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The Relationship between Alcohol and Individual Differences Variables on Attitudes and Behavioral Skills Relevant To Sexual Health among Heterosexual Young Adult Men

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Abstract

The purpose of this experiment was to investigate the effects of alcohol, alcohol sex expectancies, and sexual sensation seeking on determinants of sexual health behavior according to the Information-Motivation-Behavioral Skills (IMB) model. The participants were 48 heterosexual young adult males who attended two laboratory sessions. During Session 1, participants completed a set of screening and individual differences measures, and during Session 2 they were randomly assigned to 1 of 3 beverage conditions: control, alcohol (.65 g alcohol/kg body weight), or placebo. Following the experimental manipulation, all participants completed measures regarding attitudes toward condom use, intention to engage in risky sex, and condom use negotiation skills. The results showed that participants who consumed alcohol had poorer negotiation skills and greater intention to engage in risky sex compared to participants who did not drink alcohol. Although alcohol did not affect any dimension of attitude regarding condom use, attitude about condoms' effects on sex, as well as sexual sensation seeking, were correlated with both intention ratings and skills. Multiple regression models including both attitudes and sensation seeking showed that attitudes accounted for 20% – 25% of variance independent of beverage condition in predicting intention ratings and skills. The findings are consistent with past research showing that alcohol consumption can have detrimental effects on determinants of sexual health behavior and that individual differences factors can enhance the power of models like the IMB to predict such behavior.

Keywords

condom use; alcohol; risk behavior; men; attitudes

INTRODUCTION

A large number of *global association* studies suggest a direct correlation between patterns of alcohol use and risky sexual behavior; i.e., individuals who report heavier and more frequent alcohol use tend to report more unsafe sex (Weinhardt & Carey, 2001). Unfortunately, global association studies cannot specify the covariation between alcohol use and risky sexual behavior on a given occasion (Dolezal, Carballo-Diequez, Nieres-Rosa, & Draz, 2000). Because of the resulting limitations in interpretation imposed by global association studies,

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event level research has been designed to investigate alcohol's relationship to risky sex. Such event level studies investigate the co-occurrence of alcohol and risky sex either on a specific occasion, or on multiple occasions in the same individual over time. Although event level studies cannot be used as causal evidence, they do allow a clearer picture than do global association studies of alcohol's association with the occurrence of risky sex on a given occasion. Reviews by Leigh (2002) and Weinhardt and Carey (2001) reveal that event level studies yield a less consistent correlation between alcohol consumption and risky sex than do global association studies. Event level studies also show that the relationship between alcohol consumption on an occasion and risky sexual behavior may be related to situation, person, and relationship factors that have not been defined with precision (Leigh, 2002; Weinhardt & Carey, 2001).

A better understanding of the nature of the alcohol-risky sex correlation has considerable practical and theoretical importance. From a practical viewpoint, increased knowledge about the relationship between alcohol use and the occurrence of risky sex could improve primary prevention efforts. From a theoretical perspective, the complexity of the alcohol-risky sex association and the inadequacy of correlational research to test hypotheses about causal mechanisms suggest that the controlled experimental setting has the potential to help explain the alcohol-risky sex relationship. Accordingly, an increasing number of studies on the alcohol-risky sex connection have been experiments focusing on acute alcohol intoxication (here meaning having a positive blood alcohol concentration following consumption of some dose of alcohol).

Experimental research on alcohol's effects on risky sexual behavior has also incorporated sexual enhancement expectancies (Goldman, Del Boca, & Darkes, 1999). Expectancies have been viewed as a complement to alcohol intoxication in many of these experiments. When they are "activated," beliefs (expectancies) that alcohol enhances sexual experiences may lead to the initiation or continuation of alcohol use in contexts where a sexual encounter is anticipated. Furthermore, expectancies may lead to risky sexual behavior in the absence of actual alcohol use, although the situations in which that is more likely to occur have not been specified.

Relevant to this report are experiments that have evaluated the effects of alcohol and alcohol expectancies on variables that determine engagement in HIV risky sex according to prominent theoretical models (Ajzen, 1991; Fisher & Fisher, 1992). These variables have been indicators of constructs that may be identified generally as motivation to engage in safer sex (e.g., risk perception, intentions to engage in risky sex, and attitudes toward condom use) and behavioral skills (e.g., condom use negotiation skills). Therefore, alcohol and alcohol expectancies have been investigated for their possible direct or moderating effects on constructs theoretically influencing HIV-related sexual health behavior.

Maisto, Carey, Carey, and Gordon (2002) summarized the findings of six recent reports of experimental research (Fromme, D'Amico, & Katz, 1999; Fromme, Katz, & D'Amico, 1997; Gordon, Carey, & Carey, 1997; MacDonald, Fong, Zanna, & Martineu, 2000; MacDonald, MacDonald, Zanna, & Fong, 2000; Murphy, Monahan, & Miller, 1998) and drew the following conclusions. First, alcohol intoxication is positively associated with perceived likelihood of having sex without a condom and perceived potential for a sexual relationship with an attractive but risky partner (MacDonald, MacDonald, et al., 2000; Murphy et al., 1998). Second, alcohol effects are more likely when sexual arousal is elevated. Third, alcohol intoxication impairs condom use negotiation skills (Gordon et al., 1997). Fourth, independent of alcohol intoxication, expectancies about the effects of alcohol on sex are negatively associated with condom use negotiation skills (Gordon et al., 1997), and Murphy et al. (1998) showed that instructions that alcohol was administered enhance the perceived potential for a sexual relationship with an attractive but risky partner. Related to this latter finding, data

from the Murphy et al. experiment but published elsewhere showed that instructions about beverage content, but not actual beverage content, were a determinant of confidence in detecting if a potential sexual partner was HIV+ (Monahan, Murphy, & Miller, 1999). Individuals who believed they drank alcohol reported more confidence than individuals who believed that they had not consumed alcohol. Overall, therefore, experimental research suggests that both alcohol intoxication and mobilization of alcohol-related sexual expectancies can enhance intentions to engage in risky behaviors and undermine relevant behavioral skills.

