# The Effects of Alcohol and Expectancies on Risk Perception and Behavioral Skills Relevant to Safer Sex Among Heterosexual Young Adult Women

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## Abstract

**Objective—**This study was undertaken to test the hypotheses that acute alcohol intoxication and alcohol-rated sex expectancies are negatively related both to risk perception (a motivational factor) and ability to negotiate safer sex (a behavioral skills factor) with a partner. Motivation and behavioral skills are determinants of safer sex according to the Information-Motivation-Behavioral Skills (IMB) model.

**Method—**A total of 102 heterosexual females aged 21–30 years participated in two sessions. The first session involved the administration of various measures to confirm eligibility status, and random assignment to one of three beverage conditions: water control, alcohol (.65gm alcohol/kg. body weight), or placebo. The second session involved administration of the beverage and then completion of a risk perception measure and an audio-visual role-play measure of behavioral skills.

**Results—**Regression analyses showed that alcohol expectancies and the perception of intoxication contributed independent variance to both risk perception and behavioral skills. Actual alcohol intoxication had little influence on these dependent variables.

**Conclusions—**Alcohol expectancies and related factors can be related to variables that theoretically precede the occurrence of risky sex. Research is needed on the processes through which expectancies might be related to the occurrence of safer sex, as well as on person and situation variables that moderate the effects of alcohol and alcohol expectancies on safer sex.

Although human immunodeficiency virus (HIV) transmission rates in men who have sex with men and intravenous drug users declined during the 1990s, HIV transmission through heterosexual contact among young adult women increased (Karon et al., 2001; Rosenberg & Biggar, 1998). Because there is no cure for HIV and AIDS, substantial importance is given to the prevention of HIV transmission (Centers for Disease Control, 2000).

HIV prevention research has been devoted to identifying variables that influence the use of condoms, including the effects of alcohol use. Correlational studies involving community samples have been the most common in this literature. Among these, the most useful are event-based investigations that provide information about the co-occurrence of alcohol use and risky sex on the same occasion. Weinhardt and Carey (2001) and Cooper (2000) summarized recent research, and they concluded that there is little evidence to support a general, negative association between the use of alcohol and condom use. Instead, the relationship between alcohol use and the occurrence of unprotected sex varies according to factors such as age and the sexual experience of the participants.

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A much less frequently used approach to the investigation of the alcohol-risky sex problem is the use of experimental designs. This approach allows the establishment of causal relationships between two (or more) variables that are hypothesized to account for the occurrence of unprotected sex. If they are theoretically based, experimental intoxication studies can contribute to the understanding the relationship between alcohol and risky sex.

Several experimental studies have investigated alcohol's effects on risky sexual behavior. All have involved young adults and consumption of a moderate dose of alcohol (blood alcohol concentration (BAC) .07% –.08%, gm. alcohol/100 ml. blood. Most of these experiments have involved only male participants. MacDonald et al. (2000) completed a program of research designed to evaluate the validity of the disinhibition and myopia theories of alcohol's effects on sexual behavior. This research included male college students who were at least of legal drinking age in Alberta (18 years of age) or Ontario (19 years), Canada. In a series of seven experiments, participants were randomly assigned to one of three beverage conditions, alcohol, placebo, or water control. They also were classified post hoc as high or low sexual arousal based on their responses to a 1-item rating scale of their sexual arousal in response to a videotape of an attractive couple in a situation in which sexual intercourse is mutually desired after a first date, but neither partner has a condom. Therefore, the design involved the crossing of a manipulated (beverage condition) and a correlational variable. Participants received and consumed the beverages consistent with their assigned condition, viewed the video, and then responded to a series of questionnaires and rating scales. The results of these 7 experiments generally were consistent and were interpreted as in support of myopia theory. That is, individuals who drank alcohol and who were rated as more aroused tended to report a higher likelihood that they would have unprotected sex in the situation depicted in the video compared to participants in the other groups.

Murphy et al. (1998) included young adult women recruited from the community and manipulated alcohol expectancy set with instructions that the beverage that participants drank did or did not contain alcohol. After consuming their beverages, participants watched 4 videos that depicted a male who was or was not prejudged to be attractive, and who was or was not depicted as a "high-risk" (for unsafe sex). After watching the videos, participants rated the male actor's attractiveness, the type of relationship (none to sexual) they could imagine themselves having with the male character, and their perception of the male character. In general, the results of this study were interpreted to be consistent with myopia theory. Alcohol consumption increased potential for having a relationship only under conditions of high inhibitory conflict (attractive but risky male). The results also showed that instructions that the beverage contained alcohol were associated with less perceived risk and greater perceived relationship potential in the high inhibitory conflict situation.

