

Alcohol Use and Protective Sexual Behaviors Among High-Risk Adolescents*

ANGELA BRYAN, PH.D.,[†] LARA A. RAY, PH.D.,[†] AND M. LYNNE COOPER, PH.D.[†]

Department of Psychology, 345 UCB, University of Colorado, Boulder, Colorado 80309-0345

ABSTRACT. Objective: This study seeks to advance our understanding of moderating influences on the relationship between alcohol and condom use by examining their association at both the global and event levels of analysis using a prospective approach within a sample of high-risk adolescents. The following potential moderators were examined: sex-related alcohol expectancies, gender, relationship type, level of alcohol use, and impulsive sensation seeking. **Method:** Criminally involved adolescents ($N = 300$) completed measures of alcohol use, condom use, personality, and alcohol expectancies; 267 (89%) participants completed a behavioral assessment 6 months later. **Results:** At the global level of analysis, there was a significant moderating effect of alcohol-related sexual-enhancement expectancies, such that the relationship between alcohol and condom use was negative and significant

only among individuals with higher sexual-enhancement expectancies. At the time-limited global level, impulsive sensation seeking at baseline was negatively associated with condom use at 6-month follow-up. At the event level, there was a Gender \times Alcohol interaction such that alcohol use was unrelated to condom use among males but was strongly and negatively related among females. **Conclusions:** This study makes a contribution to the understanding of the relationship between alcohol use and condom use by looking beyond main effects and conducting an empirically driven and multilevel examination of moderating variables. Results support the inclusion of situation-specific alcohol risk-reduction content in human immunodeficiency virus/sexually transmitted disease-prevention activities. (*J. Stud. Alcohol Drugs* **68**: 327-335, 2007)

EMPIRICAL DATA REGARDING ALCOHOL and sexual risk behavior suggest that the association of alcohol use and risky sex is strongest amongst adolescents (Cooper, 1992; Leigh and Morrison, 1991; Testa and Collins, 1997; Wilsnack et al., 1997), putting them at risk for a host of negative outcomes. Adolescents and young people ages 15-24 have the highest rate of common sexually transmitted diseases (e.g., *Chlamydia*; Centers for Disease Control and Prevention, 2000), and they are the only subset of the population for whom the incidence of human immunodeficiency virus is actually increasing (Centers for Disease Control and Prevention, 2001). Adolescents who are involved with the criminal justice system are at even greater risk than their noncriminally involved peers (Barthlow et al., 1995; Bryan et al., 2004; Lux and Petosa, 1994, 1994-1995). Furthermore, alcohol use and misuse is highly prevalent among adolescents and young adults, such that 82.5% of individuals ages 15-24 report a history of

alcohol use, 16.5% of whom meet Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised (American Psychiatric Association, 1987) criteria for alcohol dependence (Anthony et al., 1994). Alcohol use and misuse is even more widespread in criminally involved adolescents (Lebeau-Craven et al., 2003; Neighbors et al., 1992).

Despite the high prevalence of alcohol use and sexual risk among incarcerated adolescents, little is known about the link between the two behaviors in this population. Most work on the alcohol and risky sex connection focuses on other groups (e.g., college students, community adolescents, gay men, and psychiatric patients). The development of interventions to reduce sexual risk behavior among criminally involved adolescents hinges on a better understanding of the extent to which alcohol is related to sexual risk taking in this population.

One might simply assume there is a causal relationship between drinking to excess and engaging in sexual risk behavior among criminally involved adolescents, but such a clear-cut relationship does not exist in the broader literature. Some researchers have found no relationship between alcohol and sexual risk (e.g., Testa and Collins, 1997), some find the expected positive relationship (e.g., Dermen et al., 1998), and yet others actually show that drinking is associated with less risky sexual behavior (e.g., Corbin and Fromme, 2002). The explanation for the disparate empirical findings is multifaceted. Cooper (2002) argues that the inconsistencies are perhaps best framed in terms of two of

Received: April 25, 2006. Revision: October 2, 2006.

*This research was supported by National Institute on Alcohol Abuse and Alcoholism grant RO3 AA12925-01 to Angela Bryan.

[†]Correspondence may be sent to Angela Bryan at the above address or via email at: angela.bryan@colorado.edu. Lara A. Ray is now with the Center for Alcohol and Addiction Studies, Brown University, Providence, RI. M. Lynne Cooper is with the Department of Psychological Sciences, University of Missouri-Columbia, Columbia, MO.

the theories that articulate the possible causal association of alcohol with sexual risk behavior: alcohol myopia (Steele and Josephs, 1990) and expectancy theory (Hull and Bond, 1986; but more specifically Dermen and Cooper, 1994b). Both stress the complex and conditional nature of the alcohol → sexual risk behavior relationship. We used these theoretical frameworks as the basis for our selection of factors that (1) might help to explain the conditions under which there is a connection between alcohol and risky sexual behavior and (2) are specifically relevant to high-risk adolescents.

Alcohol myopia theory emphasizes the pharmacological and cognitive effects of alcohol that narrow one's focus and, particularly in a situation of inhibition conflict, suggests that individuals under the influence of alcohol are more likely to focus on highly salient cues (e.g., emotional relationship to partner) rather than distal cues (e.g., sexually transmitted disease) (Steele and Josephs, 1990). Expectancy theory focuses on the psychological mechanisms associated with the alcohol and risky sex connection, positing that an individual's beliefs about the effects of alcohol will influence both the situations under which they consume alcohol and their behavioral and social reactions to alcohol consumption. Key to the current study, Dermen and Cooper (1994b) found that an individual's beliefs about the sexual effects of alcohol are important, such that those who believe that alcohol will enhance and disinhibit sexual experiences show a stronger relationship between alcohol and risky sexual behavior. To the extent that there is a causal association of alcohol to lack of condom use, these theories work together to suggest that those effects "are contingent on the nature of instigating and inhibiting cues governing momentary behavior, on the content of one's beliefs about alcohol effects, or possibly on a combination of both" (Cooper, 2006, p. 20). Finally, we examine the possibility that, as many have argued, a reason for the apparent relationship of alcohol use to risky sexual behavior is noncausal and due to third-variable explanations such as an underlying personality trait that predisposes individuals to engage in risk behaviors generally.