Experimental research suggests further that both alcohol intoxication and alcohol expectancies are associated with *risk perception*. For example, Fromme et al. (1999) showed that both alcohol intoxication and expectancies reduced perceived risk in situations that included having sex without a condom. Murphy et al. (1998) found that instructions that alcohol would be administered also reduced perceived risk involved in having sex with an attractive but risky partner. Gordon et al. (1997) showed that pre-existing expectancies that alcohol enhances sexual experiences were negatively correlated with attitudes toward condom use.

Maisto et al. (2002) investigated the relationship of alcohol intoxication and expectancies to two constructs that theoretically are determinants of sexual health behavior according to the information-motivation-behavioral skills (IMB) model: *motivation* to engage in safe sex, and *behavioral skills* to negotiate condom use with a partner (Fisher & Fisher, 1992; Fisher & Fisher, 1998). According to the IMB model, both motivation and skills may have direct effects on sexual health, and the effects of motivation may in part be mediated by behavioral skills. It should be noted that the third major construct in the IMB model, *information* regarding safer sexual behavior, was not investigated by Maisto et al., because earlier research by members of this research team had found that acute alcohol intoxication had little effect on information (Gordon & Carey, 1996). The participants in the Maisto et al. study were 102 women randomly assigned to one of three beverage administration conditions of water control, alcohol (target blood alcohol concentration of .07% – .08%, g alcohol/100 ml. blood), or placebo. Skills were assessed from responses to a videotaped behavioral role-play measure. Maisto et al. found that expectancies were associated with both motivation (risk perception) and condom use negotiation skills (behavioral skills). Participants' pre-experimental expectations about alcohol's effects on sex were positively correlated with estimated likelihood of positive consequences of having sex without a condom with a new partner. In addition, perception of intoxication and the interaction of perception of intoxication and expectancies were negatively associated with behavioral skills. No beverage main effects were found; however, similar to the findings of MacDonald, MacDonald, et al. (2000), beverage condition influenced ratings of intention (viewed as a second indicator of motivation) to have risky sex: participants who drank alcohol had greater intentions than participants in either of the other two beverage groups, which did not differ from each other. Expectancies were not significantly related to intentions.

The purpose of this experiment was to replicate and extend Maisto et al.'s (2002) procedures with young adult, heterosexual males. Young adult heterosexual men remain an important subgroup to study, given the increase in HIV transmission rates among heterosexuals and the control that men have over condom use in heterosexual encounters (Gomez & Marin, 1996; Logan, Cole, & Leukefeld, 2002). Participants were randomly assigned to control, alcohol, or placebo beverage conditions and completed measures of motivation to engage in safer sex and condom use negotiation skills. Because most of the experiments with males have shown that alcohol consumption increased one or more indicators of sexual risk, we predicted that individuals administered alcohol would show more negative attitudes toward condom use, poorer behavioral skills, and greater intentions to engage in risky sex than individuals who do not drink alcohol. Experimental and survey/interview studies also suggest either a direct association between expectancies and indicators of risky sex, in a manner that parallels alcohol's effects, or a moderating influence (Cooper, 2002; Dermen & Cooper, 2000).

Therefore, we explored both the direct association between expectancies and the primary dependent variables, and the moderation of beverage (alcohol) effects by expectancies.

In this experiment, we also investigated the value of individual differences variables in enhancing prediction of perceptions and behaviors theoretically related to risky sex. Person variables that may contribute to risky sexual behavior (e.g., Cooper, 2002; Leigh, 2002) have not been investigated systematically in experimental studies, with the exception of expectancies of alcohol's effects on sex. Perhaps this is not surprising, as the typically limited sample sizes recruited for experimental studies prevent investigating a high number of predictor or dependent variables and obtaining results that could be viewed as stable. Regarding individual differences variables besides alcohol expectancies, the survey/interview literature has identified sensation seeking (or its more specific derivative, sexual sensation seeking) as negatively associated with safer sex in heterosexual men and women, and among men who have sex with men (Justice, Finn, & Steinmetz, 2000; Kalichman, Heckman, & Kelly, 1996; Kalichman, Tannenbaum, & Nachimson, 1998; Kalichman, Weinhardt, DiFonzo, Austin, & Luke, 2002). The experimental literature, however, has only two studies that included the investigation of sensation seeking, but neither one showed a relationship to hypothesized determinants of risky sex (Fromme et al., 1997; Gordon et al., 1997). Due to the consistent finding of an association between sensation seeking and risky sex found in correlational studies, sexual sensation seeking was included in this experiment's assessment protocol, with the prediction that it would be positively related to intentions and negatively related both to attitudes and skills.

In summary, a main objective of this experiment was to replicate and extend Maisto et al. (2002) by studying the effects of alcohol consumption on indicators of antecedents of safer sexual behavior according to the IMB model. Another aim of this study was to further extend the Maisto et al. experiment by including sexual sensation seeking in the prediction of antecedents of safer sex along with alcohol expectancies and alcohol consumption.

METHOD

Participants

The participants were 48 men who were recruited from campus and community fliers and newspaper advertisements. Inclusion criteria were age 21–30; predominantly heterosexual sexual orientation, defined by response to a single item rating ranging from 0 (exclusive heterosexuality), to 6 (exclusive homosexuality) (Kinsey, Pomeroy, and Martin, 1948), with men scoring 0 or 1 eligible to participate in the experiment; sexually active in the last year, with “sex” defined as vaginal intercourse; and current drinking pattern classified as moderate or heavy according to Cahalan, Cisin, and Crossley's (1969) criteria, which are 3–4 drinks of beer, wine, or hard liquor less than (moderate) or more than (heavy) half the time. Exclusion criteria were history of alcohol or psychiatric problems and any medical conditions such as liver disorders or diabetes that would contraindicate the use of alcohol.

