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The Effects of Alcohol and Dosage-Set on Risk-Seeking Behavior in Groups and Individuals

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Abstract

A great deal of risky activity occurs in social contexts, yet only recently have studies begun to examine the impact of drinking on risk-seeking behavior in groups. The present study sought to extend this work by examining both pharmacological and expectancy (dosage-set) effects of drinking. In addition, by using a much larger sample than in prior studies we aimed to increase the power to examine how drinking affects the decision making process (i.e., Does the initial proposed decision stand, or does it shift during discussion to a safer or riskier final decision?). Seven hundred twenty unacquainted social drinkers (half female) were randomly assigned to 3-person groups that consumed alcohol (0.82 g/kg males; 0.74 g/kg females), a placebo, or a noalcohol control beverage. After drinking, participants decided whether to complete a 30-min questionnaire battery (the less risky choice) or toss a coin and, pending the outcome of that toss, complete either no questionnaires or a 60-min battery (the riskier choice). Neither drinking nor believing one had been drinking affected the decision to toss the coin when participants deliberated in isolation. In contrast, when the decision occurred in a group context, groups led to believe they were drinking alcohol (i.e. groups administered alcohol or placebo beverages) were significantly more likely than groups knowing they had consumed a nonalcoholic beverage (i.e., groups administered a no-alcohol control beverage) to choose the coin toss. Results extend prior findings highlighting the effects of alcohol dosage-set in social contexts.

Keywords

alcohol; alcohol expectancies; risk-taking; decision-making

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The human and economic costs associated with drinking are high, and it is clear that much of this harm is caused by hazardous decisions made while drinking (National Institute on Alcohol Abuse and Alcoholism, 2000). Recently there has been renewed interest in investigating how drinking alcohol affects decision making. Often risky decisions (e.g., those related to drunk driving, violent crime) are enacted in a social context, and it is important to study the effects of drinking on group decision making. As we have noted elsewhere, these actions "often involve multiple, cascading decisions made by groups rather than by individuals acting alone" (Sayette, Kirchner, Moreland, Levine & Travis, 2004, p. 190).

Although the majority of drinking occurs in social settings (Bachman, Johnston, O'Malley, & Bare, 1985), most alcohol administration research has tested drinkers in isolation. When "group" situations have been implemented, typically they involve dyads in which one member is a confederate whose behavior is scripted (e.g., Taylor, Gammon, & Capasso, 1976). Although such studies can answer important questions, they may be suboptimal for examining group-level phenomena in which all members reciprocally affect each other (Ickes & Gonzalez, 1994). Despite the importance of understanding the impact of drinking on social decision making, there have been few studies to test decision making in groups. Improved understanding of the effects of alcohol on social drinkers may thus require group research designs (Sayette, 1993).

In a preliminary study we tested the impact of alcohol on risk-seeking behavior in three-person groups of unacquainted male social drinkers (Sayette et al., 2004). All group members were randomly assigned to consume either a moderate dose of alcohol or a placebo beverage. After drinking, participants decided whether to complete a 30-min questionnaire battery or toss a coin and, pending the outcome of that toss, complete either no questionnaires or a 60-min battery. Unlike much research in this area, participants were informed that the consequences of their decision were real rather than hypothetical. This may be important, as in many cases hypothetical responding corresponds weakly to actual behavior (see Krasnor, 1983). As outlined by Rothschild and Stiglitz (1970), choosing the coin toss is thought to be a riskier prospect than choosing not to toss. By holding expected value constant and manipulating outcome certainty, decision scientists have defined risk-seeking behavior as the choice of the less certain outcome (e.g., Tversky & Kahneman, 1983). The coin toss has been used to assess risk seeking behavior in both economic and psychological studies (e.g., Hsee & Weber, 1999; Johnson, Rustichini, & MacDonald III, 2009). Results of this initial study indicated that groups consuming alcohol were more likely than placebo groups to choose the coin toss (i.e., the riskier decision).

Abrams, Hopthrow, Hulbert, and Frings (2006) examined the impact of alcohol on risk attraction. Risk attraction was assessed using a series of duplex bets in which different amounts of money with varying odds of winning or losing were contrasted. Groups rated their interest in gambling on each pair of bets. An especially compelling aspect of this study was that participants completed the task in either a group or an individual setting. Alcohol led individuals, but not groups, to find these risky analytic choices to be more attractive, relative to a placebo.