In sum, the set of explanatory variables we examine in this work includes a potential third-variable personality construct particularly relevant to a criminally involved adolescent population (impulsive and sensation-seeking personality) and sex-related alcohol expectancies found to be associated with alcohol-related sexual risk taking in a community sample of adolescents (Dermen et al., 1998; Dermen and Cooper, 2000). From the alcohol myopia perspective, we examine the direct pharmacological effects of alcohol (quantity of alcohol consumed) and a particularly salient contextual cue for adolescents (relationship type). Moreover, we test the role of gender, which is an important explanatory variable in its own right when one is examining heterosexual condom use (e.g., Bryan et al., 1996, 1997,

2001) and has been found to moderate the way in which expectancies (Cooper and Orcutt, 1997), quantity of alcohol (Cooper et al., 1994; Weinhardt and Carey, 2000), and relationship type (Wight, 1992) are associated with condom use.

In addition to focusing on theoretically meaningful moderator variables, we note that the relationship of alcohol to sexual risk can also depend on the level of analysis explored (see Cooper, 2002). Therefore, we examine our data at the global, time-limited global, and event levels of analysis (Halpern-Felsher et al., 1996). Some moderating variables may be more or less relevant depending on the level of analysis. For example, examining the influence of partner type at the global level is especially difficult with high-risk adolescents because they are likely to have had a number of different types of partners during their recent sexual history. However, other moderators, such as personality, are appropriately examined at multiple levels of analysis.

The present study seeks to advance our understanding of the relationship of alcohol use to condom use among criminally involved high-risk adolescents. These data are crucial for the development of interventions to decrease sexual risk behavior among criminally involved adolescents as the data improve our understanding of the nature of the connection, if any, of this behavior to alcohol use. Consistent with our theoretical orientations, prior work, and knowledge of high-risk adolescents, the relationship between alcohol use and condom use is expected to be strongest for individuals scoring high on impulsivity, those with positive sex-related alcohol expectancies, and those who drink more before sexual activity. We will also explore the impact of gender and relationship status on the association between alcohol and risky sexual behavior.

Method

Participants

Our initial convenience sample included 300 adolescents (77% male, 23% female) who were involved with the Denver metro area juvenile justice system. The gender breakdown reflects the demographics of the Colorado juvenile probation system. Most (77%; $n = 230$) were sexually experienced, and of those 230, 73% ($n = 169$) were male and 27% ($n = 61$) were female. The ethnic composition of the sample was 49% Hispanic, 23% white, 21% black, and 7% "other." There were no differences in whether participants had ever had sex at baseline by race (recoded as Hispanic, white, black, and "all other") ($\chi^2 = 2.37$, 3 df, $p = .50$; $n = 298$) or gender ($\chi^2 = 0.22$, 1 df, $p = .64$; $n = 298$). Because all analyses included only sexually experienced participants ($n = 230$), remaining demographics refer only to those participants who had had sex at least once. Mean (SD) age of

sexually experienced participants was 15.56 (1.29; range: 12-18). Average age at first intercourse was 13, and median number of lifetime sexual partners was 5 (range: 1-100).

Procedures

Recruitment and baseline procedures. Recruitment was primarily accomplished by contacting young people on probation in the waiting rooms of probation offices. Extensive detail on these procedures can be found in Bryan et al. (2005). All procedures were approved by our university-level human subjects review board, and a federal certificate of confidentiality was obtained for this research to further protect participants' privacy. All adolescents who completed the pencil-and-paper baseline survey were compensated \$15 for their participation.

Follow-up procedures. Participants were contacted 6 months after they completed the baseline questionnaire to complete the Time 2 behavioral follow-up. Research staff contacted participants using reminder postcards 1 month before, and via phone beginning approximately 2 weeks before, their 6-month follow-up due date. The retention rate was 89%, with 267 of the original 300 participants completing the follow-up. Participants were compensated \$50 for completing the pencil-and-paper follow-up. Of the 267 participants who completed the follow-up, 76% of the males and 85% of the females reported having had sex in the past 6 months. Of the 183 participants who reported having had sexual intercourse in the previous 6 months and had valid data for the questions on the survey asking about condom use (57 females and 126 males), 37% "always" used condoms in the past 6 months, 14% "never" used condoms, and the remainder used condoms inconsistently.

Measures: Global-level variables—Time 1

Alcohol use was evaluated with a variation of the measure used by White and Labouvie (1989). The instructions defined one alcoholic drink as "one beer, one glass of wine, or one serving of hard liquor either by itself or in a mixed drink." Three items asked, "In the last 6 months, (1) How often did you consume at least one alcoholic drink?" (answered on a 9-point scale ranging from "never" to "every day"), (2) "How many drinks did you usually have at one time?" (answered on a 10-point scale ranging from "none" to "more than 20 drinks"), and (3) "When you drank alcohol how often did you get drunk?" (answered on a 5-point scale ranging from "never" to "always"). Slightly more than one third of participants (38%) reported not drinking at all in the past 6 months, whereas 21% reported drinking four to five times a month or more. The average quantity response was two to three drinks, whereas 27% reported drinking seven or more drinks per drinking occasion. Less than half of the sample (44%) reported "never" getting drunk,

and 22% reported "almost always" or "always" getting drunk. The three items were standardized and averaged to form an alcohol quantity and frequency index (Time 1: $\alpha = .87$).

The Impulsivity and Sensation Seeking Scale (IMPSS) captured the impulsive, unsocialized, sensation-seeking factor of the Zuckerman-Kuhlman Personality Questionnaire (Zuckerman, 1994; Zuckerman et al., 1993). An advantage of this 19-item scale is that it contains general items reflecting the personality construct, as opposed to behavioral items reflecting participation in activities such as drinking or sexual behavior that would be confounded with our behavioral measures ($\alpha = .77$).