Of the 69 men evaluated for participation, 48 were eligible, consented, and completed both Sessions 1 and 2. A total of 16 men were defined as ineligible to participate in the experiment for the following reasons: 8 exceeded the cutoff score used on the Center for Epidemiologic Studies-Depressed Mood Scale (CESD); 3 men were defined as light drinkers; 1 man exceeded the cutoff score used on the Brief-MAST; 1 man was determined not to be sexually active in the last year; 2 men exceeded the cutoff score on the Brief MAST and the CES-D; and 1 man exceeded the cutoff score on the Brief MAST, the CES-D, as well as answered several items with a score ≥ 2 on the Brief Symptom Inventory. In all of these cases, the men were counseled by the research assistant according to a prepared set of procedures written by the senior investigators for use of relevant health care services in the University or the community. No

participant required immediate placement for treatment. A description of the instruments used to determine participants' meeting inclusion/exclusion criteria and the cutoff scores used are presented later in this report.

There also were five men who completed Session 1 but failed to keep their appointments for Session 2. These men did not differ from men who completed the experiment ($n = 48$) in age, race, marital status, employment status, year in school, amount of time in current relationship, or income.

Table I presents demographic, alcohol use, and sexual activity characteristics of the 48 participants in the experiment. Their mean age was 23.8 years, and 81% of them were Caucasian (the remaining participants were African American or Hispanic). A total of 75% of the participants were classified as heavy drinkers. A total of 42 men reported information on a current relationship; 11 of these men said they were not in a current relationship. The 31 men in a current relationship reported a mean relationship duration of 19.2 months (range = .5–84 months). The total sample of participants also reported that they had had 1.4 sexual partners in the last 3 months. Participants averaged 5.8 occasions of sex with a condom in the last 3 months, and 10.2 occasions of sex without a condom. Differences among the beverage conditions on the variables presented in Table I were tested by use of one-way analysis of variance or chi squared. The results of these analyses showed no beverage condition differences. Although the mean frequency of having sex without a condom was higher for the alcohol compared to the other two groups, the means were not statistically different.

Screening and Individual Differences Measures

Demographic Information—This questionnaire asked about age, marital status (asked to confirm the participant's phone screen response of being unmarried), length of current relationship, highest grade completed in school, race, employment status, and income. The item on sexual orientation also was included on this questionnaire.

Center for Epidemiologic Studies – Depressed Mood Scale (CES-D)—This 20-item measure was used to screen for current (past week) significant depressed mood (Radloff, 1977). Evidence of reliability and validity is excellent (Fischer & Corcoran, 1994). Individuals who scored ≥ 16 were excluded.

The Brief Symptom Inventory (BSI)—This measure was used to screen for psychopathology (Derogatis & Melisaratos, 1983). Scores of ≥ 2 on any BSI item reflecting acute psychiatric distress or thought disorder led to the research assistant's further inquiry to rule out psychiatric impairment. Although it did not occur in this experiment, evidence of acute psychiatric impairment would result in termination of the experiment and immediately informing the principal investigator, who would conduct further evaluation and make and complete a referral to the necessary level of care.

Quantity-Frequency-Variability Questionnaire (QFV)—This questionnaire was used to measure usual drinking patterns in the last 3 months (Cahalan, Cisin, & Crossley, 1969). The Cahalan et al. questionnaire asks respondents to report the frequency with which they typically have consumed beer, wine, and hard liquor, respectively, over the designated period of time, and the typical amounts they have consumed. From these two pieces of information, respondents are classified as having a "QFV Index" of abstainer, light, moderate, or heavy drinker. Only individuals in the moderate or heavy classifications were eligible to participate.

Brief Michigan Alcoholism Screening Test (Brief MAST)—The Brief MAST is a 10-item questionnaire that asks respondents to report whether they experienced various alcohol-

related consequences during their lifetimes. It was developed by Pokorny, Miller, and Kaplan (1972) to screen for history of alcohol problems and has been shown to have good validity as a screening measure for adults (Maisto, Connors, & Allen 1995). Individuals responding positively to three or more items were excluded from participation.

The Sexual Behavior Survey—This measure was used to obtain self-reports of number of sexual (defined as vaginal intercourse) partners (lifetime, previous year, and the previous 3 months), and condom use (previous year, previous 3 months; Carey et al., 2000; Carey et al., 1997; Gordon et al., 1997). Only individuals who were sexually active in the last year were eligible to participate.

Alcohol Expectancy Questionnaire—This 13-item questionnaire was used to measure beliefs about the effects of alcohol on sex (Leigh, 1990). Participants rated on a 0 (not at all) to 3 (very much) scale the degree to which they feel changes in sexual arousal, feelings, and performance while drinking alcohol, with higher scores reflecting a greater degree of belief that alcohol enhances sexual arousal and behavior. Examples of items include “I feel less self-conscious,” “I become more sexually forward,” and “I am a better lover.” Coefficient alpha in the current sample was .83, and the total score was used in the analyses.

Sexual Sensation Seeking Scale Revised—Kalichman et al. (1994) developed this 11-item Likert-type scale. This scale has been used in several studies to investigate the influence of sensation seeking on sexual risk behavior. Respondents rate on a 1 (not at all) to 4 (very much like me) scale the degree to which various thoughts, feelings, and behaviors are characteristic of them. Examples of items include “I like wild, uninhibited sexual encounters,” and “I enjoy watching ‘X-rated’ videos.” In this sample, the coefficient alpha for the overall scale was .83.

Dependent Measures

The Multidimensional Condom Attitudes Scale (MCAS; Helweg-Larson & Collins, 1994)—This 25-item scale measures five dimensions of condom attitudes: (1) the reliability and effectiveness of condoms, (2) the pleasure associated with condom use, (3) the stigma attached to being a condom user, (4) embarrassment about negotiation and use of condoms, and (5) embarrassment about purchase of condom. Respondents rate each item on a 1 (strongly disagree) to 7 (strongly agree) scale. The coefficient alpha for each dimension in this sample was .73, .77, .72, .78, and .89, respectively. Because previous validation studies of this instrument with males showed that the embarrassment, negotiate, and pleasure factors each was associated with previous condom use (also see Gordon et al., 1997), only scores on these three factors were analyzed in this study.