Taken together, the studies by Sayette et al. (2004) and Abrams et al. (2006) raise more questions than they answer. Whereas alcohol enhanced risk-seeking behavior of groups in the former study, alcohol had no effect on risk attractiveness ratings of groups in the latter study. Several issues are pertinent in evaluating these disparate findings. First, both studies were small, employing just 9 to 12 groups per drink condition. A different response by just one group in the Sayette et al. (2004) study would have affected interpretation of the findings using standard levels of significance. Second, neither study included a no-alcohol

control condition. Both studies informed all participants that they would be drinking alcohol (half did receive alcohol and half received a placebo). Consequently, these studies could not test the effects of *dosage-set* (the belief that one has been consuming alcohol, see Martin & Sayette, 1993) on risky decision making. It has long been observed that merely believing that one has consumed alcohol can affect behavior, and such dosage-set effects appear to be especially pronounced in social settings, where shared beliefs about the effects of alcohol may be salient (MacAndrew & Edgerton, 1969; Maisto, Connors, & Sachs, 1981).

Efforts to disentangle the impact of pharmacological and dosage-set effects of drinking led to the development of the balanced placebo design (e.g., Marlatt, Demming, & Reid, 1973). The balanced placebo design has four conditions: expect alcohol/receive alcohol; expect alcohol/receive non alcohol; expect nonalcohol/receive nonalcohol; and expect nonalcohol/ receive alcohol (the“antiplacebo” condition). Research has accumulated that indicates that the antiplacebo condition cannot be reliably executed, however, when even a moderate dose of alcohol is administered (because it is hard to convince a participant who just received four or five drinks in a 20-min period that he or she was in a no-alcohol control condition) (Hull & Bond, 1986, Martin & Sayette, 1993). It does appear, however, that the remaining three conditions of the balanced placebo design can be used to examine the separate effects of pharmacology and dosage-set (Martin & Sayette, 1993; Testa et al., 2006).

Interestingly, and germane to the present study, Hull and Bond (1986) conclude in their comprehensive review of placebo effects that social behaviors are more strongly affected by alcohol expectancy than are other types of behaviors. Moreover, these authors also conclude that the actual consumption of alcohol had “nonsignificant effects on social behaviors.” (p. 350). They argue that the effects of dosage-set may be explained by an attributional mechanism discussed by Marlatt and Rohsenow (1980). Specifically, consuming a placebo may provide an excuse to “engage in what would otherwise be considered inappropriate acts” (Hull & Bond, 1986, p. 347). In light of these conclusions, it is surprising that researchers have yet to study the impact of dosage-set on decision-making in groups.

Finally, the relatively small samples precluded further probing of the data to examine potential processes underlying the effects of drinking on risk-seeking behavior. As we noted previously (Sayette et al., 2004), larger studies could examine the effects of drinking on the likelihood that groups would change their minds and ultimately select an option that differs from the first option suggested by a group member (see McGuire, Kiesler, & Siegel, 1978; Weisband, 1992). Specifically, in circumstances in which the option proposed by a group member is risky, we wondered if drinking or believing one has been drinking would reduce the probability that subsequent discussion would lead the group to ultimately shift to the safer choice, such that “cooler heads might prevail” when group members drink a control beverage, but not when they drink (or possibly believe they are drinking) alcohol.

The present study sought to address some of the limitations of the prior alcohol/group decision making studies by Sayette et al. (2004) and Abrams et al. (2006). Unlike those studies, the current study included three beverage conditions: groups drank a moderate dose of alcohol, a placebo, or a no-alcohol control beverage in which participants knew the beverage contained only juice. In contrast to the earlier pair of studies that recruited only male drinkers, the present investigation included both genders. This study also expanded on the Sayette et al (2004) study by including groups of participants and participants tested individually, so that -- as in Abrams et al. (2006) -- effects of drinking could be contrasted in both settings. Finally, by recruiting a very large sample for an alcohol administration study (240 three-person groups), the present experiment provided enhanced power to test hypotheses. This larger sample also allowed us to examine a potential process measure, namely whether the initial choice proposed by a group ended up switching during the 150-

sec group discussion. Specifically, we tested the extent to which drinking (or believing that one is drinking) alcohol affected the likelihood that the discussion would move in a riskier direction, compared to control groups.

