault. These studies are based on the supposition that responding to a hypothetical scenario may relate to actual behavior in similar situations. In a prospective study to test the validity of such vignettes, Messman-Moore and Brown (2006) examined risk detection and future experience of sexual assault among 262 women. Participants completed a written sexual assault risk detection task in which they were asked to pretend they were a woman in a hypothetical sexual assault scenario with a man. The story describes a man and the participant meeting one another and getting along well before the man begins to make increasingly aggressive sexual advances despite objection. Women indicated when they began to feel uncomfortable and when they would leave the situation. Participants who reported feeling uncomfortable later in the vignette, and reported they would leave the

situation later were more likely to experience a sexual assault during an 8-month follow-up time period (Messman-Moore & Brown, 2006).

Similar vignette methodology has been employed to study the effects of intoxication on risk detection. Several researchers have identified that alcohol intoxication is associated with impairments in sexual assault risk detection among women (for a full review see Melkonian & Ham, 2018). Loiselle and Fuqua (2007) examined the effects of intoxication in an alcohol administration experiment with 42 undergraduate women comparing the effects of lower doses of alcohol (.04% Blood Alcohol Concentration [BAC]) to a placebo beverage condition. Risk detection was measured using an audio recording depicting a sexual assault scenario (in a vignette developed by Marx & Gross, 1995). The story begins by describing a man and a woman spending time together talking and laughing. As the story progresses, the man in the vignette uses increasingly aggressive means such as verbal persuasion, threats, and eventually force to engage in sexual behavior. Women who consumed alcohol indicated the man should stop his advances significantly later than the placebo control group. Although there was no true nonalcoholic control group, results suggest an effect of low doses of alcohol on the impairment of sexual assault risk detection. Significant effects of alcohol (alcohol condition BAC = .04%) resulting in slower response latency to this vignette was observed among a sample of men (Marx, Gross, & Adams, 1999).

Similar effects of alcohol impairing risk detection have been reported at higher levels of intoxication (BAC = .08%). Testa, Livingston, and Collins (2000) examined the effects of alcohol intoxication on women's perceptions of risk and evaluation of positive consequences in a hypothetical scenario in which a man unexpectedly shows up to a woman's house appearing intoxicated. Participants read a written vignette and were asked to place themselves in the first

person as the woman in the scenario. Participants responded to questions assessing perceived risk and benefits of inviting the man in. Results suggested women who were intoxicated were more likely to rate the male positively, report less risk, and perceive greater benefit of letting the man in compared to participants who did not consume alcohol. In this study, alcohol was associated with decreased processing of potential risks in favor of greater attention and interpretation of positive benefits from the interaction.

Using two video vignettes, Parks, Levonyan-Radloff, Dearing, Hequembourg, and Testa (2016) examined the effects of alcohol intoxication (BAC = .08%) on interpretation of a man's harassment behavior in a party setting. In the "low risk" video, the female participants view a first-person interaction with a man who is making progressive attempts to spend time with the participant. In the "high-risk" video, the participant viewed, in the first person, the man makes progressive sexual advances towards the participant, including increased attention to the participant's body. Further, the man in the video attempts to get them to an isolated location and encourages participant alcohol intoxication. Women in the alcohol condition reported fewer overall moments of concern throughout this video vignette, and rated the male more positively, compared to the no-alcohol condition. However, there were no differences in reported concern or ratings of the male's behavior in the "low risk" video vignette.

Detection of risk represents an important step of social information processing in that it influences decisions about possible behavior responding. Testa, Vanzile-Tamsen, Livingston, and Buddie (2006) report the mediating effects of risk appraisal on behavioral intentions in a field study setting. Participants were recruited from a downtown area in which potential participants had been consuming alcohol at bars. Participants in the high BAC (>.06%) group reported lower levels of risk in the vignette than did those in the low BAC (<.06%) group, and

those who reported lower risk were also less likely to predict they would employ direct resistance strategies and were more likely to report hypothetical passive and polite responding (Testa et al., 2006).

Although the majority of articles examining the effects of intoxication on women's risk detection have reported at least some significant impairing effects of alcohol on sexual assault risk detection and behavioral responding, not every study has reported consistent effects. Some suggest that effects observed across studies may be influenced by the vignette type and specific risk cues used. One research study has reported significant differences across alcohol conditions in recognition of risk cues only for more ambiguous cues (such as being isolated from others at a social gathering), whereas no differences were observed across alcohol conditions for recognition of more severe cues (such as a woman refusing a man's sexual advances) (Davis, Stoner, Norris, George, & Masters, 2009). However, Testa and colleagues (2006) report differences by alcohol condition for risk appraisal only after more clear cues of risk are displayed, such as the man in the vignette taking off his pants and physically forcing himself upon the female victim. Risk detection measurement may vary significantly between studies, utilizing different levels of severity, presentation style, and dependent variable measurement. Some studies use audio (Loiselle & Fuqua, 2007), video (Parks et al., 2016), or written vignettes (Davis et al., 2009), and may quantify risk detection with response latency measures (Loiselle & Fuqua, 2007), or questionnaires (Davis et al., 2009). These vignettes allow for testing of interpretation and responding in specific sexual assault scenarios, but given the wide range of social encounters, may not capture every possible complexity of a social interaction. Furthermore, the inconsistent pattern of results reported for the effects of alcohol on detection of

risk cues supports the need for further researchers examining potential mediators and moderators of the relationship between intoxication and risk cue detection.

**Alcohol Myopia and Information Processing.** Although many researchers focus on the effects of alcohol on the detection of specific cues for sexual victimization within scenarios (e.g., perception of risk, ratings of male perpetrator's behavior), alcohol may also alter general processing of social cues. These more general processing styles may be relevant to understanding social information interpretation and behavioral responding in a wider variety of situations and scenarios. Social information has been studied relating to the processing of facial cues (Kano et al., 2003), reading written words describing social situations (Field et al., 2001), cognitive performance tasks, (Curtin, Patrick, Lang, Cacioppo, & Birbaumer, 2001), and physiological responding to cues (Soler-Baillo, Marx, & Sloan, 2005; Waldron, Wilson, Patriquin, & Scarpa, 2015). Consistent with social information processing theory, all relevant social information is processed and contributes to behavioral response selection and enactment. Thus, if particular social cues are misinterpreted or not equally attended to, resulting behavioral responding may be altered.

The effects of alcohol myopia leading to enhanced processing of positive cues over negative inhibiting cues have been examined in several studies. For example, general processing of social information which may be impaired by alcohol has been studied by examining responses to facial displays of emotion. In line with alcohol myopia theory, after consuming low doses of alcohol (approximate BAC of .012%), participants were more accurate at identifying faces depicting happy emotions compared to other emotions (Kano et al., 2002). Video vignettes have also been used to examine the effects of alcohol on general social cue processing through situational recall and interpretation of an interaction. After viewing a video vignette depicting a

man and a woman interacting in which the woman displays both cues of interest and cues of rejection of the man, it was found that intoxicated women (BAC = .08%) were more likely to have a bias for recalling and processing the positive cues over negative cues compared to sober women (Bartolucci, Zeichner, & Miller, 2009).

This self-reported cue attention bias has also been supported by neuropsychological evidence using event-related potentials in response to social cues. Examining the effects of intoxication on the processing of positive and negative social behavior, Bartholow, Fabiana, Gratton, and Bettencourt (2001) discovered that sober individuals tended to display a more pronounced late positive potential (LPP) event-related potential response to the description of negative behaviors than positive behaviors, suggesting a bias toward enhanced processing of negative social information. However, compared to sober participants, participants who were intoxicated instead displayed a bias for positive behavior (Bartholow, Pearson, Gratton, & Fabiani, 2003). Measures of cognitive attention remained similar between sober and intoxicated participants. Bartholow and colleagues (2003) suggest that later processing differences due to intoxication may result in a bias for interpreting positive social information over negative cues above and beyond simple differences in attention. Thus, at a neuropsychological level, alcohol intoxication may be contributing to enhanced processing of positive information and decreased processing of negative cues.

Modified Stroop tasks with threat-relevant words have also been used to study individuals' processing of social cues. Researchers have extensively examined emotional Stroop task performance in relation to trauma exposure and posttraumatic stress disorder functioning (see Cisler et al., 2011 for a review). The use of emotional Stroop tasks to measure processing is intended to predict cognitive and behavioral performance in applied settings. Participants who

had experienced victimization and showed decreased responding to an emotional Stroop task targeting sexual victimization words were more likely to report victimization in a follow-up time period (Waldron et al., 2015). Bias in processing for threat cues has been shown among trauma exposed, anxious, and control participants (Field et al., 2001; Mathews & MacLeod, 1985; Thomas, Johnstone, & Gonsalvez, 2007; Thrasher, Dalgleish, & Yule, 1994). Emotional Stroop results suggest that when not intoxicated, individuals exhibit a trend towards more strongly processing negative information. Processing of risk represents an important step in determining appropriate behavioral responses to dangerous situations. This trend towards increased processing of threatening environmental cues may represent a cognitive interpretation bias important for survival and safety.

This processing can also be impaired by the consumption of alcohol. In contrast to sober processing tendencies, research suggests that alcohol intoxication results in an increased bias toward processing of convivial cues (e.g., friendly, sociable, happy) compared to violence-related cue words (e.g., anger, fight, aggression) in an emotional Stroop task (Mitchell, Rutherford, Wrinch, & Egan, 2008). Related to risk detection and social information processing theory, if an individual is attentive to cues of risk and threat observed in their environment, they may be more effective at generating appropriate behavioral responses. If this processing interpretation is influenced by alcohol intoxication to prefer positive social cues, the risk cues may not be equally interpreted compared to a sober individual, and behavioral responding may be limited.

In another study of social information processing bias, Davis et al. (2009) sought to understand the role of processing of social information as it relates to decision making related to unprotected sex among a sample of 62 women. Participants' attention to and processing of both

positive, impelling cues, as well as inhibiting negative cues were measured in a hypothetical sexual vignette. Participants also responded to questions related to likelihood of engaging in unprotected risky sex. Results from this study suggested that alcohol intoxication was related to unprotected sex intentions, and this effect was significantly mediated by alcohols effects on a positive cue evaluation bias. In support of alcohol myopia theory, the effects of intoxication resulted in biased processing of social cues and resulting reported behavioral intentions.

However, the authors note that although they measured cue attention directly related to the scenario, there may be other individual difference variables that relate to decision making in social situations outside of the specific scenario witnessed. Individual differences in analyzing cue interpretation may relate to risk detection in a social scenario, thus it is possible that an individual's general ability to process social information may relate to their interpretation of specific situations.

### **Alcohol Myopia, Social Information Processing, and Risk Detection**

Yeater, Hoyt, and Rinehart (2008) proposed that an integrative approach should be taken to study all relevant social information processing factors that may contribute to risk for sexual assault. Previous research suggests social information processing of facial emotional expressions is related to interpretation of a sexual assault scenario, however, the association between general information processing and sexual assault risk detection has rarely been examined (Melkonian, Ham, Bridges, & Fugitt, 2017). If alcohol impairs general social information processing ability in such a way that decreased attention to negative cues, then the processing of specific cues in an applied sexual assault social scenario may also be impaired. Thus, considering alcohol myopia theory integrated within the social information processing framework, alcohol may relate to risk for sexual assault through the disruption of the accurate perception and decoding of relevant

social information. If an individual experiences a general disruption of social information processing, then responding in any social situation will be altered.