Gordon et al. (1997) investigated the effects of alcohol and alcohol-related sex expectancies (i.e., beliefs about the effects of alcohol on sexual behavior) on risk reduction motivation and behavioral skills, two constructs included in Fisher and Fisher's (1992) model of HIV risk behavior. Sixty young men ($\underline{M}$ age = 24.9 years) recruited from the community were randomly assigned to a control, alcohol, or placebo beverage condition. Following beverage consumption and alcohol absorption, they completed the Condoms Attitudes Scale (Helweg-Larsen & Collins, 1994), an indicator of motivation, and an audiotaped role-play test of behavioral skills in which participants were asked to negotiate condom use with a new partner. Perception of intoxication, alcohol-related sex expectancies, and their interaction all were associated with less favorable attitudes toward condom use. Attitudes were not influenced by beverage condition. Behavioral skills were negatively associated with alcohol expectancies, and participants who drank alcohol showed poorer behavioral skills compared to participants in either of the other two conditions. The latter two groups did not differ from each other.

These experimental studies of acute intoxication show that alcohol and alcohol-related expectancies contribute to risky behavioral intentions and attitudes (MacDonald et al., 2000; Murphy et al., 1998). MacDonald et al.'s research consistently has revealed a strong effect for alcohol compared to expectancy effects, which may be due to the younger age of the participants in that research program. In this regard, in survey research, the association between alcohol intoxication and risky sexual behavior on the event level has been shown to be stronger among middle-late adolescents than among young adults (Cooper, 2000). Furthermore, MacDonald et al.'s procedures included relatively insensitive measurement of expectancies, decreasing the likelihood that expectancy effects would be observed. However, Gordon et al.'s study (1997) showed how alcohol and expectancy are related to the theoretical antecedents of risky sexual behavior.

The purpose of this experiment was to extend Gordon et al.'s (1997) study of the effects of alcohol and alcohol-related sex expectancies on two constructs theoretically relevant (Fisher & Fisher, 1992) to the prediction of safer sex (motivation to engage in safe sex, and behavioral skills to negotiate condom use with a partner). The current study extends Gordon et al.'s in three ways. First, young adult women were the participants in this experiment. Second, risk perception, a construct often identified in models of health-related behaviors (Weinstein, 1993), was the motivation construct evaluated. Third, the measure of behavioral skills involved audio-visual administration to enhance the measure's sensitivity to simulate an actual risky sex situation. As in the Gordon et al. experiment, a single dose of alcohol was used that was designed to raise average BAC to .07% – .08%. Ample evidence exists (Finnigan & Hammersley, 1992) that such a dose of alcohol impairs the simultaneous processing of multiple sources of information, which has been hypothesized to underlie alcohol's influence on decisions regarding risky sexual behavior (MacDonald et al., 2000). We hypothesized that alcohol intoxication and alcohol expectancies each would be negatively related to behavioral skills.

The experiment also investigated risk perception. Unlike the experimental research relevant to risky sexual behavior, the acute intoxication experiments on risk perception have included a more balanced representation of men and women (Fromme et al., 1997, 1999). We predicted that expectancies would be negatively related to risk perception, consistent with Fromme et al.'s (1999) findings that individuals who had stronger expectancies that alcohol disinhibits sexual behavior perceived a higher likelihood of positive consequences of engaging in risky sex than individuals whose expectancies about alcohol's disinhibiting effects on sex were not as strong. This prediction also is consistent with Gordon et al. (1997) and the general literature on alcohol and sexual arousal (Crowe & George, 1989). Fromme et al. also provided evidence that alcohol intoxication would be negatively related to perception of risk, as they found that intoxicated individuals reported negative consequences of engaging in risky sex as less likely and reported fewer negative consequences of engaging in unprotected sex than did sober individuals.

## Method

### Participants

The participants were 102 women who were recruited from campus and community flyers and newspaper advertisements. Women were required to meet several criteria to be eligible to participate in the study, as follows: aged 21–30; predominantly heterosexual sexual orientation; sexually active in the last year but not pregnant; current drinking pattern classified as moderate or heavy; no current or history of alcohol or psychiatric problems; and no medical problems such as liver disorders or diabetes that would contraindicate the use of alcohol.