Sex-related alcohol expectancies were determined using Dermen and Cooper's (1994a,b) measure for adolescents. Given the uniqueness of the sample in this study, responses to the 14-item sex-related alcohol expectancies scale were subjected to a principal components analysis to determine if the three-factor structure found in prior work (Dermen and Cooper, 1994b) held in this sample. Results showed two unexpected findings. First, only two factors were extracted. Second, four items had extremely diffuse loadings across the two factors. We suspect that these items (e.g., "I am more likely to have sex on the first date") may not be uniquely informative in a sample that is highly sexually active and thus are likely to covary with sexual activity generally more than sexual activity specific to alcohol-use situations. An examination of the items comprising the two factors suggested a less complex factor structure in this sample: one factor reflective of expectancies associated with sexual enhancement and one factor reflective of expectancies associated with increased sexual risk taking. The four diffuse items were dropped and the factor structure was re-estimated. The two components (sexual-enhancement expectancies and sexual risk-taking expectancies) accounted for 63% of the total variance. Six items loaded on the sexual-enhancement factor, and four items loaded on the sexual risk factor (indicated by factor loadings $> .50$). The subscales were reliable (sexual enhancement $\alpha = .85$; sexual risk $\alpha = .75$) and significantly correlated ($r = .57, p < .001$).

Condom use. To assess frequency of condom use since becoming sexually active, participants were asked how often they had used condoms, with response options ranging from "never" to "always" (Bryan et al., 2004; Fisher et al., 2002).

Time-limited global-level variables—Time 2

Alcohol and condom use were assessed with respect to the 6-month interval since the administration of the initial questionnaire. Alcohol use in conjunction with sex was assessed at follow-up with the following question: "In the past 6 months only, how much of the time have you used alcohol when you've had sexual intercourse?" answered on

a 5-point scale ranging from “never” to “always.” Of those who had intercourse during the follow-up period ($n = 208$), 43% said that they “never” used alcohol during sex, whereas 6% of participants reported using alcohol during intercourse “almost always” or “always.” Recent alcohol use was assessed by the same three questions adapted from White and Labouvie (1989) (Time 2: $\alpha = .89$). The means and frequencies for level of alcohol use mirrored those from the Time 1 assessment.

Event-level variables

Event-level measures of alcohol and condom use were collected at baseline and at follow-up. At Time 1, participants were asked whether they used condoms (yes/no) and whether they had been drinking alcohol (yes/no) at their most recent intercourse occasion. At Time 2, respondents were asked about the most recent time they had sexual intercourse while drinking alcohol, and the most recent time they had sexual intercourse without drinking alcohol. For both episodes, participants were asked whether a condom was used, and what was the relationship status of their partner (i.e., “someone I just met,” “a casual sexual partner,” or “my boyfriend/girlfriend”). For the most recent intercourse episode including alcohol, participants were asked how much alcohol they and their partner consumed (ranging from “none” to “more than 20 drinks”).

The full questionnaires and descriptive statistics on all variables used in each level of analysis are available from the first author on request.

Results

Analysis strategy

At each level of analysis, we first present the main effect relationships between alcohol use and condom use and then perform moderational analyses that examine each moderator in turn that is relevant to that level of analysis. We note that no demographic factors (i.e., race and age) relate to or change the relationship between alcohol and condom use, except that there was a tendency for older adolescents to drink more. Given that controlling for age did not change any of our substantive conclusions, neither age nor race are included in the subsequent analyses. Given the methodologically underpowered nature of tests of interaction effects in nonexperimental field studies (see McClelland and Judd, 1993), we have adopted a critical α of .10 for tests of interactive effects.

Global correlation

At baseline, overall condom use was not related to drinking quantity, frequency, “getting drunk,” or the alcohol-use index (r 's = -.10, -.08, .01, and -.07, respectively). Four moderators were examined in separate regression equations (see Table 1): impulsive sensation seeking, sexual-enhancement alcohol expectancies, sexual risk-taking alcohol expectancies, and gender. In each equation, lifetime condom use was the criterion, and the predictors were the alcohol-use index, the moderator, and the Alcohol Use \times Mod-

TABLE 1. Global and time-limited global (i.e., past 6 months) associations tested by regressing condom use on alcohol use, moderators (all measured at baseline), and their interactions

Model	Global			Time-limited global		
	R^2	B	pr^2	R^2	B	pr^2
Model 1: IMPSS	.06 [†]			.05*		
Alcohol use		-.05	.00		.09	.01
IMPSS		-.22 [‡]	.04		-.22 [†]	.04
Alcohol \times IMPSS		.02	.00		-.08	.01
Model 2: Sexual enhancement (SE)	.05*			.02		
Alcohol use		-.01	.00		.07	.00
SE expectancies		-.11	.01		-.07	.01
Alcohol \times SE Expectancies		-.18 [†]	.03		-.08	.01
Model 3: Sexual risk-taking (RT)	.07 [‡]			.03		
Alcohol use		-.01	.00		.05	.00
RT expectancies		-.24 [‡]	.06		-.08	.01
Alcohol \times RT Expectancies		-.11	.01		-.14	.02
Model 4: Gender	.02			.06*		
Alcohol use		.04	.00		.19	.02
Gender		.05	.00		.17*	.03
Alcohol \times Gender		-.15	.01		-.21*	.03

Notes: Continuous measures in all models were centered before to their inclusion in the interaction term, and the main effect also refers to the effect of the centered version of the variable. IMPSS = Impulsivity and Sensation Seeking scale.