Behavioral skills—Seven audio-video role-play scenarios were developed for this experiment to measure behavioral skills. All 7 scenarios were equivalent in duration, were adapted from those used by Gordon et al. (1997), and required participants to negotiate the social situation using verbal communication skills. Five of the role-plays were “filler items” intended to reduce reactivity to two sexual role-plays. The two sexual and five filler role-plays and the accompanying post-video ratings required 20 minutes to administer. Two of the seven scenarios using two different sets of actors provided indicators of the behavioral skills needed for safer sex in situations that would (a) be familiar to participants, (b) pose moderate difficulty to communicate feelings about condom use, and (c) elicit moderate sexual interest. The first role-play scenario depicted two individuals who were in a steady relationship for four months and were faced with the decision of having sexual intercourse for the first time without the use of condoms. The second scenario depicted two individuals who were acquainted through work and met at a party. The couple must make a decision whether their first sexual encounter

together should involve the use of condoms. The scenarios were enacted by professional actors according to a script and were filmed by professional videographers. The content of the role-play scenarios was based on the results of a series of qualitative studies that preceded production of the videos.

Participants were asked to provide verbal responses to two prompts in the first of the two sexual scenarios, and to three prompts in the second. Prompt 1 of the first scenario consisted of the women's suggestion that not using a condom during sex is not a risk for pregnancy because she is on the pill. Prompt 2 consisted of an invitation by the woman to have unprotected sex, as it would not be risky and that it would enhance the pleasure of the situation. Prompt 1 of the second scenario was the woman asking in a general way what the couple should do. The second prompt was the suggestion that having unprotected sex would not be risky, because she was on the pill. The third prompt consisted of another statement that the couple should just have sex with the implication that it was not risky.

Participants' responses to each of the prompts were scored (on a 0–2 scale) for five dimensions (higher score = better communication skills): (1) use of an "I" statement of intention of safer sexual behavior or refusal of unsafe sexual behavior; (2) presence of a positive statement about the other person in the scenario; (3) provision of a statement of a reason for safer sexual behavior; (4) suggestion of a specific alternative behavior that is safer; and (5) indications that the participant's response was direct, serious, and clear. Scores for each of the response dimensions were assigned according to criteria specified in a rating manual developed for these role-play measures. The general approach to and procedures followed in the development of the role-play scenarios and scoring of participants' performance followed previous research by our team (Forsyth, Carey, & Fuqua, 1997; Gordon et al., 1997; Gordon, Weinhardt, Forsyth, & Carey, 1995; Maisto et al., 2002).

Psychometric properties of the role-play measure—The interrater reliabilities of the behavioral skills score for each of the 5 dimensions were based on 25 scores (5 dimensions for each response to 2 and 3 prompts across 2 scenarios) for each participant. For these analyses, two raters who were not aware of the participant's beverage condition independently rated the tapes, and the scores that they assigned were compared. Statistics were computed for each response dimension for each scenario. The analyses showed that percent agreement for the 5 response dimensions and the 2 scenarios (10 comparisons) ranged from 97.8% to 100%. The kappas for these data ranged from .96 to 1.0.

The next analyses concerned the post-video ratings. The first question was the overall mean of the ratings assigned to the dimensions of realistic situation, attractiveness of the female actor, interest in having sex with the female actor, and difficulty of response (to prompts), as these were the basic criteria for the initial selection of the scenarios. The overall means, standard deviations, and medians for ratings of each of these dimensions are presented in Table II. A 3 (beverage condition) × 2 (scenario) analysis of variance (ANOVA) was conducted and showed no significant main effects or interactions for any of the four ratings.

The interrater reliability and scenario comparison data provided the bases for creation of a behavioral skills score that consisted of the sum of the (5) dimension scores for each of the (2) responses to the comparable prompts for each scenario. Therefore, the scores were summed for responses to the first prompt of the first sexual scenario and the second prompt of the second sexual scenario to create a new prompt 1 variable (sum of 10 individual scores). The scores were also summed for the responses to the second prompt of the first sexual scenario and the third prompt of the second sexual scenario to create a new prompt 2 variable. This approach emphasizes behavioral skills in response to conceptually similar communication demands.

Cronbach's alphas were computed for each of the 10 dimension scores (possible range = 0–2 for each dimension) that were summed to derive a total score (range = 0–20) for prompts 1 and 2, respectively. The results showed $\alpha = .70$ for prompt 1 and $.74$ for prompt 2. A 3 (beverage condition) \times 2 (scenario) ANOVA showed no significant effects involving the scenario variable.

Manipulation Checks

Actual Blood Alcohol Concentration (BAC)—Breath analysis was used to measure BAC (Alcosensor III, Intoximeters, Inc.). The mean peak BAC of participants in the alcohol group was recorded on the third breath test (.059%; $SD = .011$). The median BAC on trial 3 was .058%. The BAC of individuals in the control and placebo conditions was .000%.

Perception of the Amount of Alcohol Consumed and Perception of Intoxication

—A single item asked participants to estimate the number of shots of vodka that they consumed. A score of 0 (none), 1 (1–2 shots), 2 (3–4 shots), 3 (5–6 shots), or 4 (> 6 shots) was assigned on this variable. In addition, a single item ranging from 1 (“not at all”) to 10 (“more intoxicated than you’ve ever been”) was used to measure the participant’s perception of intoxication.

A *t*-test comparing the alcohol and placebo groups on their estimates of number of shots of vodka consumed (all control participants estimated 0, so they were not included in these analyses). The analyses showed that the alcohol group’s estimate ($M, 2.56; SD = .63$) was higher than that of the placebo group ($M, 2.06; SD = .68$), $t(30) = 2.16, p < .05$.

The same pattern was observed for the comparison of the perception of intoxication data for the alcohol and placebo groups (control participants all perceived that they were not at all intoxicated). The alcohol group perceived a higher degree of intoxication ($M, 4.63; SD = 1.75$) than did the placebo group ($M, 3.19; SD = 2.06$), $t(30) = 2.74, p < .01$.