Incorporating evidence regarding the effects of alcohol on information processing into our current understanding of risk factors for sexual assault provides a novel factor by which prevention programs can be improved. For example, many researchers target assertive behavior as a key component of sexual assault prevention programs, as research suggests that lacking assertive behavior skills may result in increased risk for sexual assault for many individuals (Greene & Navarro, 1998; Katz et al., 2010; Schry & White, 2013). However, specific sexual assault prevention programs teaching assertiveness skills did not find a significant reduction in sexual victimization, despite showing an increase in knowledge and use of these assertiveness skills (Gidycz, Rich, et al., 2006). Although knowledge of assertive skills can be increased, it remains unknown if risky situations are accurately identified to practice these skills.

Models of bystander intervention for sexual assault also describe the stepwise process by which information can be observed and interpreted as dangerous prior to intervention behavior (Burn, 2009). Recent evidence suggests that alcohol intoxication impairs the accurate situational recall and recognition of risk in a hypothetical sexual assault scenario for bystanders (Ham et al., 2019). If alcohol is impairing the interpretation of social cues and decreased the processing of risk in a scenario, an individual may not adequately identify a situation as dangerous enough to necessitate intervention. Attention to the effects of intoxication on the bystander's ability to recognize cues relevant for sexual assault and intervene in potentially dangerous situations represents an understudied, but promising area of research (Leone, Haikalis, Parrott, & DiLillo, 2018). Thus, results from the current study could be used to further inform bystander intervention programs by integrating knowledge of the effects of alcohol intoxication. For

example, educational training on the myopic effects of alcohol reducing attention to negative cues, and focused training on enhancing risk cue recognition could serve to further empower bystanders to overcome the interpretation impairment to apply intervention content such as assertiveness skills.

Interventions aimed at reducing hazardous alcohol consumption, such as the application and use of protective behavioral strategies may also integrate knowledge of the effects of alcohol on social information processing. Studies of drinking patterns have identified greater rates of unwanted sexual contact among those who are less likely to use protective behavioral strategies to reduce their drinking, and decreased rates of sexual assault among those who use protective behavioral strategies to limit drinking (Lewis, Rees, Logan, Kaysen, & Kilmer, 2010; Palmer, McMahon, Rounsaville, & Ball, 2010). Lewis et al. (2010) suggest that due to the impairing effects of alcohol intoxication and the relationship between intoxication and sexual assault, one approach to reduce sexual assault incidence is to attempt to reduce hazardous alcohol consumption. Rather than blame individuals for the behavior of perpetrators, such research is aimed at informing individuals of the cognitive effects of intoxication to aid in effective management of potential risks as a result of intoxication that all individuals face.

### **Current Study**

The current study aimed to identify the effect of alcohol on social information processing as a potential mechanism by which risk detection in a sexual assault scenario is impaired. Given previous research examining alcohol's effects on the noticing and interpretation of social cues (e.g., Davis, Hendershot, George, Norris, & Heiman, 2007; Mitchell et al., 2008), the current study aimed to test the impact of alcohol myopia within the theoretical framework of social information processing in a sexual assault vignette. Young adult women consumed either a non-

alcohol control beverage or an alcoholic beverage dose targeting a BAC of .06% and completed measures of social information interpretation and a sexual assault risk detection task. Differences in threatening information processing and risk detection specific to a sexual assault scenario were compared between intoxicated and sober participants. Furthermore, this study tested the role of social information processing as a mediator of the relationship between alcohol intoxication and sexual assault risk detection.

**Hypotheses.** Extending previous research examining individual differences in the myopic effects of alcohol bias processing for positive information in the context of protected sex behavior (Davis et al., 2007), it was hypothesized that **1)** women in the alcohol condition will exhibit increased processing of positive social cues and decreased processing of sexual assault cues, as evidenced by smaller Stroop sexual assault difference scores (subtracting positive social cue block completion time from sexual assault cue block completion time) on the modified emotional Stroop, compared to women in the no alcohol condition. Consistent with previous risk detection studies (e.g., Loiselle & Fuqua, 2007), it was also predicted that **2)** alcohol condition will be associated with longer response latency in a hypothetical sexual assault vignette, indicating decreased detection of sexual assault risk compared to participants in the no alcohol condition. Finally, it was predicted that **3)** the relationship between alcohol condition and sexual assault vignette response latency will be mediated by decreased modified Stroop sexual assault difference scores.

## **Method**

### **Participants**

Participants were 48 young adult female college students ages 21 to 29 years recruited for an experiment about alcohol and social information processing. Participants were recruited from

the general psychology participant experiment pool in exchange for psychology experiment credit, as well as the general student body. Non-psychology students were recruited via fliers that were physically posted on campus and digitally distributed (i.e., University Newswire) offering financial compensation. Interested participants were invited to contact the laboratory to complete an eligibility screening.

Initial participant eligibility was determined through a brief telephone screening with exclusion criteria consistent with the guidelines by the National Advisory Council on Alcohol Abuse and Alcoholism (2005) for alcohol administration research. Participants were excluded if they were below age 21, were pregnant or attempting to become pregnant, had a medical condition for which alcohol is contraindicated, taking contraindicated medication, using illicit drugs, lacked experience with the study alcohol dose, or met diagnostic criteria for alcohol dependence or posttraumatic stress disorder in relation to a sexual trauma. In total, 151 individuals contacted the laboratory with interest in participating. Of those, 38 did not respond to telephone contact. One-hundred and thirteen individuals completed a telephone screening, of which 83 were deemed initially eligible. After phone screening, 15 individuals either cancelled their scheduled appointments or were unable to arrange time to participate. Of those scheduled, 14 did not show for their appointment. Individuals who no-showed two scheduled appointments or did not return two follow-up telephone attempts were deemed no longer interested and were not contacted further. Of the 54 individuals who arrived at the laboratory and completed informed consent, three individuals were deemed ineligible upon completing comprehensive eligibility screening in the laboratory.

Fifty-one participants completed the study. Three participants were not included in the analytic sample, as described in the Data Analytic Plan. The final sample consisted of 48 female

participants. The majority of the sample reported their ethnicity as 70.8% non-Hispanic White. Participants were 22.10 ( $SD = 1.79$ ) years of age on average. Full sample demographics are displayed in Table 1.

## **Materials**

**Demographics.** Age, sex, race/ethnicity, and current student status were assessed with self-report questionnaires.

**Sexual Victimization History.** Given mixed results relating sexual victimization history and differences in risk detection (i.e., some have found victims of sexual assault respond later on measures of risk detection [Soller-Baillo, Marx, & Sloan, 2005], while others have found no differences in risk detection by victimization history [Loiselle & Fuqua, 2007; Melkonian et al., 2018]), sexual victimization history was measured as a potential covariate.

Adult sexual victimization was assessed using the Sexual Experiences Survey–Short Form Victimization (SES-SFV; Koss et al., 2007). The SES-SFV includes seven types of unwanted sexual experiences (e.g., unwanted sexual touching, oral, vaginal, and anal penetration) each asked by five different methods the perpetrator may have used (e.g., verbal coercion, manipulation, taking advantage via alcohol or drugs, physical threatening, and physical force). The SES-SFV asks the frequency of each of these experiences within the past year and since the age of 14 years. The SES-SFV encourages accurate responding by avoiding the terminology “rape”, and rather assesses for history of specific behaviors. The revised SES-SFV has evidenced excellent reliability and validity in recent studies (Johnson et al., 2013; Schry & White, 2013). The SES-SFV was scored by tabulating the frequency of reported completed unwanted sexual contact obtained by any means including coercion, force, or intoxication.

Women who reported any unwanted sexual contact were included in the positive sexual victimization history group ( $n = 29$ ).

Sexual victimization prior to age 14 was assessed with the Computer Assisted Maltreatment Inventory (CAMI; DiLillo et al., 2010). The CAMI asks participants if they have experienced a series of sexual acts (such as sexual contact and penetration) either against their will, with a family member, or with someone more than 5 years older. Instructions direct participants to not include acts that occurred voluntarily with a romantic partner or that “occurred during explorative play with a peer.” Frequency of occurrence are rated as 1 = *never happened*, 2 = *1-2 times*, 3 = *3-5 times*, 4 = *6-10 times*, and 5 = *over 10 times*. The authors of this measure suggest scoring any item endorsed as occurring prior to 14 with a perpetrator 5 years or older as childhood sexual assault. Any endorsement of sexual experiences without consent or with a family member are scored as childhood sexual assault. The CAMI has displayed good to excellent internal consistency of subscales, and good test-retest reliability (DiLillo et al., 2010). Among the current sample, 6 participants reported any childhood sexual assault.

Participants who reported any childhood sexual victimization or victimization since the age of 14 were included in the positive lifetime sexual victimization history group ( $n = 30$ ).

**Comprehensive Effects of Alcohol Scale.** Given the potential relevance of the expected effects of alcohol on relevant study measures, the Comprehensive Effects of Alcohol (CEOA; Fromme, Stroot, & Kaplan, 1993) scale was used to assess alcohol outcome expectancy effects as a potential covariate. Both positive (e.g., “I would be humorous”) and negative (e.g., “I would feel moody”) expectancies are measured by asking participants to rate the degree to which they agree an effect of alcohol will happen to them if “under the influence from drinking alcohol” on a scale of 1 = *disagree* to 4 = *agree*. Participants were informed they should respond to the

measure regarding what effects they would expect as a result of consuming alcohol, rather than how they typically act when not under the influence. Mean scores were calculated for seven subscales: sociability (e.g., “I would be outgoing”;  $\alpha = .77$ ), tension reduction (e.g., “My body would be relaxed”;  $\alpha = .78$ ), liquid courage (e.g., “I would be brave and daring”;  $\alpha = .85$ ), sexuality (e.g., “I would act out fantasies”;  $\alpha = .81$ ), impairment (e.g., “I would feel clumsy”;  $\alpha = .63$ ), risk and aggression (e.g., “I would take risks”;  $\alpha = .80$ ), and self-perception (e.g., “I would feel self-critical”;  $\alpha = .61$ ). The CEOA has demonstrated good internal consistency, reliability, and construct validity (Fromme et al., 1993; Ham, Hope, Stewart, & Norton, 2005).

**Hazardous Alcohol Use.** To assess randomization procedures and to include as a possible covariate, levels of hazardous alcohol use was assessed using the Alcohol Use Disorders Identification Test (AUDIT, Babor et al., 2001). The AUDIT includes 10 items assessing drinking frequency, quantity, and problems across the past 12 months. A total score was calculated by summing responses to each of the 10 items. Reliability in the current sample was poor ( $\alpha = .59$ ).

**Sexual Assault Vignette Risk Detection.** Risk detection in a sexual assault vignette was measured using an audio recording describing a sexual social situation (Marx & Gross, 1995). The vignette depicts a man and a woman who are alone together following their second date and describes progressive stages of sexual contact and varying levels of consent. This vignette is designed to proceed in a linear fashion with each successive step representing more severe levels of sexual aggression. The vignette begins with light conversation between the man and woman. The audio proceeds to describe kissing, followed by describing the man fondling of the woman’s breasts and genitals despite the woman’s refusal. The audio vignette concludes with a description of the man having forced intercourse with the woman. Participants were instructed they are to

indicate via the press of a button on the computer when the man has “gone too far” and should stop making sexual advances. Participants were informed they will still listen to the remainder of the story no matter when they press the button, to eliminate effects of participants refraining from stopping the story to hear its conclusion. The entire story lasts 370 seconds. Previous research applications of the vignette have identified six phases of the story: 0 – 74 seconds represents mutual conversation, 75-97 seconds reflects the beginning of the female victim politely and then directly refusing advances, 98 – 136 seconds describes verbal refusals while the male perpetrator apologizes for his actions, 137 – 179 seconds describes the man continuing to verbally pressure the female despite her refusal, 180 – 276 seconds describes “verbal threats and adamant refusals,” and 277 – 370 depicts “forced sex” (Marx et al., 1999; Soler-Baillo et al., 2005).