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

erator interaction. In all cases, continuous predictors were centered before inclusion in the regression equation (cf. Aiken and West, 1991). There was a main effect of IMPSS, such that higher impulsive sensation seeking was associated with lower reported condom use. There was also a significant moderating effect of sexual-enhancement alcohol expectancies. Two additional regression equations were calculated to probe this interaction, one for the effect of alcohol frequency on condom use at 1 SD above the mean enhancement expectancy score, and one for the effect of alcohol frequency at 1 SD below the mean enhancement expectancy score (cf. Aiken and West, 1991, pp. 54-58).

As can be seen in Figure 1, the relationship of alcohol use to condom use was positive but not significant ($B = .16, p = .11$) for individuals with lower enhancement expectancies but was negative and significant ($B = -.18, p < .05$) for individuals with higher enhancement expectancies. Finally, we examined gender as a moderator of the alcohol use/condom use relationship by assigning weighted effects codes to gender (cf. Aiken and West, 1991) before the cre-

ation of the interaction term. There was no main effect of gender, nor was there a Gender \times Alcohol Use interaction on condom use.

Time-limited global correlation

There was no association of condom use and any of the alcohol-use measures in the past 6 months (r 's ranged from .01 to .09). Moderational analyses were conducted that mirrored the global-level analyses (see Table 1). Again, there was a main effect of IMPSS on condom use. There was a marginal interaction between risk-taking expectancies and alcohol use, of the same form as in Figure 1, such that the relationship of alcohol use to condom use was slightly positive for individuals with lower risk-taking expectancies but was negative and significant for individuals with higher risk-taking expectancies and was near zero at the mean of risk-taking expectancies. There were no main or interactive effects of sexual-enhancement expectancies. In the equation including gender, we found a main effect of gender

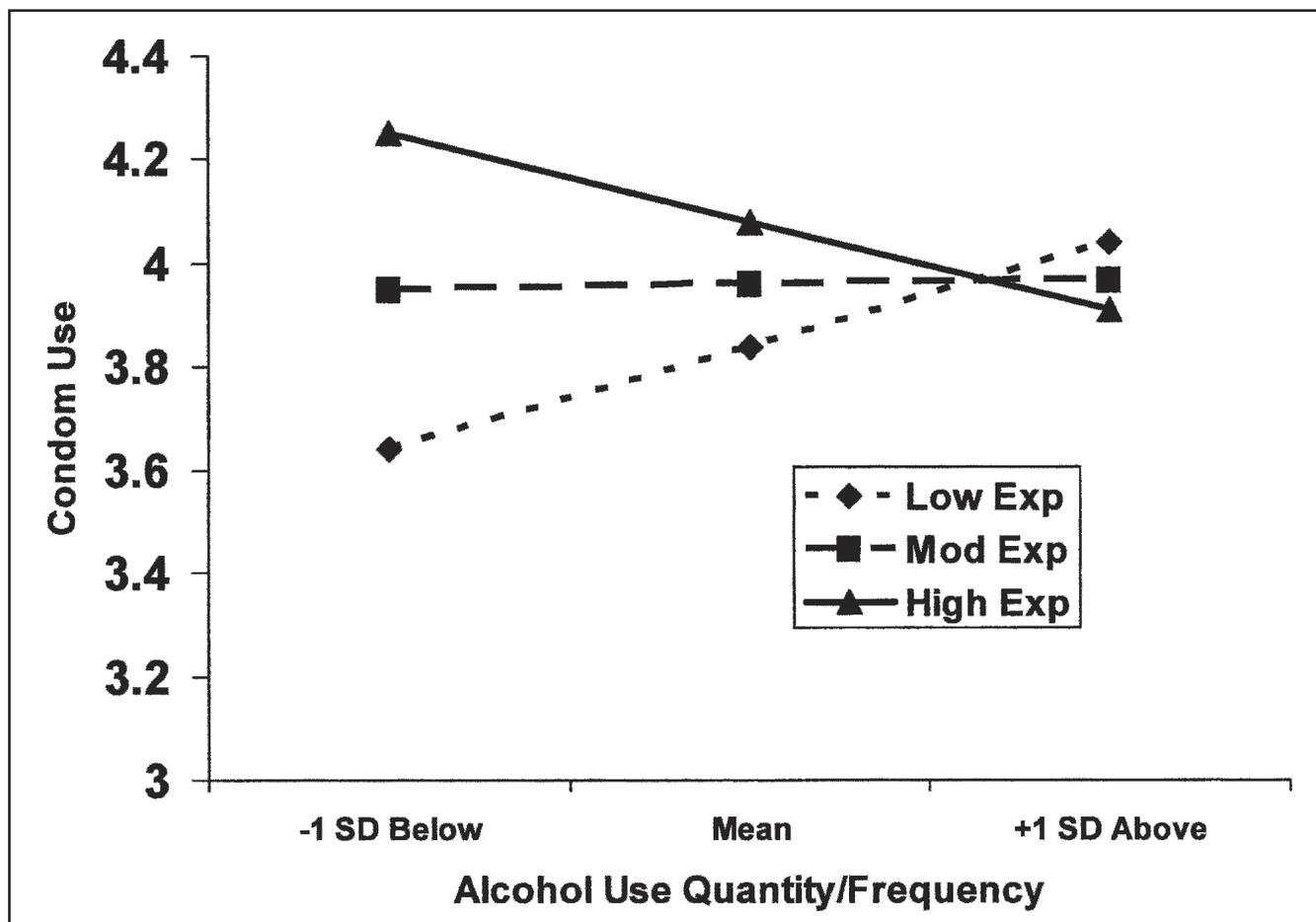


FIGURE 1. Relationship of alcohol quantity and frequency of use to condom use at the mean of expectancies (Mod Exp) for sexual enhancement owing to alcohol use, 1 SD above the mean on enhancement expectancies (High Exp) and 1 SD below the mean on enhancement expectancies (Low Exp). Condom use is measured on a 5-point Likert scale where response options are 1 = never, 2 = almost never, 3 = sometimes, 4 = almost always, and 5 = always.

and a significant Alcohol Use \times Gender interaction. The main effect indicated that males were more likely than females to report condom use. Probing the interaction showed that the relationship between alcohol use and condom use was positive for females ($B = .30, p < .05$) but nonsignificant for males ($B = -.06, p = .55$).