In sum, data from prior studies of alcohol and group decision making are hard to reconcile. To provide additional information regarding the impact of alcohol on decision making, we examined the impact of alcohol consumption, as well as the belief that one has consumed alcohol, on risk-seeking behavior in individuals and in groups of unacquainted male and female social drinkers. Based on prior conclusions that believing one has consumed alcohol will offer an excuse for disinhibiting behavior (Hull & Bond, 1986; Marlatt & Rohsenow, 1980), we hypothesized that groups drinking both alcohol and placebo would be more likely than groups in the control condition to toss the coin (i.e., the risky option), and that these effects would be greater when tested in a group setting than in an individual setting. We also predicted that when groups changed their choice during discussion the no-alcohol control groups would be more likely to change to the safer solution than would the alcohol and placebo groups. The prior research on the effects of alcohol on social behavior, as well as the mixed findings from the two previous studies that examined the impact of alcohol on group decision making, made it difficult to make confident predictions about the specific impact of alcohol ingestion. Nevertheless, based on our prior data (with men only) using this same task, we predicted that alcohol groups would be more likely than placebo groups to choose the coin toss.

Method

This study employed methods used in our preliminary study and are described briefly (for additional detail, see Sayette et al., 2004). Healthy male and female social drinkers aged 21 to 28 were recruited via newspaper ads. Those who successfully completed a brief telephone screening were invited to the Alcohol and Smoking Research Laboratory for a screening session that included the Impulsivity/Sensation Seeking Scale (ISSS: Zuckerman, 1994), the NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992), and a measure of drinking quantity and frequency. Participants were excluded if they reported a history of adverse reaction to the type or amount of beverage used in the study; if they reported medical conditions that contraindicated alcohol administration; if they met Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 1994) criteria for past alcohol abuse or dependence; if they were not within 15% of ideal weight for their height, as indexed by the 1983 Metropolitan Life tables (Harrison, 1985); if they were illiterate; or if they reported smoking 15 or more cigarettes/day (to avoid nicotine withdrawal during the study). All those invited to participate had to report drinking a mean of at least two drinks on at least one occasion per 2 weeks, or at least four drinks on at least one occasion per month, over the past year. Eligible participants were invited to an experimental session. They were told to avoid consuming caffeine within 4-hr, avoid using alcohol or drugs within 24-hr, and avoid smoking for 1-hr prior to arrival (to avoid possible effects of nicotine on performance). They also were told that breath measurement instruments would be used to confirm compliance. They were told that they could not drive themselves home from the study. Those who needed transportation were provided with money for a taxi or bus.

Participants

Equal numbers of men and women (total n =720) aged 21-28 (M= 22.4, SD = 1.89) participated in the study. They were randomly assigned to groups of three unacquainted persons. These groups in turn were randomly assigned to receive either alcohol, placebo, or a nonalcoholic control beverage, with the qualification that each beverage condition was populated with an equal number of men and women. (The number of all male, 2 male and 1 female, 1 male and two female, and all female groups was equal in the alcohol, placebo, and

control conditions.) The members of every fourth group (following drink consumption) were run individually through the coin toss task, so that there were 60 groups in each of the three beverage conditions and 60 individual participants in each of the three beverage conditions. (Thus, not all 720 participants contributed a unique data point to the study.) Eighty-three percent of participants identified themselves as Caucasian, 11% as African American, 2.5% as Asian, 1% as Hispanic, and 2.5% as other. Age, marital status, income, smoking status, and ethnicity were equivalent across groups, as were responses to questions about drinking history and current drinking patterns. Participants reported drinking on average a bit more than twice a week [M= 3.72 (SD = 0.93) using a 7-point scale with "3" = 1-2 occasions/ week and "4" = 2-3 occasions/week] and consuming an average of 4.29 (*SD* = 1.89) drinks per occasion. Slightly more than one-third of our sample drank 1-2 times/week, about a third drank 2-3 times/week, while slightly more than a sixth drank 3-4 times/week. About a third of the sample drank 3 or fewer drinks/occasion, another third drank between 3 and 4 ½ drinks/occasion, while the final third drank more than 5 drinks/occasion. All indicated they could comfortably drink at least 3 drinks in 30-40 min.

Procedure

Predrink assessment—To ensure that the groups included 3 unacquainted participants, at least 4 people were invited to the lab. They were told that they would likely take part in the experiment but that there was a chance that they might be asked to return on another day, in which case they would receive an extra $20. Each participant was initially greeted and placed in a separate room, and then the participants were casually introduced to each other, one at a time, while being observed by two experimenters to check for any signs of recognition. [If it appeared that two people did know each other (5% of the time), one was privately asked to return, allegedly because we had overbooked without indicating that it had to do with their familiarity.] In addition, the trio thought to be unacquainted with each other reported whether or not they had ever met the others. These procedures allowed us to create groups consisting of three "strangers."