Convergent and divergent validity tests report response latency on this measure is associated with positive perceptions of sexual aggression, calloused sexual beliefs, and more positive perceptions of interpersonal violence, and is not associated with reported social desirability (Bernat, Stolp, Calhoun, & Adams, 1997). Previous victimization history has been associated with later recognition of risk in the scenario (Soler-Baillo et al., 2005). Bernat et al. (1997) also reported test-retest reliability of .87 across a two-week follow-up time period in a sample of 102 undergraduates. Later risk detection in a similar written vignette has been associated with subsequent experience of sexual assault (Messman-Moore & Brown, 2006). The current audio vignette was selected due to its increased use in previous experimental research studies examining risk detection in a sexual assault setting including alcohol administration and psychophysiological assessment (Loiselle & Fuqua, 2007; Pumphrey-Gordon & Gross, 2007; Soler-Baillo et al., 2005).

**Alcohol Myopia and Social Information Processing.** Social information processing was measured using a modified emotional Stroop task. Emotional Stroop tasks have been used to study social information processing among adults when sober and when under the influence of alcohol (Dykas & Cassidy, 2011; Mitchell et al., 2008). Consistent with previous applications of a modified Stroop task in sexual assault and threat processing (Field et al., 2001; Mitchell et al., 2008; Waldron et al., 2015), participants were shown words from categories in separate blocks: positive (e.g., party, friends, fun), negative (e.g., cancer, stress, panic, nervous), control (e.g., “XXXXX”), and sexual threat-related (e.g., victim, fondle, rape). Based on the task design by Field et al. (2001), each block consisted of 10 total unique words, arranged on an 8.5” x 11” sheet of paper into five columns of 20 words each, for a total of 100 words per page. Each column contained each of the 10 words repeated twice, and arranged in a randomized sequence. Each individual word was printed in a randomized order of red, blue, green, or yellow ink. Participants were instructed to quickly name aloud the ink color that the words are printed in, rather than reading than the text of the printed word. Participants were instructed to complete this task as quickly and accurately as possible. If the participant made a mistake in naming the correct color of ink, the researcher stated aloud “No,” prompting the participant to correct their mistake and continue. The researcher recorded the total time it takes the participant to complete each block of words. Scores are calculated based on total time to complete each task block (positive, negative, control, sexual assault-related threat). Longer interference scores indicate greater processing of the target word block (Field et al., 2001). Field et al. (2001) found greater interference scores for sexual assault threat words compared to neutral and general threat words indicating a bias for processing sexual assault risk cues among sober individuals. Stroop sexual assault difference scores were calculated by subtracting participant’s positive social cue block

time from their sexual assault cue block time. Greater numerical scores represent greater processing of sexual assault threat cues. Negative information bias scores were also calculated by subtracting participant's negative cue block time from their positive cue block time. Consistent with previous applications of this measure and alcohol intoxication, the task will be presented only once after condition assignment and drinking, to reduce the potential influence of practice effects altering performance (Mitchell et al., 2008).

### **Procedure**

Figure 1 depicts flow chart of study procedures. Potential participants first completed a brief telephone screening to assess for the primary eligibility criteria (between the ages of 21 and 29 years, not currently pregnant or attempting to become pregnant, no medical conditions for which alcohol is contraindicated, taking any medication on a regular basis or within 24 hours of study session, currently using any illicit drugs, lacking experience with alcohol dose, or requiring intensive treatment for alcohol problems). Participants who passed the initial screening were provided an overview of study procedures and informed they were not to consume alcohol 24 hours before their planned session, should not consume food 3 hours prior, nor take any contraindicated medications within 24 hours. Participants were also instructed to arrange for transportation after participation, given they may consume alcohol.

Once participants arrived to the laboratory, breath alcohol concentration (BrAC) was measured to ensure participant sobriety. All participants recorded an initial BrAC of .000%. BrAC was measured using the Intoximeter Alco-Sensor FST®. Next, participants were given an overview of the study procedures, including expected risks and benefits of participation, and provided informed consent. After providing informed consent, participants were also required to sign a behavioral contract indicating they agree not to drive if they consume alcohol and agree

they must remain in the laboratory until their BAC reaches below 0.04%. Next, participants completed an assessment of eligibility criteria through a brief structured interview, and current pregnancy was ruled out with a urine pregnancy test. If participants indicated any contraindication for alcohol administration, they were informed they were no longer eligible for the remainder of the study due to health and safety concerns. Participants who screened out for further study completion were compensated for their time and debriefed.

Following the eligibility interview, eligible participants were weighed using a digital scale to inform alcohol dosing. Participants then proceeded to complete questionnaires administered through computer survey software, including demographic measures, sexual assault history, and alcohol expectancies measures. Next, participants were directed to the bar-laboratory and informed of their randomly assigned beverage condition to drink alcohol (alcohol condition) or a non-alcohol control beverage (control condition). The consumption phase was facilitated by a trained female research assistant “bartender.” The “bartender” provided participants instructions for the beverage consumption phase. Participants were informed they will be given three drinks to consume in a 10-minute drinking phase. Participants assigned to the alcohol condition consumed a mixed beverage club soda and 100 proof vodka. The amount of alcohol consumed was calculated per participant to achieve a peak BrAC of .06%. Although some studies have examined the effects of alcohol at higher doses (.08 - .10%), the effects of alcohol on impairing risk detection have been observed at lower levels (.04 - .06%; e.g. Davis et al., 2009; Loiselle & Fuqua, 2007; Pumphrey-Gordon & Gross, 2007). Given the scope of the present study, a BrAC of .06% was targeted to reduce overall detoxification time and cost of a higher target BrAC, while still remaining high enough to observe expected effects. Based on prior alcohol administration research targeting a BrAC of .06%, this BrAC was achieved with an

alcohol dose of .477g ethanol/kg body weight (Davis et al., 2009). This alcohol dose was mixed with club soda at a 1-part alcohol to 3-parts club soda ratio. Participants were provided the option to add zero calorie, zero sugar flavorings to this mixed beverage. An equation was created in Microsoft Excel to compute the volume of club soda and vodka to be mixed based on entered participant weight. Control condition participants consumed club soda at an amount equal to the total volume of liquid they would consume if assigned to the alcohol condition.

After the drinking phase, the bartender recoded the completion time and total amount of beverage remaining. Next, each participant was instructed to rinse their mouth with water to ensure accurate BrAC assessment. BrAC readings were then taken every four minutes following completion of beverage consumption until the criterion BAC (.045%) was reached to ensure the remainder of the study will occur while on the ascending limb of the BAC curve. A yoked control design was used to control for variability in alcohol absorption times (Giancola & Zeichner, 1997). Each alcohol condition participant was followed by a yoked control participant who waited the same amount of time following completion of beverage consumption and completed the same number of BrAC tests during that period as did the alcohol condition participant to which they are yoked.

Although expectancy effects of alcohol consumption may relate to sexual risk taking, a placebo drink condition was not used. However, alcohol expectancies were measured as a potential covariate. In natural drinking situations, women frequently are aware of the alcoholic or nonalcoholic status of their beverages. There are further concerns of the effectiveness of a placebo condition to produce reliable measurements of expectancy effects compared to compensatory and reactionary behavior (Testa et al., 2006). Given the problems surrounding the

use of a placebo condition to address the aims of this project, drink conditions were limited to alcohol and control.

After beverage consumption, participants completed the modified emotional Stroop task facilitated by the research assistant. Participants were provided instructions that they are to name aloud the color of the ink each word is printed in as quickly and accurately as possible. Four trials blocks were presented in sequential order: control, positive, negative, and sexual assault. Participants' time to complete each word block was recorded. BrAC was again measured (observed  $M_{BrAC} = .058\%$ ).

Participants returned to the computer for additional experimental tasks. Participants first completed a supplemental task as a component of a secondary study outside of the scope of the current study analyses. Specifically, participants viewed a video set in the first-person of a male in a convivial drinking setting. In the video, the male compliments the female's appearance, offers to provide an alcohol drink, and requests to spend time alone (for full video details see Parks et al., 2016). Participants responded by indicating the number of times throughout the interactions they felt uncomfortable.

Next participants completed the sexual assault risk detection audio vignette. Participants were instructed they would be listening to an audio vignette describing a social interaction. They were provided written and verbal instructions to press the space bar on the computer at the point in which they believe the man in the story had "gone too far" and should stop making sexual advances. Participants were informed the story would continue in its entirety, regardless of when they pressed the space key. The audio vignette task was administered through DirectRT computer software. Participants pressed the "enter" key to begin the audio vignette. Response

latency was recorded by the computer software at the moment participants pressed the “space” key.

After completion of the sexual assault risk detection task, participants another task assessing reactions to interpersonal social aggression vignettes, and additional measures of psychological functioning for another study.

Upon completion of all measures, participants were then debriefed on the purpose and procedures of the study. Participants were requested to keep study procedures confidential, as sharing details of the vignette may bias future participants. The debriefing also included a brief check in of the participant’s current physical and emotional state due to the potentially distressing nature of the audio vignette and effects of intoxication. All participants were provided a list of mental health resources for further assistance managing emotional difficulties if necessary, in addition to a list of resources for sexual assault support and treatment. Participants who did not consume alcohol were compensated for their time and the study was concluded at this point.

Participants in the alcohol condition, however, completed detoxification following the initial verbal debriefing. Participants remained in the laboratory until they reached a BAC below 0.04%. During the detoxification phase, participants had access to food and water and engaged in leisure activities such as reading or watching television. BrAC was measured approximately every 15 minutes. Once consecutive BAC readings below 0.04% were reached, participants were again debriefed. All participants in the alcohol condition were informed of the risks of operating a motor vehicle, and reminded of their signed behavioral contract not to drive after leaving the laboratory. Participants were then compensated for their time and the study was concluded.

Participants recruited from the general psychology research pool were compensated for their time at a rate of 1 credit per hour of participation. Non-psychology student participants were compensated for their time at a rate of \$10 per hour of participation.

### **Data Analytic Plan**

First, descriptive statistics were obtained for all study variables. Data were examined for missing data and outliers. Of the 51 participants who completed the study, one participant did not have complete data for the modified emotional Stroop task and was not included in analyses. Another participant reported their gender as “genderfluid” and was excluded from analyses due to study focus on individuals who identify as women. One outlier was observed for sexual assault vignette response latency. Their score was over 3.5 standard deviations above the mean, and this case was removed from the sample. The final sample reported in analyses consisted of 48 women.

Modified emotional Stroop sexual assault difference scores were calculated by subtracting the “positive” block completion time from the “sexual assault” cue block (Field et al., 2001; Thomas et al., 2007). Larger values represent a stronger bias for processing sexual assault cues relative to positive social information. Data were further assessed for normality and assumptions of regression including linearity, independence of error, and homoscedasticity. Differences in demographic variables between conditions and by sexual assault history group were examined with chi-square difference tests and independent samples t-tests.