Of the 154 women evaluated for participation, 102 were identified as eligible and consented to participate in this experiment. Women defined as ineligible ($\underline{n}$ = 52) did not differ from the women who participated ($\underline{n}$ = 102) on age, race, marital status, employment status, year in school, amount of time in current relationship, or income. Table 1 shows that individuals assigned randomly to one of the three beverage conditions differed in the number of times they had sex without a condom in the last 3 months, $\underline{F}$ (2, 95) = 3.81, $\underline{p}$ < .05 ($\underline{N}$ = 98). Paired comparisons of group means by $\underline{t}$ – tests showed that individuals in the alcohol condition reported more frequent sex without a condom than did placebo participants ($\underline{p}$ < .05).

### Measures

Three categories of measures were collected: Screening and descriptive measures, manipulation checks, and dependent variables.

### Screening Measures

Short Michigan Alcoholism Screening Test (SMAST; Selzer et al., 1975) was used to screen for history of alcohol problems and has been shown to have good validity as a screening measure for adults (Maisto et al., 1995).

The Kinsey Scale (KS; Kinsey et al., 1948) is a 7-point scale used to assess sexual orientation, with zero representing exclusive heterosexuality and 6 representing exclusive homosexuality. Only subjects scoring a zero or 1 were included in this experiment.

Quick-Vue One-Step LCG (human chorionic gonadotropin) urine test (General Medical Corporation) was self-administered by each participant in the alcohol and placebo conditions to screen for current pregnancy at the beginning of Session 2. This test provides a quick analysis of a urine sample with strong sensitivity, specificity, and accuracy (all > .99).

Center for Epidemiologic Studies – Depressed Mood Scale (CES-D; Radloff, 1977) was used to help screen for current significant depressed mood. Evidence of reliability and validity is excellent (Fischer & Corcoran, 1994). Individuals who scored ≥16 were excluded from participation in the experiment.

The Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983) was used to confirm participants' reports of psychological health. 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.

The Demographic Questionnaire asked about age, maritial status, length of current relationship, highest grade completed in school, race, employment status, and income.

Quantity-Frequency-Variability (QFV) Questionnaire (Cahalan et al., 1969) was used to measure usual drinking patterns in the last 3 months. Only individuals in the moderate to heavy range were eligible to participate.

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

Sex-Related Alcohol Expectancies were measured with Leigh's (1990) 13-item questionnaire. Participants rated how much alcohol affects them, with higher scores reflecting a greater degree of belief that alcohol affects sexual arousal and behavior. In this sample the coefficient alpha for the overall scale = .89, and the total score in the analyses was used.

## Dependent Variables

Risk perception was measured with the CARE Questionnaire (Fromme et al., 1999) The variables of interest in this study were the likelihood of positive and negative consequences, respectively, of engaging in sex with a new partner. The coefficient alphas for these two subscales in this sample both were > .85.

Behavioral skills were measured with 7 audio-video role-play scenarios that were developed for this experiment. All 7 scenarios were equivalent in duration and were adapted from those that Gordon et al. (1997) used. All 7 required participants to negotiate the social situation using verbal communication skills. Five of the role-plays were "filler items" intended to reduce reactivity to 2 sexual role-plays. The 2 sexual and 5 filler role-plays and the accompanying post-video ratings required 20 minutes to administer. Two of the 7 scenarios 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 6 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 have been close friends and were faced with their first sexual experience. The couple must make a decision of 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.

Participants were asked to make verbal responses to 3 prompts in each of the two sexual scenarios. Prompt 1 consisted of the male's suggestion that not using a condom during sex is not risky and that it would enhance the pleasure of the situation. Prompt 2 consisted of another statement by the male that having unprotected sex would not be risky. Prompt 3 consisted of the male's suggestion that not agreeing to have unprotected sex would reveal a lack of trust in him.

Participants' responses to each of the prompts were scored (on a 0–2 scale) for 5 dimensions (higher score = better communication skills): (a) use of an "I" statement of intention of safer sexual behavior or refusal of unsafe sexual behavior; (b) presence of a positive statement about the other person in the scenario; (c) provision of a statement of a reason for safer sexual behavior; (d) suggestion of a specific alternative behavior that is safer; and (e) 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 et al., 1997, and Gordon et al., 1997).

## Manipulation Checks

Actual Blood Alcohol Concentration (BAC) was estimated by breath analysis (Alcosensor III, Intoximaters, Inc.).

Perception of the Amount of Alcohol Consumed was measured by asking participants to estimate the number of shots of vodka that they consumed. A score of 0 (None), 1 (1–2 shots), 3 (3–4 shots) or 4 (> 6 shots) was assigned on this variable. Participants' Perception of Intoxication was measured on a 10-point (1= not all, 10 = more intoxicated than you've ever been) scale.