Event-level analyses

Between-subject analysis. Sixty-nine percent of subjects reported having used a condom at last intercourse, and 18% reported having had alcohol immediately before their last sexual encounter. Of those who were drinking, 63% reported using a condom, and of those who were not drinking, 71% reported having used a condom ($\chi^2 = 1.12, 1 \text{ df}, p = .29; n = 226$).

Moderational analyses were conducted via individual logistic regression equations, regressing condom use at last intercourse on drinking at last intercourse, the moderator, and the Drinking \times Moderator interaction. There was no moderating effect of IMPSS, although there was a significant main effect of IMPSS such that higher IMPSS scores were associated with a lower probability of condom use at last intercourse (odds ratio [OR] = 0.92, 95% confidence interval [CI]: 0.84-0.99; $B = -.09, p < .05$). There was no Sexual Enhancement Expectancies \times Alcohol Use interaction, nor was there a main effect of enhancement expectancies. Although there was also no Sexual Risk-Taking Expectancies \times Alcohol Use interaction, there was a significant main effect such that higher risk-taking expectancies were associated with a lower probability of condom use at last sex (OR = 0.61, 95% CI: 0.42-0.88; $B = -.50, p < .01$).

In the equation in which alcohol use at last sex, gender, and the Alcohol Use \times Gender interaction were included, there was a significant main effect of gender (OR = 1.84, 95% CI: 1.12-3.04; $B = .61, p < .05$), such that males were almost two times more likely than females to have used a condom. Interestingly, there was a marginal Alcohol Use \times Gender interaction (OR = 2.94, 95% CI: 0.86-10.09; $B = 1.08, p = .09$). Among males, 76% of those who had not been drinking at last intercourse used a condom, whereas 77% of those who had been drinking at last intercourse used a condom ($\chi^2 = 0.05, 1 \text{ df}, p = .83; n = 162$). Among females, 57% of those who had not been drinking at last intercourse used a condom, whereas 25% of those who had been drinking at last intercourse used a condom ($\chi^2 = 3.98, 1 \text{ df}, p < .05; n = 61$). At the event level, alcohol use appears to decrease the probability that females, but not males, will use condoms.

Within-subject analysis. Of the 267 participants who completed the 6-month follow-up, 100 provided valid data for both an intercourse occasion in which alcohol was involved and one in which it was not. During the intercourse occa-

sion without alcohol, 69% of participants reported having used a condom. During the intercourse occasion with alcohol, 58% reported having used a condom. McNemar's test for dependent proportions (Agresti, 1990) indicated that this difference was significant (Cochran-Mantel-Haenszel Statistic = 7.12, $p < .01$).

For moderator analyses, we examined the intercourse occasion when alcohol was used in a set of logistic regression equations. In this analysis, we simultaneously examined partner type (i.e., casual or serious), drinking quantity, IMPSS, risk-taking expectancies, enhancement expectancies, and gender. There were no effects of risk-taking or enhancement expectancies on condom use during a drinking occasion. Therefore, expectancies were dropped from the analyses. Further, the correlation between amount of drinking by self and partner was high ($r = .51, p < .001$); therefore, we included drinking by self.

We first predicted condom use in a drinking/intercourse situation while controlling for condom use during the nondrinking/intercourse occasion. In this analysis, gender (OR = 3.77, 95% CI: 1.09-13.00; $B = 1.33, p < .05$) and quantity of alcohol consumed (OR = 0.59, 95% CI: 0.37-0.94; $B = -.53, p < .05$) were significant predictors of condom use in the drinking occasion. Males were more likely than females to have used a condom, and, as quantity of alcohol consumed during the occasion increased, the probability of condom use decreased. Given that we were asking about two intercourse occasions in the past 6 months, it is likely that both of these intercourse occasions were with the same partner, compromising our ability to assess the effects of partner type, as variance in partner type is likely collinear with variance associated with condom use in the two occasions. To address this issue, we re-estimated the equation without controlling for condom use in a nonalcohol situation. In this analysis, we found an additional significant effect of partner type (OR = 0.32, 95% CI: 0.12-0.88; $B = -1.13, p < .05$), suggesting that condom use was more likely during a drinking occasion with casual as opposed to serious partners. Quantity of alcohol consumed (OR = 0.57, 95% CI: 0.40-0.81; $B = -.56, p < .01$) was still significant, whereas the effect of gender was no longer significant ($p = .13$). Also, IMPSS was again marginally related to condom use (OR = 0.90, 95% CI: 0.78-1.01; $B = -.11, p = .07$). Given that IMPSS was related to condom use in the same direction at every level of analysis, we believe this marginal finding is part of a larger pattern and thus warrants reporting.

Discussion

The objective of the present study was to advance our understanding of the relationship between alcohol use and risky sex among high-risk adolescents by focusing on theoretically and empirically relevant moderators and by

examining data at both the global and event levels of analysis. At the global level, we found a significant relationship between impulsive sensation seeking and risky sexual behavior, such that individuals who scored higher on impulsive sensation seeking reported lower overall condom use. Moreover, there was a significant moderating effect of alcohol-related sexual-enhancement expectancies at the global level, such that the relationship between alcohol and condom use was negative only among individuals with higher sexual-enhancement expectancies. A similar trend was found in the time-limited global findings for sexual risk-taking expectancies. Taken together, these findings provide further evidence that individuals with higher sex-related alcohol expectancies and a more impulsive sensation-seeking personality may be more likely to have sex without condoms and, for expectancies at least, to be even less likely to use a condom in a drinking situation (Dermen et al., 1998; Weinhardt et al., 2002).

We found a positive relationship between alcohol and condom use for females at the time-limited global level. Similar results have been reported in the literature (Corbin and Fromme, 2002; Dermen and Cooper, 2000). Corbin and Fromme (2002) found a positive association between alcohol and condom use for intercourse situations with a new partner, suggesting that perhaps many of the intercourse occasions in the past 6 months reported by females in our sample may have been with new or casual partners.