**Primary Analyses.** To examine the direct effects of alcohol on sexual assault risk detection and social information processing, independent samples t-tests were conducted comparing response latency and modified emotional Stroop sexual assault difference scores by condition. Mediation was tested consistent with Preacher and Hayes’ (2004) recommendations

and was performed using SPSS version 23.0 with Hayes' (2012) PROCESS macro model 4 with bias-corrected bootstrapping (with 5000 replicates). Mediation analyses were conducted to identify the direct effect of alcohol condition on sexual assault response latency, and the indirect effect of alcohol condition on sexual assault response latency mediated by social information processing difference scores. See Figure 2 for a depiction of the mediation model tested.

Although preliminary analyses revealed sexual assault history did not significantly differ by alcohol condition, due to previous research suggesting that sexual assault risk detection response latency may differ based on participant sexual victimization history experience, participant sexual assault history were included as covariates in this mediation model (Pumphrey-Gordon & Gross, 2007; Soler-Baillo et al., 2005; Wilson, Calhoun, & Bernat, 1999). No alcohol outcome expectancy subscales significantly differed by condition, nor did AUDIT scores, and thus these measures were not entered as covariates in the model.

**Exploratory Analyses.** Given mixed patterns of findings related to the direction of association between sexual victimization history and sexual assault risk detection response latency, sexual victimization history's relationship to response latency was explored as an exploratory moderator. Although the current sample size is underpowered to detect significant moderation (see Power Analysis), these results are intended to inform future study hypotheses.

**Sample Size and Power.** Tests of the relationship between processing bias and sexual decision making, and social information processing and risk detection suggest medium-to-large effect sizes of the effect of social information processing (Davis et al., 2007; Melkonian et al., 2014). Preliminary studies also reveal a medium effect of alcohol condition on social information processing related to threat cues ( $\eta_p^2 = .10$ ) in a sample of 48 community participants (Ham et al., 2014). Related studies examining alcohol's effects on risk detection (Loiselle & Fuqua,

2007) and cue detection mediating the effects of alcohol in a risky sex vignette (Davis et al., 2007) suggest medium-to-large effect sizes for the effect of alcohol on cue processing and risk detection ( $d = .65$ ). Following Fritz and MacKinnon's (2007) required sample size guidelines for detecting mediated effects, using a bias-corrected bootstrapping model with a power of .80 and medium-to-large effect sizes between individual pathways, *a priori* power analyses suggested sample size of 53-71 participants would be required to detect predicted mediation effects. If effect sizes are large, a sample size of 43 would be sufficient to detect predicted mediation effects. Thus, the current sample size of 48 was sufficient to detect large effect sizes, but may be slightly underpowered to detect medium-sized mediation effects.

A power analysis was conducted to inform exploratory analyses using G\*Power software version 3.19. To detect significant interaction effects between alcohol condition and sexual victimization history associated with sexual assault response latency, estimating medium effect sizes, a sample size of approximately 149 participants would be required.

## **Results**

### **Preliminary Analyses**

Participant age, ethnicity, sexual orientation, or year in school did not significantly differ between alcohol and no alcohol conditions. The alcohol condition contained a nonsignificantly greater proportion of women who reported any lifetime history of sexual assault (75%) compared to the no alcohol condition (50%),  $\chi^2 = 3.20, p = .07$ . Participants did not vary in reported hazardous alcohol use or in alcohol outcome expectancies subscales between the alcohol and no alcohol conditions. Demographic results are detailed in Table 1.

Descriptive results for study variables are shown in Table 2 for the full sample, alcohol condition, and no alcohol condition. Participants did not significantly differ on any descriptive study measures by alcohol condition.

Table 3 shows differences in descriptive study variables between women with and without a history of any lifetime sexual assault. Participants did not significantly differ in reported hazardous alcohol use, or on alcohol outcome expectancy subscales of sociability, tension reduction, liquid courage, cognitive behavioral impairment, or risk and aggression. Women who reported any lifetime sexual victimization reported significantly higher expectancies for alcohol to enhance sexuality ( $M = 2.43, SD = .73$ ) compared to women who did not report any lifetime sexual victimization ( $M = 1.92, SD = .59$ ),  $t(46) = -2.49, p = .02$ . Women in the positive sexual victimization history group also reported significantly higher expectancies for alcohol to influence negative self-perception ( $M = 1.60, SD = .49$ ) compared to women in the no sexual victimization history group ( $M = 1.31, SD = .28$ ),  $t(46) = -2.33, p = .02$ .

Bivariate correlations are displayed in Table 4. Sexual assault vignette response latency was significantly positively associated with negative AOE, sociability AOE, and cognitive behavioral impairment AOE. Stroop sexual assault difference scores were significantly positively correlated with Stroop Positive – Negative difference scores.

### **Hypothesis 1**

Participants in the alcohol condition stopped the sexual assault vignette significantly earlier ( $M = 76.97$  seconds;  $SD = 25.89$ ) than participants in the no alcohol condition ( $M = 103.11$  seconds;  $SD = 37.67$ ),  $t(46) = 2.46, p = .02, \eta^2 = .12$ .

## Hypothesis 2

Modified emotional Stroop sexual assault difference scores did not significantly differ between the alcohol condition ( $M = 16.84$ ;  $SD = 9.27$ ) and no alcohol condition ( $M = 11.88$ ;  $SD = 10.04$ ),  $t(46) = -1.78$ ,  $p = .08$ ,  $\eta^2 = .06$ .

## Hypothesis 3

First, the relationship between the independent variable and the hypothesized mediator was tested. Controlling for lifetime sexual victimization history, alcohol condition was significantly associated with modified emotional Stroop sexual assault difference scores such that participants in the alcohol condition displayed larger difference scores ( $M = 17.63$  seconds) compared to participants in the no alcohol condition ( $M = 10.10$  seconds),  $B = 6.54$  (95% CI: 0.95, 12.12);  $t = 2.36$ ,  $p = .02$ ,  $\eta_p^2 = .11$ .

Next, the relationship between the independent and dependent variables were tested. Controlling for lifetime sexual victimization history, alcohol condition was significantly associated with sexual assault vignette response latency, such that participants in the alcohol condition stopped the vignette significantly earlier ( $M = 74.08$  seconds) compared to participants in the no alcohol condition ( $M = 106.00$  seconds),  $B = -31.92$  (95% CI: -53.28, -10.57);  $t = -3.01$ ,  $p < .01$ ,  $\eta_p^2 = .17$ .

Third, the relationship between the mediator and dependent variable was examined. Accounting for alcohol condition, lifetime victimization history, modified emotional Stroop sexual assault difference scores were not significantly associated with sexual assault response latency,  $B = -0.14$  (95% CI: -1.30, 1.02);  $t = -0.25$ ,  $p = .81$ ,  $\eta_p^2 < .01$ . Controlling for the relationship between modified emotional Stroop sexual assault difference scores and lifetime

victimization history, alcohol condition was significantly associated with sexual assault vignette response latency,  $B = -30.99$  (95% CI: -53.88, -8.10);  $t = -2.73$ ,  $p = .01$ ,  $\eta_p^2 = .15$ .

Finally, the significance of the indirect effect between alcohol condition and sexual assault vignette response latency mediated by modified emotional Stroop sexual assault difference scores was tested. Results suggest the indirect effect was not significant,  $B = -0.93$ , 95% CI: -10.12, 8.60. This test of mediation is depicted in Figure 3. The full pattern of mediation results are shown in Table 5. Findings indicate alcohol condition was significantly associated with increased modified emotion Stroop sexual assault difference scores, and decreased sexual assault vignette response latency. However, modified emotional Stroop sexual assault difference scores were not significantly associated with sexual assault vignette response latency. No evidence was found in support of significant mediation.

### **Exploratory Analyses**

A significant main effect was observed for alcohol condition on sexual assault response latency such that participants in the alcohol condition stopped the vignette significantly earlier ( $M = 76.97$ ,  $SD = 35.89$ ) than participants in the no alcohol condition ( $M = 103.11$ ,  $SD = 37.67$ ),  $F(1, 44) = 9.03$ ,  $p < .01$ ,  $\eta_p^2 = .17$ . A significant main effect of sexual assault history group was observed such that participants in the positive sexual assault victimization history group stopped the vignette significantly later ( $M = 95.51$ ,  $SD = 38.74$ ) than participants in the no sexual victimization history group ( $M = 80.93$ ,  $SD = 38.00$ ),  $F(1, 44) = 4.59$ ,  $p = .04$ ,  $\eta_p^2 = .09$ . The interaction between alcohol condition and sexual victimization history group was not significant,  $F(1, 44) = .25$ ,  $p = .62$ ,  $\eta_p^2 = .01$ . Interaction means by condition are displayed in Table 6.

Significant main effects were observed for alcohol condition and sexual victimization history group on emotional Stroop sexual assault difference scores. A significant main effect was

observed for alcohol condition on modified emotional Stroop sexual assault difference scores such that participants in the alcohol condition displayed significantly greater sexual assault difference scores ( $M = 16.84$ ,  $SD = 9.27$ ) than participants in the no alcohol condition ( $M = 11.89$ ,  $SD = 10.04$ ),  $F(1, 44) = 4.38$ ,  $p = .04$ ,  $\eta_p^2 = .09$ . A significant main effect of sexual assault history group was observed such that participants in the positive sexual assault victimization history group displayed significantly shorter Stroop sexual assault difference times ( $M = 12.69$ ,  $SD = 10.29$ ) than participants in the negative sexual victimization history group ( $M = 17.24$ ,  $SD = 8.68$ ),  $F(1, 44) = 4.41$ ,  $p = .04$ ,  $\eta_p^2 = .09$ . The interaction between alcohol condition and sexual victimization history group was not significant,  $F(1, 44) = .27$ ,  $p = .61$ ,  $\eta_p^2 < .01$ . Interaction means by condition are displayed in Table 7.

### **Discussion**

The current study proposed social information processing as a potential mediator between alcohol intoxication and processing of risk related to sexual assault. This study tested the relationships between modified emotional Stroop task performance (as a measure of social information processing), and risk detection response latency to a hypothetical audio sexual assault vignette (as a measure of sexual assault risk processing) in a between-groups alcohol administration experiment. It was hypothesized that alcohol condition would be associated with **1)** increased bias for processing positive social information as indicated by smaller modified emotional Stroop sexual assault difference scores compared to the no alcohol condition, and **2)** decreased sexual assault risk detection as measured by greater vignette response latencies compared to the non-alcoholic beverage condition. It was further hypothesized that **3)** alcohol's effects on sexual assault vignette response latency would be mediated by smaller modified

emotional Stroop sexual assault difference scores. These three hypotheses were not supported by the current study results.