Post-video Ratings were obtained following presentation of each of the role-play scenarios on a 0–6 Likert-type scale of the following dimensions: realistic situation; attractiveness of the male actor in the scenario; participant's interest in having sex if she were actually in the

situation depicted in the role-play; the likelihood that she would have sex without a condom (this rating is highly similar to ratings of "intention to have unprotected sex"; MacDonald et al., 2000); difficulty of responding to the role-play; the participant's judgment of the quality of her responses to the role-play; perception of whether the participant "got what she wanted" through her responses to the role-play; and the participant's "nervousness" in responding.

## Procedures

**Recruitment and screening—**Participants were recruited with newspaper advertisements for a "social communication" study and by placement of flyers on campus and in the community. Women who responded to the advertisements were invited to participate in two sessions and were screened initially over the telephone by a female research assistant (RA), who followed a written script for this purpose. If individuals agreed to these terms, an appointment for Session 1 was scheduled. Participants also were told at this time that, if they were invited back for the second session, there was a chance that they would consume alcohol.

**Session 1—**This session began with a female RA checking proof of the participant's age and then testing her breath to confirm a BAC of zero; no participant showed a BAC > 0 at this point. Participants then were given a brief overview of the study to read, and they read and signed a consent form that explained the procedures in detail. After participants gave their consent to participate in the experiment, eligibility criteria were confirmed by interview and administration of the SMAST, BSI, CES-D, and QFV. Upon confirmation of their meeting eligibility criteria, participants were asked to complete the Sexual Behavior Survey and Leigh Questionnaire. 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 also were 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 female RAs introducing themselves to participants as co-experimenters. One of the RAs (Experimenter 1) then breath tested the participant to confirm that her BAC was zero. Participants also were asked if they complied with the substance use and food and beverage intake requirements; all of the participants said that they had (Failure to comply, or a BAC > 0, would have required a rescheduling of the participant's appointment.) Participants then were asked to self-administer the pregnancy test. After completion of the pregnancy test, participants were weighed to determine the amount of alcohol individuals in the alcohol condition would receive. After confirming that the participant was not pregnant, Experimenter 1 left the room, and the second RA (Experimenter 2) entered the room to "assign" participants to their beverage condition (in fact, participants' beverage condition assignments were determined randomly at the end of Session 1). Individuals who actually were assigned to the alcohol or placebo condition were told that they would be drinking alcohol.

Participants assigned to the alcohol group received 0.65 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 also were 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 equal doses. They sat alone while they consumed their drinks and were asked to take a total of 20 minutes to finish both of them. Participants were asked to take about the same amount of time to finish each drink, and the RA checked on the participant every 6 or 7 minutes to assure that the instructions were being followed. Newspapers and general news magazines that did not include mention of HIV or AIDS were available to the participants while they consumed their beverages.

The RA who administered the measures to participants in Session 2 was not aware of their beverage condition. In this regard, Experimenter 1 greeted the subject, completed the session's preliminary details, and administered all measures except breath testing and beverage manipulation checks. Experimenter 2 assigned the participant to beverage condition, administered the beverages, measured BAC by breath analysis, and administered beverage manipulation checks. Neither RA was aware of the experiment's hypotheses.

Participants read for about 15 minutes after they finished their second drink, when the first breath test was administered. Experimenter 1 then asked the participant to complete some "opinion surveys," which were used as a time filler activity, following Gordon et al.'s (1997) procedures. After 5 minutes of the participant's completing these "surveys," she then was asked to complete the positive and negative consequences sections of the CARE. Experimenter 1 collected the CARE data after the participant completed the instrument, and Experimenter 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. Experimenter 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, Experimenter 1 returned to administer the role-plays. The experimenter 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 combined VCR-monitor, and their responses to the prompts were audio-taped. 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 set of 8 post-video ratings that were described earlier.

After participants completed the last post-video rating, Experimenter 1 entered the room and, following Gordon et al. (1997), asked them about their responses to a few of the items on the opinion survey in order to further divert participants' attention from the true purpose of the experiment. When the survey was completed, Experimenter 2 returned to breath test the participant and to give final BAC feedback appropriate to the participant's beverage condition. Participants then were asked to complete a brief unstructured questionnaire regarding their perceptions of the experimental hypotheses. After this procedure, Experimenter 1 debriefed the participant about the true purpose of the research in a global way, but the specific hypotheses being tested were not discussed. Participants who drank alcohol then were breath tested every 15 minutes and were not permitted to leave the laboratory until their BACs were $\leq .02\%$. Participants who completed Session 2 were paid $30.