At the event level, between-subjects analyses revealed that higher impulsive sensation-seeking scores at baseline, as well as alcohol-related expectancies for sexual risk taking at baseline, were associated with a lower likelihood of condom use at last intercourse assessed 6 months later. Males were almost two times more likely than females to report using condoms at last intercourse, and there was a trend toward less condom use among individuals who reported drinking alcohol before intercourse. Interestingly, a Gender \times Alcohol interaction revealed that, although alcohol use was unrelated to condom use among males, females who reported no alcohol use before intercourse were two times more likely to use condoms than those who reported drinking before intercourse (57% vs 25%). Thus, at the event level (and in contrast to the global level), alcohol use appears to play a greater role in impairing condom use among females.

The results for within-subjects analyses at the event level were in accord with the trend toward a main effect of alcohol on condom use seen at the between-subjects event level. Specifically, participants were less likely to report having used a condom in their last intercourse occasion with alcohol as compared with the last occasion without alcohol. Quantity of alcohol and gender were significant predictors of condom use in a drinking occasion—even when controlling for condom use in a nondrinking occasion—such that higher alcohol consumption was associated with a lower

likelihood of condom use, and males were more likely to report having used condoms than females. In addition, condom use was less likely among individuals who were more impulsive, and more likely with casual partners.

An intriguing and contradictory finding is that the relationship of alcohol to condom use was negative at the event level but positive at the global level for females. Part of the explanation for this effect may be the type of partner under consideration. At the event level, females were more likely to report that their partner was serious (69%) than were males (54%). Given that condoms are used less frequently with serious partners in general, perhaps the combination of alcohol and a serious partner made the probability of condom use especially unlikely for females recalling particular sexual events. Although we do not have overall data on partner type at the global level (i.e., what percentage of partners were casual vs serious in the past 6 months?), we speculate that, perhaps across time, a high percentage of these females' partners may be new or casual. We can speculate about why these effects differ by gender. First, given the male-controlled nature of condom use, it may simply be that situational factors are not as strong an influence (either positive or negative) on males. Second, issues of the power differential in terms of control of the sexual encounter (Amaro, 1995; Bryan et al., 1996, 1997; Wingood and DiClemente, 2000) may be exacerbated when a woman has been drinking, leaving her with less control to suggest or insist on condom use. Third, negotiating condom use with a steady partner with whom one has already had sex has entirely different social consequences (signaling infidelity or distrust) than negotiating condom use with a new or casual partner (Flood, 2003; Jadack et al., 1997; Misovich et al., 1997; Netting and Burnett, 2004). Given the higher rate of self-defined "serious" relationships at the event level for females in the current study, perhaps the combination of alcohol use and perceived social consequences of suggesting condom use in these instances made condom use particularly unlikely. Whatever the exact reasons for the direction of the effect of alcohol on condom use for females, our findings support the idea that, although alcohol use affects females' decisions regarding condom use, it appears largely unrelated to males' decisions.

In terms of personality characteristics and expectancies, this study expanded the generalizability of the impulsivity/risky-sex relationship, which has been established in other samples (Kalichman et al., 2003; Kalichman and Cain, 2004). Impulsive sensation seeking was consistently associated with a reduced likelihood of condom use at every level of analysis. Sex-related alcohol expectancies moderated the association between alcohol and condom use at the global level but were simply a direct negative predictor of condom use at the event level. Conflicting results at different levels of analysis were also reported by Corbin and Fromme (2002) and have been discussed at length

elsewhere (e.g., Cooper, 2002; Leigh and Stall, 1993; Nezlek, 2001). In trying to reconcile these conflicting findings it is important to consider the different aspects of behavior captured by each of the three levels of analysis. The global analyses provide an "average" of behaviors and thus are better suited to tell us something about the types of persons most likely to drink or use a condom or who are most/least likely to use a condom when drinking. In contrast, the event-level analyses are better suited to tell us something about the type of situation in which alcohol is most/least likely to lead to risky sexual behaviors. Thus, enduring belief systems involving sex-related alcohol expectancies may influence overall behavior (global) more strongly than on any particular intercourse occasion (event). Our results are consistent with this notion, such that situational cues like number of drinks consumed and type of partner were better predictors of event-level associations.

Our study was limited by the marked reduction in sample size for the within-subjects event-level analysis, given that less than half of the sample had data for intercourse events both with and without alcohol. Second, the uniqueness of the sample, criminally involved youth, suggests that these findings may not generalize beyond high-risk adolescents. However, we note that the extremely high-risk nature of the sample is also a strength of the study from the perspective of their high levels of both risk behaviors and the paucity of information about the alcohol/risky-sex relationship in this group. Third, we are limited by the self-report nature of the data and the single-item nature of some of our assessments.

This study has direct implications from a behavioral-prevention perspective and suggests that, at least for this group of high-risk adolescents, a focus on decreasing overall alcohol use would not be an effective strategy for reducing risky sexual behavior. Our data suggest that a more effective strategy would be to target the situation-specific event-level influence of alcohol on condom use. For example, instead of gearing intervention content toward reduction of alcohol use generally, we could (and are in our current work, Schmiede et al., submitted for publication) focus on helping young people be aware of and prepared for situations in which they drink and might have the opportunity for sexual activity. Specific skills include having a friend "keep an eye on them," always having condoms with them in party situations, and moderating alcohol consumption when sexual activity is likely. Lastly, the role of gender appears to be key in this population of adolescents, and further research on gender in studies of the association of substance use to risky sexual behavior is clearly warranted.