In contrast to the first hypothesis, participants in the alcohol condition displayed significantly greater—rather than smaller—modified emotional Stroop sexual assault difference scores when controlling for sexual victimization history, compared to participants in the no alcohol condition. Greater difference scores indicate participants in the alcohol condition took relatively longer to complete the sexual assault cue block of words compared to the positive cue block of words. Longer completion time scores on a Stroop task is generally consistent with greater cognitive processing of the content of the word, inhibiting participant responding with the color of the ink. Given that difference scores were increased in the alcohol condition; this suggests greater processing of sexual assault cue words relative to positive social information cue words for women in the alcohol condition. Difference scores comparing the negative word block and positive word blocks were also examined (see Table 2). These results suggested no differences in condition for the negative/positive difference scores. Alcohol condition was uniquely associated with a relative increase in processing of sexual assault cue words, but not associated with an increase in processing negative words in general. Current study results are contrary to findings from Mitchell et al. (2008), who report that alcohol intoxication was associated with decreased processing of aggression-related threat cues and increased processing of positive cues in a Stroop task. Participants in their study were recruited at a university dance event, and participants in the alcohol condition reported consuming alcohol in a naturalistic environment. For these participants, positive social information relevant to the convivial social environment and natural drinking setting may have been more salient than negative cues of threat, thus accounting for the bias in perception for positive cues. Participants in the current

study were consuming alcohol as part of a psychological experimental task, and social, convivial cues may not have been as salient as compared to individuals in a naturalistic setting. Although Bartholow et al. (2001) discovered alcohol was associated with decreased processing of negative social information as depicted in a video, the cues presented in the Stroop task in the current study are instead words presented in isolation from social context. Additionally, intoxication may have been associated with particular impairments in maintaining task performance due to alcohol's effects on decreased cognitive control of attention when presented with potentially distressing sexual assault terms, whereas non-alcohol condition participants were able to more effectively moderate their attention (Curtin & Fairchild, 2003; Curtin et al., 2001).

Contrary to the second hypothesis, results indicated that alcohol intoxication was associated with earlier sexual assault risk detection as measured by shorter response latency times in response to the sexual assault vignette. This finding suggests that participants in the alcoholic beverage condition believed the man had gone too far and should stop his sexual advances earlier than participants in the non-alcoholic beverage condition. At the average time that participants in the alcohol condition stopped the vignette, the woman had not yet refused the man's behavior. However, he is continuing to make advances without asking for consent such as moving closer to the woman, kissing her, and commenting on her body. Participants in the no alcohol condition, on average, stopped the vignette after the woman has stated, "Please, I like it when you touch my chest, but not right now." Participants in the alcohol condition indicated the man had gone too far by making progressive advances without asking for consent, while participants in the no alcohol condition indicated the man had gone too far after the woman had asked the man to stop a specific behavior.

Although alcohol was associated with shorter response latency in the current study, prior research has reported alcohol intoxication is associated with a reduction in sexual assault risk cue detection among potential victims (e.g., for a review, see Melkonian & Ham, 2018) and bystanders (e.g., Ham et al., 2019). Specifically, two prior sexual assault risk detection studies utilizing this vignette measure have identified an impairing effect of alcohol at a lower level of intoxication such that intoxicated participants responded significantly later in the vignette. Loiselle and Fuqua (2007) report participants in their non-alcohol placebo condition stopped the vignette on average at 92.19 seconds (Current study no alcohol condition:  $M = 105.95$ ). However, participants in the alcohol condition reported by Loiselle and Fuqua (2007) stopped the vignette after approximately 134 seconds (Current study alcohol condition:  $M = 76.97$ ), during which the woman is making explicit refusals of the man's sexual touching. Marx, Gross, and Adams (1999) also reported significant effects of alcohol at an intoxication level of .04% associated with slower response latency ( $M = 185$  seconds) compared to a non-alcohol condition among a sample of men ( $M = 153$  seconds). Given the average response latency for men reported by Marx et al. (1999) appears greater than the mean response latency for women in the current study and in the study reported by Loiselle and Fuqua (2007), it is possible that there are differences in response latency between men and women.

However, not all research utilizing the Marx and Gross (2005) vignette has revealed significant effects of alcohol on response latency. Two studies including samples of women only report no significant differences in response latency by alcohol condition. In an unpublished thesis, Lewis (2001) reported no main effect of alcohol at a BrAC of .08% on response latency among a sample of 80 women (response latency averages range from 125 seconds to 145 seconds). Pumphrey-Gordon and Gross (2007) report no significant main effect of a BrAC of

.05% compared to no alcohol on response latency among a sample of 103 women, with mean response latency times ranging from 109 seconds to 116 seconds. However, the authors note the potential that individual differences, such as gender, alcohol expectancies and sexual victimization history, are possible factors that may influence alcohol's impact on response latency.

Finally, there was no support for mediation in the current study as proposed in Hypothesis 3. Alcohol condition was significantly associated with sexual assault response latency, and was associated with Stroop sexual assault difference scores. However, Stroop sexual assault difference scores were not significantly associated with response latency. Although observed effects between Stroop sexual assault difference scores and response latency were small, it is also possible there are additional individual differences which may moderate the association between information processing bias and sexual assault risk detection response latency, such as behavioral inhibition. Although some individuals who showed greater bias for processing sexual assault cues on the Stroop task may have been motivated to quickly respond to sexual assault cues in the vignette, others who displayed a similar bias for sexual assault cues may instead have spent a greater amount of time considering and perseverating on the vignette cues observed before responding. Alternate measures of sexual assault vignette risk cue awareness, such as recall of risk cues (e.g., Davis et al., 2009) may more directly relate to the information processing biases measured by the Stroop task compared to the response latency measure in the current study. Additionally, the current study examined Stroop completion times, however, Stroop completion times may not fully reflect the cognitive and physiological processes impacted by intoxication most relevant for sexual assault risk detection. For example,

decreased psychophysiological response to a sexual assault Stroop task was associated with future experience of sexual assault (Waldron et al., 2015).

Taken together, findings suggest intoxicated participants displayed greater processing of sexual assault cue words over positive social cue words, and recognized risk in a sexual assault vignette quicker than participants who were not intoxicated. This pattern of alcohol intoxication associated with more rapid response latency is contrary to some previous research findings and study hypotheses. One particular difference between the present study and previous sexual assault risk detection research studies is the inclusion of additional measures of social information processing and the presentation of a video involving sexually harassing behavior. In addition to survey measures assessing sexual assault history, the modified emotional Stroop task included a block specific to sexual assault cues. Furthermore, participants were informed they are to identify when the man has gone too far, which may suggest to participants that sexual assaultive behavior will occur. Outside of the context of intoxication, priming messages have been shown experimentally to influence bystander behavior (Abbate, Ruggieri, & Boca, 2013). After completing a priming task involving a verbal sentence task containing pro-social priming words, participants were more likely to intervene to help a stranger, compared to a neutral-word priming task. Participants in the current study may have experienced a priming effect from completing several measures assessing childhood and adulthood sexual victimization history followed by the sexual assault word block during the Stroop task, and vignette instructions. Throughout the study, participants were presented with several sexual assault-relevant terms, which may have served to prime participants of the relevance of sexual assault cues. This priming process may have interacted with the myopic effects of alcohol to result in sexual assault cues being of particular salience to participants in the alcohol condition. In accordance with

alcohol myopia theory, intoxicated individuals are more likely to cognitively process information which is most salient. Because of this enhanced cognitive processing of salient information, it is possible study measures which included sexual assault-relevant terminology, in addition to asking participants to recognize when the man had gone “too far” in the vignette primed the relevance of sexual assault information for participants during the vignette task. As a result of the myopic effects of alcohol, sexual assault was the most salient social information to be attended to during the vignette task specifically for intoxicated participants, contributing in part to earlier response latency for those in the alcohol condition.

It is also possible this increased processing of sexual assault risk cues resulted in more rapid responding due to the disinhibiting effects of intoxication. Although alcohol intoxication is commonly studied in association with negative social outcomes, the disinhibiting effects of alcohol may also result in prosocial behavior due to limited cognitive processing of potentially conflicting cues (Hirsh, Galinsky, & Zhong, 2011). When considering intervening in potential sexual assault scenarios, students have identified that ambiguity regarding the status of the victim presents a potential barrier to intervening (Pugh, Ningard, Ven, & Butler, 2016). However, when intoxicated, participants may not have cognitively dwelled on the potential situational ambiguity, and instead responded rapidly due to the disinhibiting effects of alcohol.

Furthermore, qualitative interviews with young adult women suggest that some women may anticipate potential increased sexual risk as a result of alcohol-related disinhibition, and may choose to intentionally compensate for these effects (Carey et al., 2018). It is possible that participants anticipated the impairing effects of alcohol, and chose to remain hypervigilant to overcome the potential disinhibiting effects of intoxication.

This hypervigilance may also be particularly relevant for women who have experienced prior sexual assault (e.g., Wilson et al., 1999). Although analyses controlled for victimization history, it is also possible individual features associated with sexual assault history, such as hypervigilance for risk cues, contributed to increased risk processing for women when intoxicated (Wilson et al., 1999). Individual differences in hypervigilance among women who have experienced sexual assault may contribute to the inconsistent patterns of findings relating sexual assault history and sexual assault vignette risk detection (Pumphrey-Gordon & Gross, 2007; Wilson et al., 1999). Specific risk cue detection and hypervigilance may also differ based on similarity or differences in the vignette to each individual's own sexual assault experience.

Exploratory analyses in the current sample revealed significant main effects of sexual victimization history on sexual assault risk response latency. Women who reported a history of sexual victimization indicated that the man had gone too far and should stop his advances significantly later in the vignette than women with no sexual victimization history. At the average time participants with no victimization history stopped the vignette, the woman is showing polite refusals of the man's advances. At the average time women with a history of sexual victimization stopped the vignette, the man had continued his advances and the woman is making a clear request for the man to stop touching her chest and the man apologizes. This general pattern of findings is consistent with Soler-Baillo et al.'s (2005) previous research with sober women, showing sexual victimization history is associated with slower response latency (sample  $M = 158$  seconds) compared to women with no sexual victimization history (sample  $M = 129$  seconds). Testing the moderating role of victimization history in the current sample revealed alcohol was similarly associated with faster response latency for all women equally.

Soler-Baillo et al. (2005) report that women with positive sexual victimization history also show decreased psychophysiological responding to the same sexual assault vignette. It is not clear if this differential pattern of responding is a consequence of or contributing factor to sexual victimization, however, it is suggested that decreased risk recognition and psychophysiological responding to risk may contribute to revictimization. Consistent with social information processing theory, if individuals are not fully interpreting all risk cues present in their environment, resulting behavioral response selection and enactment may be impaired. However, others also suggest that specific PTSD symptoms, may be another moderating factor which could contribute to previous research's variation in main effects of sexual victimization history on sexual assault risk detection and interpretation (Wilson et al., 1999). Childhood sexual victimization is associated with increased sympathetic nervous system response to threatening cues, which may assist with increased attention to possible threatening cues (Patriquin, Wilson, Kelleher, & Scarpa, 2012). For example, if a woman is experiencing high posttraumatic stress symptoms of hyper arousal and hypervigilance, they may be more attentive to environmental risk cues and be more likely to assess situations as dangerous. Thus, further examination of additional measures of responding (i.e., psychophysiological response) and measurement of individuals differences associated with sexual assault history including symptoms of hypervigilance may better explain the relationship between sexual assault history and sexual assault risk recognition.

Follow-up analyses suggested that participants also differed in Stroop sexual assault difference scores based on sexual victimization history. Participants who reported a history of sexual victimization took relatively shorter time to complete task blocks with sexual assault cues versus positive cues compared to women who have not experienced sexual assault. These

findings suggest that women who have experienced sexual assault displayed decreased cognitive processing of the words associated with sexual assault compared to women with no such history. Although previous research reported no significant differences in emotional Stroop reaction time between childhood sexual abuse, adult sexual abuse, and control group women, research has suggested these groups differ on physiological processing during this type of task (Patriquin et al., 2012; Waldron et al., 2015). Overall, survivors of sexual assault may be more likely to display decreased cognitive processing of, and psychophysiological reactivity to sexual assault risk cues, which may contribute to risk for revictimization.