### Overview of the Statistical Analyses

The analyses may be classified into two sets. The <u>preliminary analyses</u> concerned evaluation of the effectiveness of the beverage manipulation and determination of the psychometric properties of the role-play measure of behavioral skills. The <u>primary analyses</u> involved the use of hierarchical multiple regression to test a priori hypotheses about the relationship between alcohol intoxication and alcohol expectancies on risk perception and behavioral skills. Because the three conditions differed at baseline on number of times having sex without a condom, this variable was used as a covariate in the analyses.

## Results

### Preliminary Analyses

**Manipulation checks**—Participants in the three groups were compared on (a) their mean estimates of the number of ounces of alcohol that they consumed, (b) perceived degree of intoxication and (c) actual BAC. As expected, the analyses of the estimates of the amount of alcohol consumed revealed a significant effect of beverage condition, $F_{(2,99)} = 201.75$, $p < .0001$. Paired comparison (t-tests) showed that the alcohol group's estimate ($M = 2.2$; $SD = 0.5$) was significantly greater ($p < .0001$) than that of either the placebo group ($M = 1.4$; .06) or than the control group ($M = 1.0$; 0.0; $p < .0001$). The placebo and control group means also differed significantly from each other ($p < .001$).

The same pattern was identified for the perception of intoxication data, $\underline{F}_{(2,100)} = 109.06$, $\underline{p} < .0001$. Paired comparisons of group means (t-tests) showed that the alcohol group's mean ($\underline{M} = 5.2$; $\underline{SD} = 1.7$) was significantly ($\underline{p} < .0001$) higher than that of the placebo group's (2.7; 1.1) and the control group's (1.0; 0.0). The placebo and control groups' means also differed significantly from each other ($\underline{p} < .0001$).

The mean peak BAC reached by participants in the alcohol group was recorded on the second and third breath tests ($\underline{M} = .060\%$, $\underline{SD} = .014\%$ for each trial). The median BAC on trial 2 and 3 was .057% and .061%, respectively. The BAC of individuals in the control and placebo conditions was .000%.

**Psychometric properties of the role-play measure**—The inter-rater reliabilities of the behavioral skills score for each of the 5 dimensions were based on 30 scores (5 dimensions for each response to 3 prompts across 2 tapes) 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. Very few data were lost due to poor audio-tape recording: Scenario 1, response 1, n = 6; response 2, n = 1; response 3, n = 1; Scenario 2, response 1, n = 1; response 2, n = 3; response 3, n = 4. In addition, all data for one participant in the placebo group were lost because she became ill during the procedures and withdrew from the remainder of the session. The analyses showed that percent agreement for the 5 response dimensions and the 2 tapes (10 comparisons) ranged from 96.6% – 99.0%. The kappas for these data ranged from .91 to .98.

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 male actor, interest in having sex with the male 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 2. A 3 (beverage condition) × 2 (scenario) ANCOVA with repeated measures for main effects of scenario and for a beverage × scenario interaction (covariate = number of times having sex

without a condom in the last 3 months). These analyses showed no significant main effects or interactions in any of the four ratings. The same ANCOVA was run on the total behavioral skills scores for each of the scenarios. An ANCOVA was run on responses to each of the three prompts. These analyses revealed no significant main effects or interactions for prompt 1 or prompt 3. The analyses of the prompt 2 data showed a significant scenario effect, $\underline{F}$ (1, 89) = 12.09, $\underline{p}$ < .01. Scores for scenario 2 ($\underline{M}$ = 4.81) were higher than those for scenario 1 ($\underline{M}$ = 4.00). No other effects were statistically significant.

The inter-rater 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 score for responses to the first prompt of each scenario was based on 10 individual scores (5 dimensions × 2 scenarios). As noted earlier, 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, 2, and 3, respectively. The results showed alpha = .57 for prompt 1, .67 for prompt 2, and .71 for prompt 3.

### Primary Analyses

**Risk perception (the CARE)—**The hypothesis regarding alcohol and expectancy effects on risk perception was evaluated by use of hierarchical multiple regression to predict two CARE subscales, new partner-negative consequences and new partner-positive consequences scores, respectively. Because the CARE data were skewed (floor effects for ratings of positive consequences, ceiling effects for ratings of negative consequences), an inverse transformation was applied to the positive consequences scores and a squared transformation was applied to the negative consequences scores to make the distributions of scores more normal. In addition, consistent with Aiken and West's (1991) recommendations, these transformed data were centered before analysis.