At a broader level, this work makes contributions to theoretical and conceptual ideas about the nature of the alcohol/risky-sex relationship. Consistent with the alcohol myopia theory, we demonstrate that, at the event level, quan-

tity of alcohol consumed and the nature of the relationship change the probability of condom use. But consistent with notions of the role of stable personality characteristics and beliefs regarding the effects of alcohol, we show that pre-existing expectancies of the influence of alcohol on sexual enhancement or risk taking and an impulsive sensation-seeking personality may predispose individuals to be less likely to use a condom generally and in the context of alcohol use. Although the relationship between alcohol use and risky sexual behavior is clearly complex and multiply determined, research that targets both specific populations as well as those instigating and inhibiting factors and belief systems that are theoretically and empirically driven has the potential to begin to unravel the complex nature of this relationship.

Acknowledgments

The authors acknowledge the assistance of former graduate students Reuben Robbins and Courtney Rocheleau on this project.

References

- AGRESTI, A. *Categorical Data Analysis*, New York: John Wiley & Sons, 1990.
- AIKEN, L.S. AND WEST, S.G. *Multiple Regression: Testing and Interpreting Interactions*, Thousand Oaks, CA: Sage, 1991.
- AMARO, H. Love, sex, and power: Considering women's realities in HIV prevention. *Amer. Psychol.* **50**: 437-447, 1995.
- AMERICAN PSYCHIATRIC ASSOCIATION. *Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R)*, Washington, DC, 1987.
- ANTHONY, J.C., WARNER, L.A., AND KESSLER, R. Comparative epidemiology of dependence on tobacco, alcohol, controlled substances, and inhalants: Basic findings from the National Comorbidity Survey. *Exp. Clin. Psychopharmacol.* **2**: 244-268, 1994.
- BARTHLOW, D.J., HORAN, P.F., DICLEMENTE, R.J., AND LANIER, M.M. Correlates of condom use among incarcerated adolescents in a rural state. *Crim. Justice Behav.* **22**: 295-306, 1995.
- BRYAN, A.D., AIKEN, L.S., AND WEST, S.G. Increasing condom use: Evaluation of a theory-based intervention to prevent sexually transmitted disease in young women. *Hlth Psychol.* **15**: 371-382, 1996.
- BRYAN, A.D., AIKEN, L.S., AND WEST, S.G. Young women's condom use: The influence of acceptance of sexuality, control over the sexual encounter, and perceived susceptibility to common STDs. *Hlth Psychol.* **16**: 468-479, 1997.
- BRYAN, A., AIKEN, L.S., AND WEST, S.G. HIV/STD risk among incarcerated adolescents: Optimism about the future and self esteem as predictors of condom use self-efficacy. *J. Appl. Social Psychol.* **34**: 912-936, 2004.
- BRYAN, A., ROCHELAU, C.A., ROBBINS, R.N., AND HUTCHISON, K.E. Condom use among high-risk adolescents: Testing the influence of alcohol use on the relationship of cognitive correlates of behavior. *Hlth Psychol.* **24**: 133-142, 2005.
- BRYAN, A.D., SCHINDELDECKER, M.S., AND AIKEN, L.S. Sexual self-control and male condom-use outcome beliefs: Predicting heterosexual men's condom use intentions and behavior. *J. Appl. Social Psychol.* **31**: 1911-1938, 2001.
- CENTERS FOR DISEASE CONTROL AND PREVENTION. *Tracking the Hidden Epidemics: Trends in STDs in the United States 2000*, Surveillance Reports, Atlanta, GA: Centers for Disease Control and Prevention, 2000 (available at: <http://www.cdc.gov/std/trends2000>).