### **Prevention Implications and Future Research**

Integrating these findings within the social information processing theory framework, the effects of alcohol modifying attention to risk cues has important implications for intervention in sexual assault situations. Leone et al. (2018) suggests that impaired attention to sexual assault risk cues as a result of alcohol intoxication may contribute to decreased bystander intervention. Conversely, if potential bystanders' attention to risk cues can be increased while intoxicated, they may be more likely to intervene. Given the findings from the present study, if risk cues could be made particularly salient for individuals when intoxicated through priming, bystander intervention may be enhanced. Social advertisements or reminders in settings such as bars with intoxicated patrons could serve to increase the salience of sexual assault risk cues, and as such, increase potential intervention behavior. Future studies should aim to replicate the current findings to examine if information salience for intoxicated participants can be manipulated experimentally.

Given that findings from the current study were not consistent with study hypotheses, future studies should aim to replicate this pattern of results. Specifically, future research may

consider examining the relationship between information processing bias and assessment of risk using additional measures of sexual assault risk detection, such as alternate vignette stimuli (e.g., Parks et al., 2018), virtual reality (e.g., Wormner, Abbey, Pogram & Helmers, 2018) or alternative lab-based paradigms. There are several levels of social information processing which may be impaired or enhanced by alcohol intoxication, and thus future studies may consider examining alcohol's influence on behavior, in addition to cue processing. For example, recent research has examined bystander intervention through a behavioral analogue task in which participants intervene to stop a confederate woman from viewing sexually harassing video material (Leone et al., 2019). There are also several additional levels of cue processing which may be associated with sexual assault risk detection, such as psychophysiological reactivity to social stimuli (e.g., Soler-Baillo et al., 2005). Alcohol's influence on psychophysiological reactivity may be another important mechanism for how intoxication interferes with situational processing. Additionally, future research should continue to explore the moderating role of sexual victimization history on these relationships.

### **Limitations**

The current study has several limitations to consider. Generalizability of the findings are limited by the sample which consisted of a majority of White, non-Latina college women. Future research should aim to replicate findings with a broader sample. The measure of risk detection through response latency to an audio vignette may not fully capture the complexities of social interactions relevant for considering risk for sexual assault. Using only audio cues, there is no consideration of nonverbal behavior which may inform situational interpretation. Additionally, participants indicating the moment they believe the man has progressed too far does not necessarily capture the participant's full interpretation of the scenario. This measure of

sexual assault risk detection also does not capture intended behavior, and thus future studies should examine the relationship between this risk detection response latency and intended behavior. Analogue behavioral bystander intervention paradigms (e.g., Leone & Parrott, 2019), or measures assessing risk detection using more naturalistic video vignettes (e.g., Parks et al., 2016) may be employed in conjunction with tests of information processing to determine relationships between cue processing and behavioral responding. It is also possible the modified emotional Stroop task did not fully capture cognitive processing. Future studies may consider employing multiple measures of information processing. Multiple levels of assessment should also be used to examine information processing in addition to completion time, and psychophysiological reactivity may also be examined to determine individual responding to sexual assault cues. Furthermore, measures of sexual victimization history were scored dichotomously. Several features of the sexual assault experience may contribute to individual differences such as frequency, severity, age of experience onset, or relationship to perpetrator, which could influence response to a hypothetical scenario. It is also possible the current sample size may also not have been sufficiently large enough to detect hypothesized mediation effects. Based on the minimal effect between Stroop sexual assault differences scores and sexual assault response latency ( $\eta^2_p < .01$ ), a much larger sample size would be needed to reveal significant effects.

## **Conclusions**

This laboratory based alcohol administration experiment tested the relationship between alcohol intoxication, social information processing bias, and risk detection response latency in a hypothetical sexual assault vignette. Contrary to hypotheses, findings suggest that among the current sample of women, alcohol intoxication to a BAC of .06% was associated with faster

response latency, indicating belief the man had gone too far and should stop making sexual advances, compared to the no alcohol condition. Alcohol condition was also associated with a relatively larger bias for processing sexual assault cue words compared to positive social cue words in a modified emotional Stroop task. Modified emotional Stroop sexual assault difference scores were not associated with sexual assault risk response latency. If the sexual assault relevant cues were most salient for individuals in the alcohol condition, alcohol myopia theory would suggest enhanced processing for sexual assault risk cues, which may have contributed to fast response latency in the sexual assault vignette. If certain individuals recognize risk earlier in the vignette as a result of intoxication, potential bystander intervention behavior may also be positively influenced. Participant sexual assault history was also associated with slower sexual assault risk detection response latency times and smaller Stroop sexual assault difference score times. If results can be replicated to identify relationships between alcohol intoxication and increased recognition of sexual assault risk cues, it may be possible to increase bystander intervention behavior or for potential victims to enact effective refusal or resistance techniques. Further research should aim to further identify conditions in which alcohol may be associated with greater recognition of sexual assault risk cues, and should examine individual differences that may contribute to these mechanisms such as individual sexual assault history.

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### Tables

Table 1. *Demographic Variables and Differences across Conditions*

	Total Sample ( <i>N</i> = 48)	Control ( <i>n</i> = 24)	Alcohol ( <i>n</i> = 24)	<i>t</i> -test or Chi- square
Age Mean ( <i>SD</i> )	22.10 (1.79)	22.17 (1.77)	22.04 (1.83)	<i>t</i> = .24, <i>p</i> = .81
Race/Ethnicity				$\chi^2$ (6, <i>N</i> = 48) = 8.47, <i>p</i> = .21
White, non-Hispanic	34 (70.8%)	19 (79.2%)	15 (62.5%)	
Black or African American	4 (8.3%)	2 (8.3%)	2 (8.3%)	
Latino or Hispanic	4 (8.3%)	0	4 (16.7%)	
Asian or Asian American	1 (2.1%)	0	1 (4.2%)	
Middle Eastern or Middle Eastern American	1 (2.1%)	0	1 (4.2%)	
American Indian/Native American	2 (4.2%)	2 (8.3%)	0	
Bi- or multi-racial	2 (4.2%)	1 (4.2%)	1 (4.2%)	
Sexual Orientation				$\chi^2$ (4, <i>N</i> = 48) = 4.10, <i>p</i> = .25
Heterosexual	42 (87.5%)	22 (91.7%)	20 (83.3%)	
Gay/Lesbian	1 (2.1%)	1 (4.2%)	0	
Bisexual	2 (4.2%)	0	2 (8.3%)	
Queer	1 (2.1%)	0	1 (4.2%)	
Not Reported	2 (4.2%)	1 (4.2%)	1 (4.2%)	
Year in school				$\chi^2$ (5, <i>N</i> = 48) = 1.85, <i>p</i> = .76
Freshman	0	0	0	
Sophomore	1 (2.1%)	0	1 (4.2%)	
Junior	12 (25%)	7 (29.2%)	5 (20.8%)	
Senior	25 (52.1%)	12 (50%)	13 (54.2%)	
Graduate	7 (14.6%)	4 (16.7%)	3 (12.5%)	
Not reported	3 (6.3%)	1 (4.2%)	2 (8.3%)	
Childhood Sexual victimization history				$\chi^2$ (1, <i>N</i> = 48) = 0.77, <i>p</i> = .38
Yes	6 (12.5%)	2 (8.3%)	4 (16.7%)	
No	42 (87.5%)	22 (91.7%)	20 (83.3%)	

Table 1 (continued)

	Total Sample ( <i>N</i> = 48)	Control ( <i>n</i> = 24)	Alcohol ( <i>n</i> = 24)	<i>t</i> -test or Chi- square
Unwanted sexual contact above age 14				$\chi^2(1, N = 48) =$ 2.18, <i>p</i> = .14
Yes	29 (60.4%)	12 (50%)	17 (70.8%)	
No	19 (39.6%)	12 (50%)	7 (29.2%)	
Any Sexual Victimization Reported				$\chi^2(1, N = 48) =$ 3.2, <i>p</i> = .07
Yes	30 (62.5%)	12 (50%)	18 (75%)	
No	18 (37.5%)	12 (50%)	6 (25%)	

Table 2. *Descriptive Statistics and Alcohol Condition*

	Total Sample ( <i>N</i> = 48)	Control ( <i>n</i> = 24)	Alcohol ( <i>n</i> = 24)	<i>t</i> -test or Chi-square
Sexual Assault Vignette Response Time (seconds)	90.04 (38.72)	103.11 (37.67)	76.97 (35.89)	$t(46) = 2.46, p = .02^*$
Emotional Stroop Response Times (seconds)				
Stroop Neutral Time	68.65 (10.06)	63.30 (11.48)	69.00 (8.66)	$t(46) = -.24, p = .81$
Stroop Positive Time	74.86 (12.06)	74.09 (11.74)	75.63 (12.58)	$t(46) = -.44, p = .66$
Stroop Negative Time	86.18 (17.15)	84.50 (17.24)	87.85 (17.26)	$t(46) = -.67, p = .50$
Stroop Sexual Assault Time	89.67 (18.33)	85.98 (17.02)	93.37 (19.20)	$t(46) = -1.41, p = .17$
Sexual Assault – Positive Difference Score	14.36 (9.88)	11.89 (10.04)	16.84 (9.27)	$t(46) = 1.78, p = .08$
AUDIT Score	5.88 (2.79)	5.96 (3.09)	5.79 (2.52)	$t(46) = .21, p = .84$
Comprehensive Effects of Alcohol Scale				
Positive	2.84 (.45)	2.81 (.36)	2.86 (.51)	$t(46) = -.38, p = .71$
Negative	2.08 (.38)	2.07 (.36)	2.09 (.42)	$t(46) = -.20, p = .84$
CEOA Subscale				
Sociability	3.42 (.42)	3.42 (.40)	3.41 (.44)	$t(46) = .09, p = .93$
Tension Reduction	2.43 (.68)	2.43 (.83)	2.43 (.51)	$t(46) = .00, p = .99$
Liquid Courage	2.64 (.75)	2.66 (.72)	2.62 (.80)	$t(46) = .19, p = .85$
Sexuality	2.23 (.72)	2.07 (.61)	2.40 (.80)	$t(46) = -1.57, p = .12$
Cognitive Behavioral Impairment	2.31 (.43)	2.29 (.39)	2.32 (.47)	$t(46) = -.34, p = .74$
Risk and Aggression	2.15 (.69)	2.20 (.75)	2.09 (.63)	$t(46) = .54, p = .59$
Self-Perception	1.49 (.44)	1.42 (.45)	1.56 (.43)	$t(46) = -1.14, p = .26$
Pre-Vignette Task BrAC		0.00 (.000)	.058 (.015)	$t(46) = -18.53,$ $p < .01^*$

*Note:* AUDIT = Alcohol Use Disorders Identification Test, CEOA = Comprehensive Effects of

Alcohol, BrAC = Breath Alcohol Concentration. \* denotes  $p < .01$ , \*\* denotes  $p < .01$