Next, participants' height and weight were recorded. Participants then ate a weight-adjusted snack (¾ to 1 ¾ bagels with butter) and completed an informed consent form. An initial blood alcohol content (BAC) breath sample was obtained, and participants rated their intoxication using a subjective intoxication scale (SIS) on which 0 meant *not at all intoxicated* and 100 meant *the most intoxicated I have ever been*.

Drink administration—Drinks were mixed in front of participants to increase credibility in the placebo condition (Rohsenow & Marlatt, 1981). Participants were brought one at a time into the drink-mixing room, where a researcher was waiting with a tray containing a chilled vodka bottle and a bottle of chilled cranberry juice cocktail (Ocean Spray). The alcoholic beverage was 1 part vodka and 3.5 parts juice. For those drinking alcohol, the vodka bottle contained 100-proof vodka (Smirnoff); for those drinking a placebo, the vodka bottle contained flattened tonic water (Schweppes). The glass was also smeared with vodka to enhance credibility in the placebo condition. Total beverage was isovolemic in the alcohol and placebo conditions. Prior work has revealed that this procedure generally creates a successful placebo manipulation, the goal of which is to convince participants that they have consumed alcohol (Martin & Sayette, 1993; Schlauch et al., 2010). Beginning at Time 0, which ranged from 12:15 p.m. to 2:00 p.m., those in the alcohol condition were given one third of a moderate dose of alcohol (0.82 g/kg males / 0.74 g/kg females) and asked to consume it evenly over 12 min. At 12- and 24-min, they received the middle and final thirds of the drink and were asked to consume it evenly over 12-min intervals. Immediately after the final third was finished (36-min), they were asked to rinse their mouths with water and then invited to remain in the room and relax for 5-min. Participants in all conditions drank

the beverages in the same room with the other members of their groups. Participants were told just before they began to drink that they could talk about anything they wished, except their levels of intoxication or their estimated blood alcohol levels.

Postdrink assessment—BAC and SIS ratings were recorded about 44-min after the start of drinking. To help control for dosage set, placebo participants received a BAC reading ranging from .041% to .043% (randomly assigned), which is about the highest credible reading for deceived participants (Martin & Sayette, 1993). Actual BAC levels also were recorded. Following beverage consumption (about 44-min after starting the drink), participants completed a mood questionnaire. Next, as noted above, one out of every four groups was split up into different rooms, while the other three groups remained intact. At this point, participants were reminded that they would need to remain in the lab for a few more hours in order to complete a memory task. They also learned that they would be asked to complete some additional questionnaires. Participants were given two options. They could decide as a group (or if they were isolated, decide by themselves) to complete about 30-min worth of these questionnaires and spend the remaining time reading or relaxing. Alternatively, they could elect to toss a coin and, pending the outcome, either have no forms to complete or about 60-min worth of forms to complete. All participants were told that they would complete these forms alone and that they would remain in the lab the same amount of time regardless of whether they decided to toss the coin. [We offered the coin toss option ostensibly to give the group some say in the matter. We told participants that, assuming they guessed right and wrong at similar rates, we expected that this approach would allow us to obtain on average about 30-min worth of forms for each person.] The experimenter concluded:

“You will have 2 ½ minutes to make your decision—I will return after 2 ½ minutes have elapsed and will expect you to say either “we do not want to toss the coin and will fill out 30 minutes of forms” or “we would like to toss the coin” [To control for order, the experimenter randomly chose half the participants to receive the two options in the reverse sequence.] If participants were in a group setting, the experimenter added: “All members of the group must choose the same option.” Participants then had 150-sec to discuss their decision (if they were alone they also had 150-sec to come to a decision) and inform the experimenter whether or not they had chosen the coin toss. [Initial choices were coded from video by an experimenter who was blind to condition. Final choice was marked down by experimenter at the time the decision was made (participants were explicitly asked to specify their decision at the end of the 150-sec time interval), but also independently verified from video by a rater blind to condition.]