Post-Video Ratings—These ratings were obtained following presentation of each of the role-play scenarios. Participants filled out a 0–6 Likert-type scale for five parameters: (1) realism of the situation; (2) attractiveness of the female actor in the scenario; (3) participant’s interest in having sex if he were actually in the situation depicted in the role-play; (4) the likelihood that he would have sex without a condom (this rating is highly similar to ratings of “intention to have unprotected sex”; MacDonald et al., 2000); and (5) difficulty of responding to the role-play.

Procedures

Participants were recruited with newspaper advertisements and flyers seeking men for a “social communication” study. Men who responded to the advertisements were screened over the telephone by a male research assistant, who followed a written script. If individuals meeting screening criteria agreed to participate, an appointment for the first of two sessions was scheduled. Participants were told that, if they were invited back for the second session, they might be asked to consume alcohol.

Session 1—This session began with a male research assistant checking proof of the participant’s age and then testing his breath to confirm a BAC of zero. No participant showed a BAC > 0 at this point. Participants were then given a brief written overview of the study and a consent form that explained the procedures in detail. After participants gave their consent to participate, eligibility criteria were confirmed by interview and administration of the Brief MAST, BSI, CES-D, and QFV. Upon confirmation of their meeting eligibility criteria, participants were asked to complete the remaining descriptive and individual differences measures. After these instruments were completed, the second experimental session was

scheduled. Participants were reminded not to use any substances for 24 hours prior to Session 2; they were also asked not to drink any beverage except water or eat for 3 hours prior to Session 2. Participants were instructed not to drive a motor vehicle to Session 2 because they might drink alcohol, and they were told that transportation would be arranged for them free of charge. Participants were paid \$20 for their full participation in Session 1, and \$10 to cover transportation costs.

Session 2—This session began by two male research assistants introducing themselves to participants as co-experimenters. One of the research assistants (research assistant 1) then breath tested the participant to confirm that his BAC was zero. Participants were also asked if they complied with the substance use and food and beverage intake requirements. All of the participants said that they had. Participants were then weighed to determine the amount of alcohol individuals in the alcohol condition would receive. After weighing the participant, research assistant 1 left the room, and the second research assistant (2) entered the room to “assign” participants to their beverage condition (in fact, participants’ beverage condition assignment was determined randomly by use of a random numbers table at the end of Session 1). Individuals who were assigned to the alcohol or placebo condition were told that they would be drinking alcohol.

Participants assigned to the alcohol group received .65 g alcohol/kg body weight, in the form of a chilled beverage of 80-proof vodka mixed with tonic water and lime juice in a 1:4 ratio. Participants in the placebo group received drinks containing tonic and lime juice, with a minimum amount of vodka rubbed on the rim of the glass to enhance alcohol cues. Limes soaked in vodka were also added to the placebo beverage to enhance the alcohol cues. One-fifth of the total volume of the placebo beverage was in the form of flat tonic water poured from a vodka bottle. Placebo group participants received a volume of beverage equivalent to what they would have received in the alcohol condition. Participants in the no alcohol (control) condition were told in their initial instructions that they were assigned to the control condition and therefore would not receive alcohol. As in the placebo condition, control participants drank a volume of water comparable to the volume of beverage they would have received in the alcohol condition. Participants’ drinks were divided into 2 or 3 equal doses, depending on volume. They sat alone in a room while they consumed their drinks and were given a total of 20 minutes to finish them. Participants were asked to take about the same amount of time to finish each drink, and the research assistant checked on the participant to assure that the instructions were being followed. Books and general news magazines that did not include mention of HIV or AIDS were available to the participants while they consumed their beverages.

The research assistant who administered the measures to participants in Session 2 was not aware of their beverage condition. In this regard, research assistant 1 greeted the subject, completed the session’s preliminary details, and administered all measures except breath testing and beverage manipulation checks. Research assistant 2 assigned the participant to beverage condition, administered the beverages, measured BAC by breath analysis, and administered beverage manipulation checks.

Participants read for about 15 minutes after they finished their drinks, when the first post-drinking breath test was administered. Research assistant 1 then asked the participant to complete some “opinion surveys,” which were used as a filler activity, following Maisto et al.’s (2002) procedures. After 5 minutes of the participant’s completing these surveys, he was then asked to complete the MCAS. Research assistant 1 collected the MCAS data after the participant completed the instrument, and research assistant 2 again breath tested the participant. All participants were given feedback about their BACs; participants in the placebo condition were given bogus feedback yoked to the actual BAC of a randomly selected

participant in the alcohol condition. Participants in the control condition were told their actual BAC of zero. Research assistant 2 then asked the participant to complete the manipulation check measures of estimating amount consumed and perceived intoxication.

When the participant completed the two manipulation check measures, research assistant 1 returned to administer the role-plays. The research assistant administered them from an adjoining room using a remote control and an intercom system, to allow pauses of the tapes when participants were required to respond to prompts but yet allow participants to be in the room alone during the role-plays. Participants viewed the scenarios through a 21-inch monitor, and their responses to the prompts were audiotaped. The order of administration of the two risky sex scenarios was determined randomly for each participant, with the restriction that they did not begin or end the series of 7 role-plays, or follow each other in succession. Upon completion of each of the 7 role-plays, participants were asked to complete the post-video ratings.

After participants completed the last post-video rating, research assistant 1 entered the room and asked them about their responses to a few of the items on the opinion survey to divert participants' attention from the true purpose of the experiment. When the survey was completed, research assistant 2 returned to breath test the participant and to give final BAC feedback consistent with the participant's beverage condition. Participants were then asked to complete a brief questionnaire regarding their perceptions of the experimental hypotheses. After this procedure, research assistant 1 debriefed the participant about the purpose of the research in a global way, but the specific hypotheses being tested were not discussed. Participants who drank alcohol were then breath tested every 15 minutes and were not permitted to leave the laboratory until their BACs were $\leq .02\%$.