- CENTERS FOR DISEASE CONTROL AND PREVENTION. Young People at Risk: HIV/AIDS Among America's Youth, Atlanta, GA: Centers for Disease Control and Prevention, 2001 (available at: <http://www.thebody.com/cdc/youth.html>).
- COOPER, M.L. Alcohol and increased behavioral risk for AIDS. *Alcohol Hlth Res. World* **16**: 64-72, 1992.
- COOPER, M.L. Alcohol use and risky sexual behavior among college students and youth: Evaluating the evidence. *J. Stud. Alcohol, Supplement No. 14*, pp. 101-117, 2002.
- COOPER, M.L. Does drinking promote risky sexual behavior? A complex answer to a simple question. *Curr. Direct. Psychol. Sci.* **15**: 19-23, 2006.
- COOPER, M.L. AND ORCUTT, H.K. Drinking and sexual experience on first dates among adolescents. *J. Abnorm. Psychol.* **106**: 191-202, 1997.
- COOPER, M.L., PIERCE, R.S., AND HUSELID, R.F. Substance use and sexual risk taking among black adolescents and white adolescents. *Hlth Psychol.* **13**: 251-262, 1994.
- CORBIN, W.R. AND FROMME, K. Alcohol use and serial monogamy as risks for sexually transmitted diseases in young adults. *Hlth Psychol.* **21**: 229-236, 2002.
- DERMEN, K.H. AND COOPER, M.L. Sex-related alcohol expectancies among adolescents: I. Scale development. *Psychol. Addict. Behav.* **8**: 152-160, 1994a.
- DERMEN, K.H. AND COOPER, M.L. Sex-related alcohol expectancies among adolescents: II. Prediction of drinking in social and sexual situations. *Psychol. Addict. Behav.* **8**: 161-168, 1994b.
- DERMEN, K.H. AND COOPER, M.L. Inhibition conflict and alcohol expectancy as moderators of alcohol's relationship to condom use. *Exp. Clin. Psychopharmacol.* **8**: 198-206, 2000.
- DERMEN, K.H., COOPER, M.L., AND AGOCHA, V.B. Sex-related alcohol expectancies as moderators of the relationship between alcohol use and risky sex in adolescents. *J. Stud. Alcohol* **59**: 71-77, 1998.
- FISHER, J.D., FISHER, W.A., BRYAN, A.D., AND MISOVICH, S.J. Information-motivation-behavioral skills model-based HIV risk behavior change intervention for inner-city high school youth. *Hlth Psychol.* **21**: 177-186, 2002.
- FLOOD, M. Lust, trust and latex: Why young heterosexual men do not use condoms. *Cult. Hlth Sex* **5**: 353-369, 2003.
- HALPERN-FELSHER, B.L., MILLSTEIN, S.G., AND ELLEN, J.M. Relationship of alcohol use and risky sexual behavior: A review and analysis of findings. *J. Adolesc. Hlth* **19**: 331-336, 1996.
- HULL, J.G. AND BOND, C.F. Social and behavioral consequences of alcohol consumption and expectancy: A meta-analysis. *Psychol. Bull.* **99**: 347-360, 1986.
- JADACK, R.A., FRESIA, A., ROMPALO, A.M., AND ZENILMAN, J. Reasons for not using condoms of clients at urban sexually transmitted diseases clinics. *Sex. Trans. Dis.* **24**: 402-408, 1997.
- KALICHMAN, S.C. AND CAIN, D. A prospective study of sensation seeking and alcohol use as predictors of sexual risk behaviors among men and women receiving sexually transmitted infection clinic services. *Psychol. Addict. Behav.* **18**: 367-373, 2004.
- KALICHMAN, S.C., CAIN, D., ZWEBEN, A., AND SWAIN, G. Sensation seeking, alcohol use and sexual risk behaviors among men receiving services at a clinic for sexually transmitted infections. *J. Stud. Alcohol* **64**: 564-569, 2003.
- LEBEAU-CRAVEN, R., STEIN, L., BARNETT, N., COLBY, S.M., SMITH, J.L., AND CANTO, A.L. Prevalence of alcohol and drug use in an adolescent training facility. *Subst. Use Misuse* **38**: 825-834, 2003.
- LEIGH, B.C. AND MORRISON, D.M. Alcohol consumption and sexual risk-taking in adolescents. *Alcohol Hlth Res. World* **15**: 58-63, 1991.
- LEIGH, B.C. AND STALL, R. Substance use and risky sexual behavior for exposure to HIV: Issues in methodology, interpretation, and prevention. *Amer. Psychol.* **48**: 1035-1045, 1993.
- LUX, K.M. AND PETOSA, R. Using the health belief model to predict safer sex intentions of incarcerated youth. *Hlth Educ. Q.* **21**: 487-497, 1994.
- LUX, K.M. AND PETOSA, R. Preventing HIV infection among juvenile delinquents: Educational diagnosis using the health belief model. *Int. Q. Commun. Hlth Educ.* **15**: 145-163, 1994-1995.
- MCCLELLAND, G.H. AND JUDD, C.M. Statistical difficulties of detecting interactions and moderator effects. *Psychol. Bull.* **114**: 376-390, 1993.
- MISOVICH, S.J., FISHER, J.D., AND FISHER, W.A. Close relationships and elevated HIV risk behavior: Evidence and possible underlying psychological processes. *Rev. Gen. Psychol.* **1**: 72-107, 1997.
- NEIGHBORS, B., KEMPTON, T., AND FOREHAND, R. Co-occurrence of substance abuse with conduct, anxiety, and depression disorders in juvenile delinquents. *Addict. Behav.* **17**: 379-386, 1992.
- NETTING, N.S. AND BURNETT, M.L. Twenty years of student sexual behavior: Subcultural adaptations to a changing health environment. *Adolescence* **39**: 19-38, 2004.
- NEZLEK, J.B. Multilevel random coefficient analyses of event- and interval-contingent data in social and personality psychology research. *Pers. Social Psychol. Bull.* **27**: 771-785, 2001.
- SCHMIEGE, S.J., BROADDUS, M.R., BRYAN, A., LEVIN, M., TAYLOR, S.C., AND SEALS, K.M. Theoretically-based mediators of an alcohol-related HIV intervention among detained adolescents, submitted for publication.
- STEELE, C.M. AND JOSEPHS, R.A. Alcohol myopia: Its prized and dangerous effects. *Amer. Psychol.* **45**: 921-933, 1990.
- TESTA, M. AND COLLINS, R.L. Alcohol and risky sexual behavior: Event-based analyses among a sample of high-risk women. *Psychol. Addict. Behav.* **11**: 190-201, 1997.
- WEINHARDT, L.S. AND CAREY, M.P. Does alcohol lead to sexual risk behavior? Findings from event-level research. *Annual Rev. Sex Res.* **11**: 125-157, 2000.
- WEINHARDT, L.S., OTTO-SALAJ, L.L., BRONDINO, M.J., NORBERG, M.M., AND KALICHMAN, S.C. Sex-related alcohol expectancies predict sexual risk behavior among severely and persistently mentally ill adults. *Psychol. Addict. Behav.* **16**: 64-67, 2002.
- WHITE, H.R. AND LABOUVIE, E.W. Towards the assessment of adolescent problem drinking. *J. Stud. Alcohol* **50**: 30-37, 1989.
- WIGHT, D. Impediments to safer heterosexual sex: A review of research with young people. *AIDS Care* **4**: 11-23, 1992.
- WILSNACK, S.C., PLAUD, J.J., WILSNACK, R.W., AND KLASSEN, A.D. Sexuality, gender, and alcohol use. In: WILSNACK, R.W. AND WILSNACK, S.C. (Eds.) *Gender and Alcohol: Individual and Social Perspectives*, New Brunswick, NJ: Rutgers Center of Alcohol Studies, 1997, pp. 250-288.
- WINGOOD, G.M. AND DICLEMENTE, R.J. Application of the theory of gender and power to examine HIV-related exposures, risk factors, and effective interventions for women. *Hlth Educ. Behav.* **27**: 539-565, 2000.
- ZUCKERMAN, M. *Behavioral Expressions and Biosocial Bases of Sensation Seeking*, New York: Cambridge Univ. Press, 1994.
- ZUCKERMAN, M., KUHLMAN, D.M., JOIREMAN, J., TETA, P., AND KRAFT, M. A comparison of three structural models for personality: The Big Three, the Big Five, and the Alternative Five. *J. Pers. Social Psychol.* **65**: 757-768, 1993.