The first step of the hierarchical model entered reports of number of times having sex without a condom in the last 3 months and the total Leigh expectancy score. Step 2 entered 2 vectors, each dummy coded. The first vector compared the alcohol and control condition, and the second vector compared the placebo and control condition. The third and final step of the model entered the product of each of the beverage condition vectors with Leigh score, which reflected the beverage × expectancy interaction. The N = 95 for these analyses. Application of this model to each of the two CARE scores (transformed) showed significant effects for the first step of the model on the positive consequences ratings, F change (2,92) = 3.99, p <.05, $R^2$ change = .08. The Leigh total expectancy score emerged as the significant predictor, beta = −.106, t = −2.82, p <.01. Therefore, higher expectancy scores were associated with ratings of higher likelihood of positive consequences of risky sex.

To explore the role of the expectancy construct, the same regression model was run on the two CARE scores, except that perception of intoxication was substituted for the beverage condition contrasts ($\underline{N}$ = 94 for these analyses). Based on previous research, perception of intoxication ratings were viewed as a more sensitive measure of activated expectancies than was beverage condition (Gordon et al., 1997; Maisto et al., 1978). Consistent with this view, step 2 of the model entered the intoxication ratings, and step 3 entered the Leigh × perception of intoxication product. The results of the application of this model to the CARE data were identical to those with application of the first model. The only significant entry was step 1 in the positive consequences data, $\underline{F}$ change (2,91) = 3.97, $\underline{p}$ <.05, $\underline{R}^2$ change = .08, with the expectancy score the significant predictor (beta = −2.82, $\underline{p}$ <.01).

**Behavioral skills**—The same hierarchical regression models that were used with the CARE data were applied to responses to each of the scenario prompts.

First, application of the model that contained the beverage condition vectors ($\underline{N}$=94) revealed one significant $\underline{F}$ change statistic. Step 3 in the analysis of the prompt 1 data showed an $\underline{R}^2$ change = .06, $\underline{F}$ (2,87) = 3.01, $\underline{p}$ = .05. The significant change in $\underline{R}^2$ was due primarily to the placebo condition × Leigh interaction, beta = −.070, $\underline{t}$ = 2.19, $\underline{p}$ <.05. This finding suggested that the relationship between skills score and Leigh score was more negative in the placebo than in the control condition. The same pattern was observed for the alcohol × Leigh interaction, but it did not reach conventional levels of statistical significance ($\underline{p}$ =.06). Evaluation of the models in responses to the other two prompts revealed no significant changes in $\underline{R}^2$.

The models containing the perception of intoxication variable were applied to the behavioral skills data, and the results are summarized in Table 3. As can be seen in Table 3, the findings for the prompt 1 and prompt 2 data were similar. The prompt 1 analysis revealed a significant change in $R^2$ = .05 with entry of the third step of the model, $\underline{F}$ change (1,88) = 4.17, $\underline{p}$ <.05. The Leigh × perception of intoxication interaction, beta = −.064, $\underline{t}$ = −2.04, $\underline{p}$ <.05, was due to an enhancement of the negative relationship between skills and Leigh scores with increased perceived intoxication.

The prompt 2 data showed the same pattern, as $\underline{R}^2$ change with step 3 =.05, $\underline{F}$ (1,89) = 5.39, $\underline{p}$ <.05. The Leigh × perception interaction term, beta = −.085, $\underline{t}$ = −2.32, $\underline{p}$ <.05, again showed enhancement of the negative relationship between skills and Leigh scores with increased perceived intoxication. Step 3 of the model in prompt 2 data also showed a significant negative relationship between times having sex without a condom in the last 3 months and skills scores, beta = −.005, $\underline{t}$ = −2.23, $\underline{p}$ <.05.

The prompt 3 data showed a significant $\underline{R}^2$ change =.05 with step 2 of the model, $\underline{F}$ change (1,89) = 4.47, $\underline{p}$ <.05. Table 2 shows a significant negative relationship between times without a condom and skills, beta = −.005, $\underline{t}$ = −2.12, $\underline{p}$ <.05, and a negative relationship between perception of intoxication and skills, beta = −.004, $\underline{t}$ = −2.12, $\underline{p}$ <.05. As suggested by the $\underline{F}$ change statistics, the Leigh × perception interaction term was not significant when entered into the model.