RESULTS

Distributions of the Dependent Measures

The two skills ($r = .78$) and two intentions ($r = .66$) scores were highly correlated and therefore were combined to form total skills and intentions scores, respectively. Exploratory analyses revealed that the distribution of each of these summed scores approximated normality, which allowed the use of parametric analyses. The distributions of scores for the three condom attitudes dimensions also were examined for approximation to normality. The analyses revealed a significant departure from normality of the condom attitude negotiation dimension scores and a borderline departure of purchase dimension scores, based on skewness and kurtosis statistics. As a result, each of the embarrassed-purchase scores was raised to the fourth power, and each of the embarrassed-negative scores was cubed. These transformations brought skewness and kurtosis values for each of the distributions in the statistically non-significant ($p > .05$) range.

Primary Analyses

Means and standard deviations of the raw (combined), behavioral skills (combined), intention ratings, and MCAS dimensions scores by beverage condition are presented in Table III. The hypothesis of beverage effects on each of the five dependent variables was tested using multiple regression analysis. For these analyses, two orthogonal beverage contrast vectors were created to evaluate beverage effects. The first vector contrasted the alcohol condition with the average of the placebo and control conditions (an alcohol vs. no alcohol contrast), and the second contrast compared the control and placebo conditions. The most straightforward test of the hypotheses regarding beverage condition would have involved three contrasts of alcohol versus control, alcohol versus placebo, and placebo versus control. However, a difficulty of incorporating vectors that reflect these three contrasts in a multiple regression model is the

high degree of multicollinearity among them. In order to retain the sensitivity and flexibility of using multiple regression, and still test the hypotheses regarding beverage, the two orthogonal vectors cited earlier were created. A disadvantage of this approach is that the “alcohol vs. no alcohol” contrast includes the influence of expectancies regarding beverage content in the “no alcohol” conditions; the net result is a more conservative test than the alcohol versus control contrast but a more liberal contrast than the alcohol versus placebo contrast. This trade-off is relatively minor, given the information that the pair of orthogonal contrasts does provide, and that they should be viewed as one part of a pattern of findings.

The analysis of the intention ratings showed $R^2 = .10$, $F(2, 45) = 2.53$, $p < .10$. The placebo – control contrast was not significant, but the analysis showed that individuals receiving alcohol reported a greater intention to engage in sex without a condom than did participants who did not drink alcohol, $\beta = .36$, $t = 2.19$, $p < .04$.

The analysis of the behavioral skills variable showed $R^2 = .15$, $F(2, 44) = 3.60$, $p < .05$. The alcohol/no alcohol contrast again was the only significant predictor, $\beta = -.43$, $t = 2.67$, $p = .01$, as participants who drank alcohol showed poorer skills performance than participants who did not. The placebo – control group contrast was not significant.

Analyses of the MCAS dimensions showed no significant effects of the contrasts on any dependent variable. Total R^2 for any MCAS dimension did not exceed .03.

Exploratory Analyses: Model Building

The purpose of these analyses was to explore the possibility of using information on individual differences in sexual sensation seeking to enhance the prediction of intention ratings and behavioral skills beyond that achieved with only the beverage manipulation. In addition, the modeling included the three MCAS dimensions, given that condom attitudes were not affected by beverage condition. With this approach and in the context of the IMB model, attitudes toward condom were construed as relatively stable individual differences variables with motivational properties predicting another motivational variable, intention to have risky sex, that is more affected by situational factors. It was expected that attitude toward condom use would be inversely related to intention ratings and, following the IMB model, that attitude toward condom use would be positively related to behavioral skills. Finally, although individuals who were assigned to the three beverage conditions did not differ statistically on the mean number of times they had sex without a condom in the last three months, Table I shows that the beverage conditions varied considerably on this factor. Because recent history of condom use was directly relevant to this experiment’s primary dependent variables, the log of the number of times having sex without a condom in the last three months was included in the hierarchical model.

The procedures used for regression modeling followed recommendations of Hosmer and Lemeshow (2000). The first step of the process was to identify the variables that had consistent significant, simple linear associations with both behavioral skills and intention ratings of at least moderate magnitude. The minimum correlation selected was $r = .30$. According to this criterion, the pleasure dimension of the MCAS and sexual sensation seeking qualified for model inclusion. Alcohol expectancies did not meet this criterion. It is important to note that sensation seeking was positively associated with intention ratings and negatively related to behavioral skills, as predicted. It also was negatively related to MCAS Pleasure. Also as predicted, the pleasure dimension was negatively related to intention ratings and positively related to behavioral skills.

The second step was to examine the possibility that individual differences factors moderated the beverage-dependent variables relationships, but visual inspection of plots of the data

provided no evidence for interactions. Accordingly, log times without a condom was entered first in the hierarchical model as a participant sexual history variable. Sexual sensation seeking and MCAS Pleasure, as individual differences variables regarding sex-related attitudes and disposition, were entered second in the model. The third step was entry of the two orthogonal beverage vectors. The results of these analyses are summarized in Table IV.

For the intention ratings data, entry of the first two variables showed $R^2 \Delta = .25$, $F(1,43) = 14.42$, $p < .0001$. In this model, log times without a condom was positively related to intention ratings, $\beta = 2.76$, $t = 3.80$, $p < .001$ (2-tailed test). Entry of next two variables revealed $R^2 \Delta = .20$, $F(2,41) = 7.44$, $p < .002$. At this step, only MCAS-pleasure was significant, $\beta = -.23$, $t = -2.55$, $p < .02$. For entry of the beverage vectors, $R^2 \Delta = .05$, $F(2,39) = 1.83$, $p < .18$. Only the alcohol vs. no alcohol contrast approached significance, $\beta = 1.27$, $t = 1.81$, $p < .08$ (two-tailed test). In the full model, the significant factors were times without a condom and MCAS pleasure, with the alcohol vs. no alcohol contrast $p < .08$. The R^2 total = .50. Therefore, a recent history of having unprotected sex and drinking alcohol independently were associated with higher intentions scores, and more positive attitudes toward condoms were associated with lower intention ratings.