Table 3. *Descriptive Statistics by Sexual Victimization History Group*

	No Sexual Victimization History ( <i>n</i> = 18)	Positive Sexual Victimization History ( <i>n</i> = 30)	<i>t</i> -test
Sexual Assault Vignette Response Time (seconds)	80.93 (38.00)	95.51 (38.74)	<i>t</i> (46) = -1.27, <i>p</i> = .21
Emotional Stroop Response Times (seconds)			
Stroop Neutral Time	68.50 (.27)	68.75 (11.54)	<i>t</i> (46) = -.08, <i>p</i> = .94
Stroop Positive Time	76.88 (7.90)	73.64 (13.96)	<i>t</i> (46) = .90, <i>p</i> = .37
Stroop Negative Time	89.94 (13.62)	83.92 (18.81)	<i>t</i> (46) = 1.18, <i>p</i> = .24
Stroop Sexual Assault Time	94.12 (12.41)	87.00 (20.85)	<i>t</i> (46) = 1.31, <i>p</i> = .20
Sexual Assault – Positive Difference Score	17.24 (8.68)	12.64 (10.29)	<i>t</i> (46) = 1.58, <i>p</i> = .12
AUDIT Score	5.22 (3.47)	6.27 (2.26)	<i>t</i> (46) = -1.27, <i>p</i> = .21
Comprehensive Effects of Alcohol Scale			
Positive	2.74 (.46)	2.90 (.45)	<i>t</i> (46) = -1.17, <i>p</i> = .25
Negative	1.97 (.40)	2.15 (.36)	<i>t</i> (46) = -1.63, <i>p</i> = .11
CEOA Subscale			
Sociability	3.35 (.44)	3.46 (.41)	<i>t</i> (46) = -.89, <i>p</i> = .38
Tension Reduction	2.43 (.86)	2.43 (.56)	<i>t</i> (46) = -.04, <i>p</i> = .97
Liquid Courage	2.61 (.77)	2.65 (.75)	<i>t</i> (46) = -.19, <i>p</i> = .85
Sexuality	1.92 (.59)	2.43 (.73)	<i>t</i> (46) = -2.49, <i>p</i> = .02*
Cognitive Behavioral Impairment	2.20 (.50)	2.37 (.37)	<i>t</i> (46) = -1.32, <i>p</i> = .19
Risk and Aggression	2.07 (.68)	2.19 (.70)	<i>t</i> (46) = .61, <i>p</i> = .54
Self-Perception	1.31 (.28)	1.60 (.49)	<i>t</i> (46) = -2.33, <i>p</i> = .02*

*Note:* AUDIT = Alcohol Use Disorders Identification Test, CEOA = Comprehensive Effects of

Alcohol, BrAC = Breath Alcohol Concentration. \* denotes *p* < .01, \*\* denotes *p* < .01

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Sexual Assault Vignette Response Latency	-																
2. Stroop – Neutral Block	-.02	-															
3. Stroop – Positive Block	-.17	.83**	-														
4. Stroop – Negative Block	-.12	.75**	.82**	-													
5. Stroop – Sexual Assault Block	-.21	.75**	.82**	.91**	-												
6. Stroop - sexual assault difference scores	-.20	.41**	.39**	.68**	.83**	-											
7. Stroop Positive – Negative Difference Scores	-.01	-.28 <sup>+</sup>	-.20	-.72**	-.55**	-.69**	-										
8. AUDIT Score	.12	.11	.11	.12	.22	.27	-.08	-									
9. Positive Alcohol Outcome Expectancies (AOE)	.24	-.10	-.03	-.15	-.12	-.17	.21	.28 <sup>+</sup>	-								
10. Negative AOE	.32*	-.12	-.10	-.17	-.19	-.24	.17	.25	.62**	-							

Table 4 (continued)																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
11. Sociability AOE	.32*	-.15	-.14	-.22	-.24	-.28	.21	.21	.87**	.50**	-						
12. Tension Reduction AOE	.14	.03	-.07	-.07	-.03	.04	.03	-.09	.43**	-.03	.31*	-					
13. Liquid Courage AOE	.21	-.06	-.02	-.09	-.08	-.10	.13	.27 <sup>+</sup>	.83**	.60**	.60**	.13	-				
14. Sexuality AOE	<.01	-.07	.13	-.03	.01	-.11	.22	.34*	.75**	.61**	.55**	.09	.51**	-			
15. Cognitive Behavioral Impairment AOE	.35*	-.10	-.10	-.14	-.19	-.21	.11	.13	.42**	.83**	.40**	.06	.29**	.45**	-		
16. Risk and Aggression AOE	.23	-.11	-.01	-.10	-.08	-.13	.15	.38**	.61**	.77**	.46**	-.17	.74**	.53**	.37**	-	
17. Self-Perception AOE	.03	-.04	-.12	-.17	-.17	-.23	.14	-.06	.32*	.59**	.20	.09	.26	.37**	.37**	.26	-

*Note:* AUDIT = Alcohol Use Disorders Identification Test, <sup>+</sup> $p < .07$ , \* $p < .05$ , \*\* $p < .01$

Table 5. *Mediation Results*

	<i>B</i>	<i>SE</i>	<b>95% CI</b>	<i>p</i>
<b>Dependent Variable: Stroop Sexual Assault Difference Score</b>				
<b>Condition</b>	6.54	2.77	0.95, 12.12	.02
<b>Sexual Victimization History</b>	-6.34	2.86	-12.11, -0.58	.03

$F(3, 44) = 4.16, p = .02, R^2 = .16$

	<i>B</i>	<i>SE</i>	<b>95% CI</b>	<i>p</i>
<b>Dependent Variable: Sexual Assault Vignette Response Latency</b>				
<b>Condition</b>	-31.92	10.60	-53.28, -10.57	<.01
<b>Sexual Victimization History</b>	23.09	10.95	1.04, 45.15	.04

$F(3, 44) = 5.48, p = .02, R^2 = .20$

	<i>B</i>	<i>SE</i>	<b>95% CI</b>	<i>p</i>
<b>Dependent Variable: Sexual Assault Vignette Response Latency</b>				
<b>Condition</b>	-30.99	11.36	-53.88, -8.10	.01
<b>Stroop Sexual Assault Difference Score</b>	-0.14	0.58	-1.30, 1.02	.81
<b>Sexual Victimization History</b>	22.19	11.65	-1.29, 45.68	.06

$F(3, 44) = 3.60, p = .02, R^2 = .20$

Table 6. *Response Latency by Alcohol Condition and Sexual Victimization History*

	No Alcohol <i>M (SD)</i>	Alcohol <i>M (SD)</i>
No Sexual Victimization History	93.97 (28.37)	54.84 (43.78)
Positive Sexual Victimization History	112.26 (44.50)	83.34 (30.80)

Table 7. *Modified emotional Stroop Sexual Assault Difference Scores by Alcohol Condition and Sexual Victimization History*

	No Alcohol <i>M (SD)</i>	Alcohol <i>M (SD)</i>
No Sexual Victimization History	15.71 (7.97)	20.30 (9.98)
Positive Sexual Victimization History	8.07 (10.75)	15.69 (9.02)

## Figures

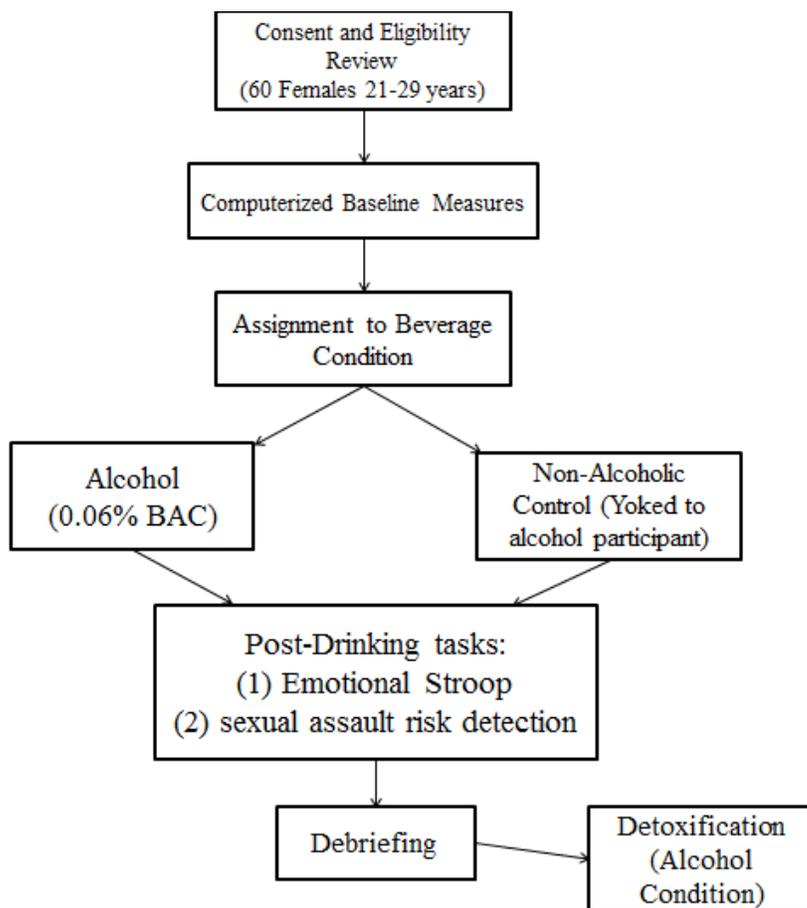
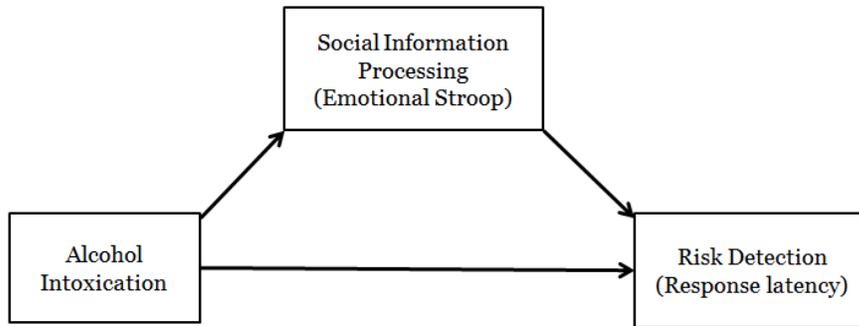


Figure 1. Study procedures flow chart.



*Figure 2.* Proposed mediation model.

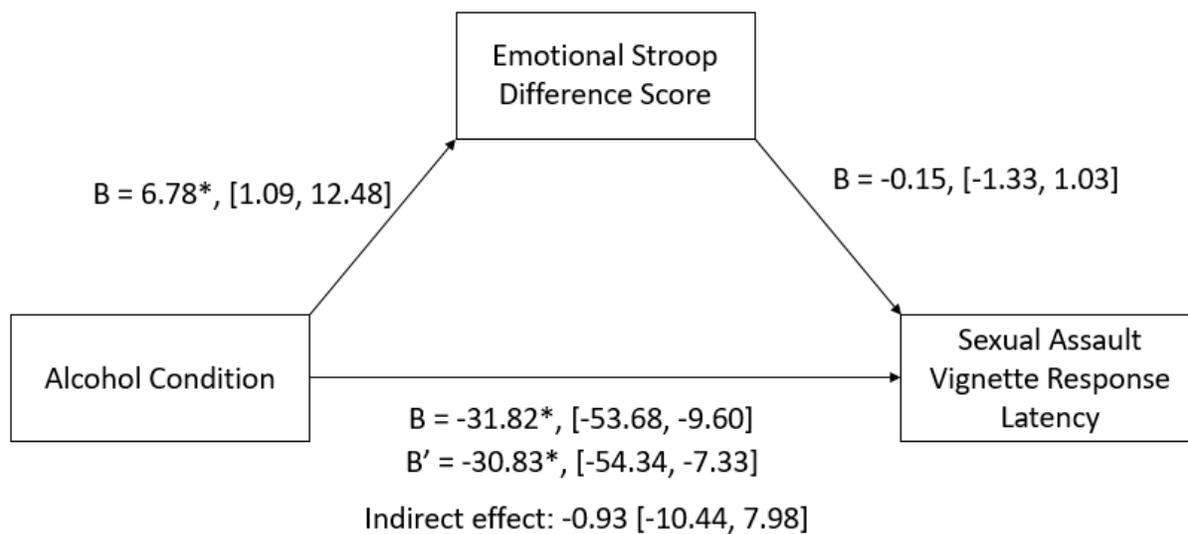


Figure 3. Mediation results.