After making their decision, participants listened to a comedy clip and completed a semantic memory task, which are not reported here. BAC and SIS measures then were obtained about 10-min after the coin toss decision. Placebo participants were presented with a false BAC reading between .039% and .037% (randomly assigned, and designed to maintain the deception that alcohol had been consumed) and, along with control participants, were asked to complete the postexperimental questionnaire, on which they described the study’s purpose; estimated the number of ounces of vodka they had consumed; and rated the highest level of intoxication they experienced during the experiment, using the same 0-to-100 scale used with the SIS (see Sayette et al., 2004 for details.) Next they were debriefed, paid $60, and allowed to leave. Alcohol participants recorded their BACs; ate lunch; and were allowed to rest, read, or listen to music. When their BACs fell below .04%, they completed the postexperimental questionnaire. Finally, they were debriefed, and when their BACs dropped below .025% they were paid $60 for their participation. Before leaving the laboratory, alcohol participants were again reminded not to drive or operate heavy machinery for the rest of the evening.

Results

Manipulation Checks

BACs and measures of subjective intoxication recorded during and at the end of the study appear in Table 1. Mean values suggest participants administered alcohol were on the ascending limb of the BAC curve with a BAC about .06% at the time of the coin toss decision. On the postexperimental questionnaire, all placebo and alcohol participants reported drinking at least 1 oz of vodka. Results indicate that, consistent with our prior studies (e.g., Sayette et al., 1994; Sayette, Martin, Perrott, Wertz, & Hufford, 2001), placebo participants reported experiencing some level of intoxication. They felt significantly more intoxicated than control participants and significantly less intoxicated than participants consuming alcohol.

Effects of Alcohol on Decisions

A second experimenter independently reviewed all videos to ensure that the groups' choices were recorded accurately. (Because the first 10 group discussions were not recorded, we excluded their data. Inclusion of these groups does not affect any of the key findings reported below.) The order in which the two options were presented to participants had no impact on the ultimate choice (p=.44), and thus was not included as a factor in subsequent analyses.

Logistic regression analysis was performed to examine the impact of drinking and setting on the coin toss decision. More specifically, dichotomous indicators of beverage condition, with the no-alcohol control condition as the reference group, and an indicator of whether participants made their decisions in isolation instead of in a group, were used to predict whether the decision was made to toss the coin or fill out forms for 30 minutes. As shown in Table 2, model 1 there were no significant differences in this decision across the three beverage conditions and the main effect of setting just failed to reach significance (p <.07). As shown in Table 2, model 2, a second logistic regression was estimated, which included interactions between each of the beverage conditions and setting. The addition of the interactions resulted in a significant improvement in the model fit (X^2 difference = 7.02, p < .04). This analysis revealed significant beverage by setting (isolation vs. group) interactions. When participants decided in a group setting, the groups that believed they had consumed alcohol [i.e., alcohol (B = 1.25, p < .006) and placebo (B = 1.14, p < .009)] were significantly more likely to select the riskier option than groups consuming the no-alcohol control beverage (47%, 44%, and 20% of the group participants in the alcohol, placebo, and no-alcohol control conditions, respectively, opted to toss the coin). In contrast, the negative and significant interactions between beverage condition and setting [i.e. (alcohol × setting (B = −1.41, p < .02), placebo × setting (−1.304, p< .03)], shows that when participants made their decisions in isolation, beverage condition did not affect their choice (27%, 27%, and 30% of the isolated participants in the alcohol, placebo, and no-alcohol control conditions, respectively, opted to toss the coin). [Seven of the 240 participants in the no-alcohol control condition reported drinking some alcohol on the post-experimental form – five of them reporting drinking just 1oz. or less. When these participants are removed from the prior analyses, all the significant findings remain.]

To allow direct comparison of the data from this study to those from our prior experiment in which alcohol and placebo groups differed on the likelihood of opting for the coin toss (Sayette et al. 2004), we examined the alcohol and placebo conditions that included only all male groups. Sixty-three percent of these alcohol groups opted for the coin toss compared to 53% for the placebo group, ns.[1] [While there was a trend (p < .06), among the participants tested individually or in single-gender groups for men to be more likely to opt for the coin

toss (36%) than were women (22%), gender did not moderate any of the findings noted above.]

We also examined the effects of beverage condition on the likelihood that a group would select an option different from the first proposed option. In 90% of the cases the proposed option voiced first by one of the group members was the option ultimately selected by the group. A final logistic regression model was estimated predicting the final decision on the coin toss with indicators for beverage condition while controlling for the initial decision proposed by one of the group members. Results indicated that, when compared to the alcohol (B = 1.67, p < .02) and placebo (B = 1.60, p < .03) groups, the no-alcohol control groups ultimately were less likely to decide to toss the coin (i.e., the no-alcohol control groups were more likely than the other two groups to shift to the safer option).