**Beverage condition and ratings of likelihood of having sex without a condom**—
The ANCOVA of post-video ratings of "likelihood of having sex (with the male actor) without a condom" revealed a significant main effect of beverage condition, $\underline{F}$ (2,94) = 5.29, $\underline{p}$ <.01. Paired comparisons ($\underline{t}$-tests) of the beverage means showed that participants in the alcohol condition assigned higher likelihood ratings across the two videos than participants in either of the other two conditions, who did not differ from each other. When the same regression models that were applied to the CARE and behavioral skills data were applied to the average likelihood ratings, the results were similar to those of the ANCOVA. That is, the model that compared beverage conditions showed only a significant F change for entry of the step involving the beverage condition contrasts, $\underline{F}$ change (2,93) = 5.35, $\underline{p}$ <.01, $\underline{R}^2$ change = .06. The effect that accounted for the significant increment in variance explained was the alcohol-control contrast, $\underline{t}$ = 2.93, $\underline{p}$ <.01; the placebo-control contrast was not statistically significant.

## Discussion

The hypotheses of this study were partially supported. Consistent with predictions, perceived intoxication, alone or in combination with alcohol-related sex expectancies, was associated with role-play performance. However, the absence of a beverage main effect on behavioral skills was surprising and inconsistent with Gordon et al.'s (1997) data with a male sample.

Furthermore, although the finding of a relationship between expectancy and perceived likelihood of positive (but not negative) consequences of having sex with a new partner was consistent with this study's hypotheses and with Fromme et al.'s results, this experiment's data did not conform to Fromme et al.'s (1999) finding of beverage main effects on the CARE. Although the differences in beverage effects found among these studies could be due to several factors related to differences in samples and procedures, it is possible that the single dose of alcohol used in the experiment was not sufficiently sensitive. In this regard, the does that was administered resulted in a mean peak BAC that was lower than anticipated. However, the level of intoxication that was reached in this study still should have impaired processes that have been hypothesized to affect decisions regarding safer sex (Finnigan & Hammersly, 1992).

A secondary dependent variable in this study is closely related to what other researchers have called "behavioral intentions" and was measured by the ratings of likelihood of having unsafe sex with the male character. Analyses revealed that the primary determinant of these ratings was beverage content, as individuals who drank alcohol gave higher ratings than individuals in either of the other two beverage conditions. The significance of this finding, which is consistent with other experimental studies (Fromme et al., 1999; MacDonald et al., 2000; Murphy et al., 1998), depends in part on the theoretical model that is followed. According to the IMB model (J. Fisher & W. Fisher, 1992; W. Fisher & J. Fisher, 1998), behavioral skills mediate safer sex, except when they consist of overlearned behaviors, and therefore would be a more important determinant than intentions of safer sex. In the IMB model, behavioral intentions might be more related to motivation to engage in safe sex, and thus would be viewed as an additional indicator of motivation. In contrast to the IMB model, however, theories of reasoned action and planned behavior (Fishbein & Middlestadt, 1989) would suggest that behavioral intentions are the most proximal determinants of actual behavior.

The participants' CARE ratings of likelihood of positive consequences showed a pronounced positive skew, and the reverse was true for ratings of the likelihood of negative consequences. The extent of skewness in these data may reflect in part the findings from other research. For example, Cooper (2000) concluded that knowledge about HIV and consequences of engaging in risky sex have become normative among young adults during the 1990s, compared to the 1980s. As a result, a face valid, self-report measure of risk perception like the CARE would be expected to show scores that are not normally distributed.

In view of the important role that alcohol expectancies played in this experiment, additional person variables warrant investigation in future research. For example, sexual sensation seeking (Kalichman & Rompa, 1995), derived from Zuckerman's (1994) research, appears promising. Although the context and procedures of the correlational studies (Kalichman et al., 1996; Justus et al., 2000) that have investigated sensation seeking and similar constructs differ from the experiments reviewed earlier, they suggest that experimental work on HIV-related risky sex would benefit by the inclusion of sensation seeking as part of its theory testing and development efforts.

Another person variable that may be important is inhibition conflict about sex. This factor was shown to be a moderator of alcohol's effects on sexual responses more than 20 years ago (Lang et al., 1980). Myopia theory (Steele & Josephs, 1990) is the reason for the recent attention this variable has received in alcohol-risky sex research. Myopia theory suggests that alcohol's disinhibiting effects on risky sex are more prominent in individuals higher in conflict about engaging in sex, and there are experimental (MacDonald et al., 2000; Murphy et al., 1998) and correlational (Dermen & Cooper, 2000) studies that support this idea. It would be valuable to pursue research on how inhibition conflict combines with other person variables to determine alcohol's effect on risky sex, consistent with the idea that the relationship is multiply determined.

Characteristics of the situation also warrant investigation in future research on alcohol and risky sex. For example, the elicitation of sexual arousal is a variable that has received little systematic attention but that may be significant (Lowenstein et al., 2001; Murphy et al., 1998). Elicitation of sexual arousal is a challenge for laboratory studies, given ethical and practical considerations. Our use of multi-modal stimuli, rather than an audiotape, to administer the role-play scenarios reflects our effort to enhance realism of these stimuli compared to the Gordon et al. (1997). However, situational variables related to the elicitation of sexual arousal have not been manipulated in previous research.