## Appendix

Appendix A	Demographic Information
Appendix B	Sexual Experiences Survey – Short Form Version (SES-SFV)
Appendix C	Comprehensive Effects of Alcohol
Appendix D	Computer Assisted Maltreatment Inventory (CAMI)
Appendix E	Emotional Stroop Example
Appendix F	Sexual Assault Vignette Description

## Appendix A

## Demographic Questionnaire

1. What is your age? \_\_\_\_\_
2. What is your sexual orientation? Heterosexual / Bisexual / Homosexual / Other
3. Are you currently a college student? Yes / No
4. What year are you in school?  
Freshman / Sophomore / Junior / Senior / Graduate Student / Other
5. With which race/ethnicity do you identify?  
White (non-Hispanic) / African American (non-Hispanic) / Hispanic / Asian / American Indian / Other







## Appendix C

**Computer Assisted Maltreatment Inventory (CAMI)**  
(DiLillo et al., 2010)

It is now commonly known that many people have sexual experiences during childhood or adolescence. These experiences may occur with other children, adolescents, or adults and can include a wide range of behaviors including witnessing sexual activity, touching or being touched in a sexual way, and sexual intercourse.

In this section we would like to ask you about some of the sexual experiences you may have had before you turned 14. First, read through the list of sexual experiences below. Then, answer the following three questions.

- Someone intentionally exposed his or her genitals to you or masturbated in front of you.
- Someone kissed, touched, or fondled your body in a sexual way or you touched or fondled them.
- Someone attempted to have sexual intercourse with you (oral, anal, or vaginal).
- You and another person actually had sexual intercourse (oral, anal, or vaginal).

1. Before you were 14, did ANY of the above ever happen with anyone against your will or when you did not want it to happen?

- (1) Yes
- (2) No

2. Before you were 14, did ANY of the above ever happen with an immediate family member or other relative? (Please EXCLUDE any voluntary sexual play that may have occurred with a similar age peer—for example “playing doctor.”)

- (1) Yes
- (2) No

3. Before you were 14, did ANY of the above ever happen with anyone who was more than 5 years older than you? (Please EXCLUDE any VOLUNTARY activities that occurred with a dating partner.)

- (1) Yes
- (2) No

Please select up to 4 people with whom the activities you reported on the previous page occurred. If these activities only occurred with one person, please select "No one" for the second, third, and fourth person boxes.			
First Person	Second person	Third person	Fourth person
<i>Drop down box with options below:</i>	<i>Drop down box with options below:</i>	<i>Drop down box with options below:</i>	<i>Drop down box with options below:</i>
(1) Father			
(2) Stepfather			
(3) Foster father			
(4) Brother			
(5) Half brother			
(6) Step brother			
(7) Foster brother			
(8) Grandfather			
(9) Step Grandfather			
(10) Uncle			
(11) Male cousin			
(12) Other male relative			
(13) Male religious leader			
(14) Male friend of yours			
(15) Male acquaintance			
(16) Male friend of the family			
(17) Male babysitter			
(18) Male teacher			
(19) Male neighbor			
(20) Male stranger			
(21) Other male (non-family)			
(22) Mother			
(23) Stepmother			
(24) Foster mother			
(25) Sister			
(26) Step sister			
(27) Half sister			
(28) Foster sister			
(29) Grandmother			
(30) Step Grandmother			
(31) Aunt			
(32) Female cousin			
(33) Other female relative			
(34) Female friend of yours			
(35) Female acquaintance			
(36) Female friend of the family			
(37) Female babysitter			
(38) Female teacher			
(39) Female neighbor			
(40) Female stranger			
(41) Other female (non-family)			
No one			
No answer			

We would now like to ask you more detailed questions about the experiences that occurred with each of the individuals you mentioned. Using the scale below, please indicate how many times (if at all) each of the following activities occurred with each person you mentioned on the previous page.

(On this page the columns will only appear for the number of persons indicated in the previous table)

<i>{response from previous table piped here:</i>	<i>1<sup>st</sup> person {MOTHER}</i>	<i>2<sup>nd</sup> person {UNCLE}</i>	<i>3<sup>rd</sup> person</i>	<i>4<sup>th</sup> person</i>
He/she kissed you in a sexual way.				
He/she intentionally showed you his/her sexual body parts (genitals, breasts, buttocks)	<b>ALL ANSWERS FOR THESE QUESTIONS WILL CONSIST OF A DROP DOWN BOX WITH THE FOLLOWING OPTIONS:</b>			
You undressed or showed him/her your sexual body parts (genitals, breasts, buttocks)		<i>Never happened</i>		
He/she masturbated in front of you.		1		
He/she touched or fondled your breasts, buttocks, or genitals on the outside of your clothing, under your clothing, or when undressed.		2		
You touched or fondled his/her breasts, buttocks, or genitals on the outside of their clothing, under their clothing, or when they were undressed.		3		
He/she put his or her mouth on your breasts.		4		
He/she touched your genitals or anus with his or her mouth, or you put your mouth on his or her genitals or anus.		5		
He/she inserted a finger or object in your vagina or anus, or you inserted a finger or object in his/her vagina or anus.		6		
He/she <i>attempted</i> to have vaginal or anal intercourse with you.		7		
He/she <i>actually</i> had vaginal or anal intercourse with you.		8		
		9		
		10		
		<i>More than 10 times</i>		

<i>{response from previous table piped here:</i>	<i>1<sup>st</sup> person {MOTHER}</i>	<i>2<sup>nd</sup> person {UNCLE}</i>	<i>3<sup>rd</sup> person</i>	<i>4<sup>th</sup> person</i>
How old were you when the sexual activities began?	1-13			
How old do you think the other individual was when these activities began?	1-100			
How old were you the last time these activities occurred?	1-30			
How upsetting was this at the time that it happened?	Drop down box for each person: 1 = Not at all, 7 = extremely			
How upset are you about this now?				
Why did these activities end?	(1) Activities have not ended (2) You moved away or left the household (3) The other person moved away or left the household (4) The other person stopped the activities voluntarily (5) The activities became known by another family member or friend (6) You confronted or resisted the other person (7) The other person became involved with someone else (8) You became involved with someone else (9) The activities came to the attention of authorities (10) Other			

Were any of the following used to get you to participate in these sexual activities?  
 (these response options could be presented as a check all that apply which would reduce participant burden but would allow participants to skim or skip options)

<i>{response from previous table piped here:</i>	<i>1<sup>st</sup> person {MOTHER}</i>	<i>2<sup>nd</sup> person {UNCLE}</i>	<i>3<sup>rd</sup> person</i>	<i>4<sup>th</sup> person</i>
Were you promised things like money, gifts, or special treatment?	Yes/No			
Did he/she threaten to tell your parents or someone else?	Yes/No			
Were you told that you would be physically hurt?	Yes/No			
Were you held down or was some other type of physical force used?	Yes/No			
Were you led to believe there was nothing wrong with these activities or that it was a game?	Yes/No			
Were you told that the activities would benefit you in some way (e.g. would teach you about sex)?	Yes/No			
Were you told that you would be punished in some way?	Yes/No			
Were you continually pestered or pressured verbally?	Yes/No			
Did you become intoxicated voluntarily and then were unable to resist?	Yes/No			
Were you promised alcohol or drugs in exchange for sexual activities?	Yes/No			
Were you given alcohol or drugs without your knowledge and became unable to resist?	Yes/No			
Were you threatened that someone or something that you cared about would be hurt?	Yes/No			
Did someone use his/her status or authority to get you to do these things?	Yes/No			
Did this person tell you not to tell anyone about these activities?	Yes/No			

## Appendix D

**Comprehensive Effects of Alcohol (CEOA)**

Check the phrase which best represents the extent to which you agree with the item - depending on whether you expect the effect to happen to you if you were under the influence of alcohol. These effects will vary, depending on the amount of alcohol you typically consume. This is not a personality assessment. We want you to know what you expect to happen if you were to drink alcohol, not how you are when you are sober. Example: If you are always emotional, you would not check agree as your answer unless you expected to become emotional if you consumed alcohol.

*All items rated on a 1 (disagree) to 4 (agree) scale.*

1. I would be outgoing.
2. My senses would be dulled.
3. I would be humorous.
4. My problems would seem worse.
5. It would be easier to express my feelings.
6. My writing would be impaired.
7. I would feel sexy.
8. I would have difficulty thinking.
9. I would neglect my obligations.
10. I would be dominant.
11. My head would feel fuzzy.
12. I would enjoy sex more.
13. I would feel dizzy.
14. I would be friendly.
15. I would be clumsy.
16. I would act out fantasies
17. I would be loud, boisterous, or noisy.
18. I would feel peaceful.
19. I would be brave and daring.
20. I would feel unafraid.
21. I would feel creative.
22. I would be courageous.
23. I would feel shaky or jittery the next day.
24. I would feel energetic.
25. I would act aggressively.
26. My responses would be slow.
27. My body would be relaxed.
28. I would feel guilty.
29. I would feel calm.
30. I would feel moody.
31. It would be easier to talk to people.
32. I would be a better lover.
33. I would be self-critical.

34. I would be talkative.
35. I would act tough.
36. I would take risks.
37. I would feel powerful.
38. I would act sociable.

## Appendix E

Emotional Stroop sample words:

Positive: party, friends, fun

Negative: cancer, stress, nervous

Neutral: XXXXXX

Sexual threat-related: victim, fondle, rape

## Appendix F

**Sexual Assault Vignette Description.** (Marx et al., 1999; Soler-Baillo et al., 2005).

0 – 74 seconds represents mutual conversation

75-97 seconds reflects the beginning of the female victim politely refusing advances

98 – 136 seconds describes verbal refusals while the male perpetrator apologizes for his actions

137 – 179 seconds describes the man continuing to verbally pressure the female despite her refusal

180 – 276 seconds describes “verbal threats and adamant refusals”

277 – 370 depicts “forced sex”

## Research Compliance Letter



Office of Research Compliance  
Institutional Review Board

July 27, 2017

MEMORANDUM

TO: Alex Melkonian  
Megan Gardner  
Benni Scallion  
Lindsay Ham

FROM: Ro Windwalker  
IRB Coordinator

RE: New Protocol Approval

IRB Protocol #: 17-07-006

Protocol Title: *How Does Alcohol Intoxication Impair Risk Detection of Sexual Assault? Testing an Integration of Alcohol Myopia and Social Information Processing Theories*

Review Type:  EXEMPT  EXPEDITED  FULL IRB

Approved Project Period: Start Date: 07/27/2017, Expiration Date: 07/16/2018

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form *Continuing Review for IRB Approved Projects*, prior to the expiration date. This form is available from the IRB Coordinator or on the Research Compliance website (<https://vpred.uark.edu/units/rsrp/index.php>). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

**This protocol has been approved for 100 participants.** If you wish to make any modifications in the approved protocol, including enrolling more than this number, you must seek approval *prior* to implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 109 MLKG Building, 5-2208, or [irb@uark.edu](mailto:irb@uark.edu).