The findings for the same model's fit to the skills data showed a significant $R^2 \Delta = .14$ with entry of log times without a condom, $F(1, 40) = 6.25$, $p < .02$. Number of times without a condom was negatively related to behavioral skills score, $\beta = -.3.80$, $t = -2.50$, $p < .02$. In the next step, $R^2 \Delta = .24$, $F(2,38) = 7.20$, $p < .002$. The only significant factor in step 2 was MCAS-pleasure, $\beta = .45$, $t = 2.44$, $p < .02$. Step 3 yielded a $R^2 \Delta = .07$, $F(2,36) = 2.42$, $p = .10$. Only the alcohol-no alcohol contrast was significant, $\beta = -.3.15$, $t = -2.20$, $p < .04$. In the full model, only MCAS-pleasure and the alcohol-no alcohol contrast were significant; drinking alcohol caused poorer skills, and more positive attitudes were associated with better skills. Total R^2 for the model = .45.

DISCUSSION

As hypothesized, this experiment showed that administration of alcohol caused greater intentions to engage in unprotected sex and impairment of skills in negotiating safer sex, both of which are determinants of safer sexual health behavior according to the IMB model. Also as predicted, both sexual sensation seeking and MCAS-pleasure were consistently correlated with intentions and skills, with attitudes accounting for substantially more independent variance than sensation seeking in multiple regression models predicting these two dependent variables.

No individual differences variable interacted with beverage condition. It is possible that this experiment did not provide a sensitive setting for investigating beverage condition by individual differences variable interactions. In this regard, interactions between individual differences and beverage condition may emerge at different doses of alcohol, but only one dose of alcohol was tested in this experiment. It is also possible that this experiment's sample size did not afford sufficient statistical power to detect interactions between beverage condition and individual differences factors. However, as cited earlier, inspection of the regression lines for each beverage condition revealed no suggestion of interactions, as the lines were parallel. It is not apparent that increasing the sample size would have changed that finding.

The findings of this experiment regarding effects of alcohol on theoretical determinants of sexual health raise the question of the mechanism of its action. One prominent explanation is alcohol myopia theory. Myopia theory states that, in situations involving "inhibition conflict" such as risky sex encounters, a reduction of information processing capacity caused by drinking alcohol results in a higher likelihood of engaging in risky sex compared to when no alcohol is

consumed (Steele & Josephs, 1990). However, it is important to note that this experiment did not provide a direct test of myopia theory. This is the case for much of the experimental research in the alcohol-risky sex area, with a few exceptions (MacDonald, MacDonald, et al., 2000; Murphy et al., 1998). Because alcohol myopia theory has been invoked so frequently to explain the findings in this area of research, the field would be advanced by additional experiments designed to test it. For example, myopia theory's major assumption that alcohol-induced impairments in information processing underlie its "myopic" effects on social behavior has not been verified. Nevertheless, the plausibility of this mechanism accounting for the data has received support from experimental research on alcohol and emotions, which suggests that alcohol affects emotion through impairment of information processing capacity (Lang, Patrick, & Stritzke, 1999). Experiments designed to test the influence of changes in information processing capacity as a mediator of alcohol's effects on determinants of safer sex would advance theoretical developments in the field.

The finding that attitudes regarding condoms' effects on sexual pleasure predicted the major portion of variance in measures of constructs hypothesized to be determinants of sexual health behavior has considerable practical implications, as attitudes can be modified by targeted interventions (e.g., St. Lawrence, Crosby, Brasfield, & O'Bannon, 2002). When combined with theoretical analyses of the relationship between emotion and risky behavior (Gold, 1993; Loewenstein, Weber, Hsee, & Welch, 2001), the results of this experiment suggest that attitudes regarding condoms and sexual pleasure would be a critical factor to address in developing and evaluating HIV prevention interventions.

It is not clear why there was little evidence in this experiment of direct or moderating relationships between expectancies and determinants of sexual health behavior. The distribution properties of the expectancy measure were not a problem, as the expectancy scores were normally distributed. In addition, as with other experiments on alcohol and risky sex, men were eligible to participate in this experiment if their current drinking patterns were classified in the moderate to heavy range. Among such drinkers, alcohol expectancy effects would be most likely to emerge (e.g., Dermen & Cooper, 2000). Future research may advance the understanding of the conditions under which expectancy effects are and are not likely to be observed by incorporating expectancies as a manipulated independent variable in experimental designs (Goldman et al., 1999). Only one experiment on alcohol and risky sex manipulated expectancies, through variation in instructions regarding beverage content (Monahan et al., 1999; Murphy et al., 1998). However, this latter experiment did not manipulate the content of expectancies.

The hypothesis that beverage condition would affect reported attitudes toward condom use was not confirmed. It may be that attitudes toward condom use are not readily modified by interventions (such as a dose of alcohol) that have little to do with the content of the attitude. Like expectancies, content-relevant interventions might be needed to modify attitudes toward condom use (Goldman et al., 1999). Furthermore, an acute dose of alcohol may not be of sufficient duration to modify attitudes which, as suggested earlier, are relatively stable and not readily altered by situational factors such as acute intoxication.

A possible limitation of this experiment is that the sample of scenarios chosen for use in the role-plays may not be representative of risky sexual encounter situations or the role-plays may lack external validity. The value of role-play measures is that they provide behavioral data rather than self-report data and are assumed to be less biased. However, the literature on behavioral role-play measures is inconsistent regarding their validity, likely due to a number of factors in real-life situations that can affect behavior and that can be difficult to simulate (Meier & Hope, 1998). These problems are especially acute when behaviors related to sex are investigated (McConaghy, 1998). In this experiment, the post-video ratings of the "realism"

of the role-plays suggest that participants perceived that the situations did resemble real-life events. Moreover, the correlation between log times having sex without a condom and the total skills score was $r = -.37$. Together, these findings support the validity of this experiment's role-play measures of sexual assertiveness skills.

It also is important to note that the participants in this experiment reported a wide range of current relationship length, and about 26 percent of the respondents said they were not in a current relationship. Therefore, participants may have varied considerably in the recency of their facing situations such as those depicted in the scenarios. The result of such variability could be both a decreased sensitivity of the design to identifying beverage effects on skills, and somewhat ambiguous generalizability of the findings. Future research likely would benefit by selection of participants to be more homogeneous on current relationship, rather than specifying no inclusion criterion on this variable.