In conclusion, the results of this experiment suggest that beliefs about the effects of alcohol on sex and perceived degree of alcohol intoxication moderate both motivation to engage in safer sex and behavioral skills to negotiate condom use with a partner, two major antecedents of HIV risk reduction behavior according to the IMB model. Alcohol was the primary determinant of behavioral intention, which may be an indicator of motivation. Future experimental research should follow a multivariate framework to discover the person and situational determinants of risky sex, as well as the process through which expectancies affect such behavior among young adults.

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**Table 1**

Participant Characteristics by Condition

| Variable | Control (n=34) | | Beverage Condition Alcohol (n=34) | | Placebo (n=34) | |
|---|---|---|---|---|---|---|
| | **Mean** | **SD** | **Mean** | **SD** | **Mean** | **SD** |
| Age | 23.6 | 2.7 | 23.6 | 2.9 | 23.4 | 2.7 |
| Length Current Relationship (Months) | 14.6 | 13.7 | 21.5 | 18.1 | 16.5 | 17.5 |
| # Partners (3 Months) | 1.0 | .6 | 1.3 | .8 | 1.0 | .7 |
| # Times Sex Without Condom (3 Months)* | 9.1 | 10.7 | 14.4 | 11.2 | 4.0 | 11.2 |
| No. Times Sex with Condom (3 Months) | 3.9 | 3.8 | 2.1 | 3.2 | 2.7 | 4.5 |
| Race (% Caucasian) | 82 | | 75 | | 76 | |
| QF Drinking Class (% Heavy) | 62 | | 79 | | 62 | |

Note: SD = Standard deviation; QF = Quantity – Frequency

*
p<.05; A>P; A=C; P=C

**Table 2**

Means, Standard Deviations (SD), and Medians of Post-Video Ratings of Two Sexual Role-Play Scenarios

| Dimension | Scenario 1 | | | Scenario 2 | | |
|---|---|---|---|---|---|---|
| | Mean | SD | Median | Mean | SD | Median |
| Realistic Situation | 4.68 | 1.43 | 5.00 | 4.82 | 1.34 | 5.00 |
| Attractiveness Of The Male | 2.87 | 1.64 | 3.00 | 2.72 | 1.75 | 3.00 |
| Interest In Sex | 2.13 | 1.72 | 2.00 | 2.23 | 1.99 | 2.00 |
| Difficulty Of The Role-Play | 1.59 | 1.49 | 1.00 | 1.86 | 1.56 | 2.00 |

Note: Ratings of the dimensions were made on a 0–6 scale. $\underline{N}$ = 93.

**Table 3**

Summary of Results of Hierarchical Regression Model Including Perception of Intoxication and Predicting Performance in Response to Three Prompts Across Two Role-Play Videos

| | Prompt 1 | | | Prompt 2 | | | Prompt 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Beta | $SE_B$ | $R^2$ Change | Beta | $SE_B$ | $R^2$ Change | Beta | $SE_B$ | $R^2$ Change |
| Step 1 | | | .01 | | | .05 | | | .05 |
| Leigh Total Score | −.001 | .048 | | −.036* | .057 | | −.026* | .063 | |
| Times Without Condom | −.001 | .002 | | −.005* | .002 | | −.005* | .002 | |
| Step 2 | | | .01 | | | .01 | | | .05* |
| Leigh Total Score | −.001 | .048 | | −.036* | .057 | | −.024* | .062 | |
| Times Without Condom | −.001 | .002 | | −.005* | .002 | | −.005* | .002 | |
| Perception Intoxication | −.012 | .015 | | −.017 | .017 | | −.041* | .019 | |
| Step 3 | | | .05* | | | .05* | | | .01 |
| Leigh Total Score | −.023 | .049 | | −.065* | .057 | | −.036* | .063 | |
| Times Without Condom | −.001 | .002 | | −.005* | .002 | | −.005* | .002 | |
| Perception Intoxication | −.010 | .015 | | −.016 | .017 | | −.039* | .019 | |
| Perception × Leigh | −.066* | .031 | | −.084* | .036 | | −.041 | .041 | |

Note: Data on all variables were centered before analysis. $SE_B$ = Standard error of beta; $R^2$ change = change in $R^2$ resulting from entering a given step of the model into the analysis. $N$ = 93.

*
$p \leq .05$