In conclusion, the results of this research are consistent with previous experiments in showing that acute alcohol consumption is a situational factor that can have a detrimental effect on the theoretical determinants of sexual health behavior. The data also suggest that individual differences in sexual behavior disposition can substantially and independently of alcohol increase the power of models like the IMB to predict sexual behavior in a given setting. Future research should be directed at specifying processes mediating alcohol's effects by investigating multiple doses of alcohol and actual information processing capacity. Experiments that involve the manipulation of alcohol expectancies also might increase knowledge about the conditions under which expectancies about alcohol's effects on sex are likely to affect sexual health behavior.

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Table 1

Participant Variables by Beverage Condition

| Variable | Beverage Condition | | | | | | Statistic | P |
|--|--------------------|------|---------|------|---------|------|-------------------|-----|
| | Control | | Alcohol | | Placebo | | | |
| | M | SD | M | SD | M | SD | | |
| Age | 24.8 | 3.4 | 23.4 | 2.8 | 22.6 | 1.8 | $F(2,47) = 2.7$ | .08 |
| Length current relationship (months) | 11.4 | 11.3 | 16.8 | 23.3 | 3.6 | 27.6 | $F(2,30) = 23$ | ns |
| Number partners (past 3 months) | 1.3 | 0.9 | 1.8 | 1.0 | 1.4 | 1.2 | $F(2,47) = 1.1$ | ns |
| Number times sex without a condom (3 months) | 4.7 | 7.2 | 18.3 | 26.5 | 10.3 | 11.8 | $F(2,47) = 1.3$ | ns |
| Number times sex with a condom (3 months) | 6.8 | 9.2 | 4.3 | 5.3 | 8.4 | 13.6 | $F(2,47) < 1.0$ | ns |
| Race (% Caucasian) | 81 | | 81 | | 100 | | $\chi^2(2) = .2$ | ns |
| QFV Index (% heavy drinkers) | 75 | | 75 | | 75 | | $\chi^2(2) = 0.0$ | ns |

Note. $n = 16$ for each beverage condition. Length of relationship data are reported only for 31 (of 42) men who reported that they were in a current relationship. QFV = Quantity-Frequency-Variability Index, according to Cahalan et al. (1969).

Table II
Means, SDs, and Medians of Post-Video Ratings of Two Sexual Role-Play Scenarios

| Dimension | Scenario 1 | | | Scenario 2 | | |
|------------------------------|------------|-----------|---------------|------------|-----------|---------------|
| | <i>M</i> | <i>SD</i> | <i>Median</i> | <i>M</i> | <i>SD</i> | <i>Median</i> |
| Realistic Situation | 4.17 | 1.42 | 4.00 | 3.79 | 1.69 | 4.00 |
| Attractiveness of the Female | 3.46 | 1.15 | 3.00 | 4.46 | 1.20 | 5.00 |
| Interest in Sex | 3.65 | 1.56 | 4.00 | 4.56 | 1.35 | 5.00 |
| Difficulty of the Role-Play | 2.02 | 1.51 | 2.00 | 2.42 | 1.46 | 2.00 |

Note. Ratings of the dimensions were made on a 0–6 scale; 0 = *not at all*, 3 = *somewhat*, 6 = *extremely*. *N* = 48.

Table III

Beverage Condition Means and SDs for the Main Dependent Measures

| Measure | Beverage Condition | | | | | | | | | | | |
|----------------------------|--------------------|-----------|----------|--|----------|-----------|----------|--|----------|-----------|----------|--|
| | Control | | | | Alcohol | | | | Placebo | | | |
| | <i>M</i> | <i>SD</i> | <i>n</i> | | <i>M</i> | <i>SD</i> | <i>n</i> | | <i>M</i> | <i>SD</i> | <i>n</i> | |
| Intentions | 4.4 | 3.5 | 16 | | 7.1 | 3.6 | 16 | | 5.2 | 3.5 | 16 | |
| Behavioral Skills | 15.8 | 6.5 | 16 | | 9.8 | 6.3 | 16 | | 12.2 | 6.1 | 14 | |
| MCAS pleasure | 20.1 | 6.2 | 16 | | 19.1 | 5.8 | 16 | | 19.6 | 5.1 | 16 | |
| MCAS embarrassed-purchase | 25.4 | 5.8 | 16 | | 29.3 | 4.4 | 16 | | 23.3 | 7.2 | 16 | |
| MCAS embarrassed-negotiate | 29.8 | 4.0 | 16 | | 29.0 | 4.3 | 15 | | 29.3 | 4.4 | 16 | |

Note: Intention rating (0–6 Likert type scale total of 2 ratings) likelihood of having sex without a condom. Skills rating is total for two prompts.

MCAS = Multidimensional Condom Attitude Scale.

Summary of Hierarchical Regression Models Predicting Intention Ratings and Behavioral Skills

| Variable Entered | Intension Ratings | | | Skills | | |
|--|-------------------|---------|-----------|--------|---------|-------------------------|
| | Beta | SE Beta | <i>p</i> | Beta | SE Beta | <i>p</i> |
| <i>Step 1</i> | | | | | | |
| Log times without a condom | 2.76 | .73 | <.001 | -3.79 | 1.52 | <.02 |
| <i>Step 2</i> | | | | | | |
| Sexual sensation seeking | 1.21 | .80 | <i>ns</i> | -2.58 | 1.65 | <i>ns</i> |
| MCAS-Pleasure | -.23 | .09 | <.02 | .45 | .19 | <.02 |
| <i>Step 3</i> | | | | | | |
| Alcohol vs. Control + Placebo Contrast | 1.28 | .70 | <.08 | -3.14 | 1.43 | <.04 |
| Placebo vs. Control Contrast | .50 | 1.00 | <i>ns</i> | -2.58 | 2.11 | <i>ns</i> |
| | | | | | | <i>R</i> ² Δ |
| | | | | | | .14* |
| | | | | | | .24** |
| | | | | | | .08 |

Note. *N* for Intentions analyses = 48, *N* for Skills = 42, MCAS = Multidimensional Condom Attitudes Scale

* *p* < .05.

** *p* < .01.