Lastly we correlated participants' scores on both the ISSS and the neuroticism subscale of the NEO-FFI with their decision to toss the coin (among the 180 participants who completed the coin toss independently). Both correlations were significant, such that the more impulsive participants tended to opt for the coin toss ($r = .20$, $p < .007$) and the more neurotic tended not to toss the coin ($r = -.18$, $p < .017$).

Discussion

We examined the impact of alcohol and dosage-set on the likelihood that individuals and groups would choose to toss a coin that would determine how many questionnaires they would have to complete. The major finding is that alcohol dosage set, or the belief that one has consumed alcohol, affected risk-seeking behavior when the decision was formed in a group context, but not when individuals acted alone. Moreover, dosage-set also influenced the degree to which the initial decision advocated by a group member was altered during the discussion, such that group members told they were drinking alcohol were less likely to shift toward the conservative option than were participants in the no-alcohol control groups. That is, cooler heads did seem to prevail, but only when group members knew they were sober. Because there have been few studies examining the effects of alcohol on risk-seeking behavior in women, it is notable that the women in the study responded similarly to the men, albeit with a lower general level of riskiness regardless of drink condition or setting.

Findings from our group conditions are consistent with research reviewed by Marlatt and Roshenow (1980) and by Hull and Bond (1986) who concluded that the belief that one has consumed alcohol may provide justification to a person to disinhibit behavior. Notably, Hull and Bond suggest such alcohol expectancy-driven disinhibition is manifested during social behaviors. In our view, the present group decision making study represents an optimally "social" context to test this proposition. That the belief that one has consumed alcohol exerted effects when participants were in a social setting, but not when they made the decision in isolation, reinforces the importance of social context when studying the effects of dosage-set in alcohol research.

In contrast to our prior work (Sayette et al., 2004), but consistent with the findings of Abrams et al. (2006), we did not observe a pharmacological effect (i.e., alcohol vs. placebo) of alcohol on group risk-seeking behavior. The lack of an effect of alcohol ingestion is in accord with the conclusions of Hull and Bond (1986) that drug effects are less prominent during social behaviors. Of course, in the natural environment ethanol is almost always

[1]Because the all male alcohol and placebo groups were adminsitered the identical 150-sec coin toss tasks in the two studies, we performed a X^2 test to examine the impact of alcohol (n= 25) vs. placebo (n= 26) in the all male groups collapsing across the two studies. Results indicated a trend such that groups consuming alcohol were more likely (64%) than were placebo groups (38%) to opt for the coin toss X^2 (df = 1) = 3.3 p <.08, reflecting a medium size effect ($\phi = .26$).

paired with the knowledge that one is drinking alcohol. Thus, the present data suggest that groups who are drinking alcohol may be more vulnerable to risk-seeking behavior. In contrast to the present study, the Sayette et al. (2004) study was much smaller and only examined all-male groups. When we consider just the all-male groups in the present study our data are not so different: in fact when one combines the all male groups from both studies to increase power, there is a marginally significant (medium size) effect of alcohol. Consequently, while the present study makes a strong case for the importance of dosage-set on risk-seeking behaviors in group settings, there also may be a pharmacological effect of alcohol on risk-seeking behavior among men.

The inclusion of both a placebo and no-alcohol control group permitted examination of both pharmacological and dosage-set effects. It is not uncommon for studies, including ones from our lab, to conserve resources by including either a placebo condition or a no-alcohol control condition, but not both. Had this study included only the alcohol and no-alcohol conditions it would have been impossible to recognize the power of dosage set, leaving many readers to assume the effect was pharmacologically driven. Conversely, had this study only included the alcohol and placebo conditions, the absence of a difference between these two conditions -- without observing how they both differed from the control condition – may have led to the conclusion that there was no effect of drink in groups (e.g., Abrams et al., 2006).

Unlike Abrams et al. (2006), we did not find either pharmacological or dosage-set effects among participants making the decision alone. We are somewhat surprised by this null finding (see Abrams et al., 2006; Fromme, Katz, & D'Amico, 1997). To our knowledge, there is no prior alcohol research testing participants alone using the cointoss task, so it may be that the task is insensitive to alcohol's effects, except when there is a group environment to promote a risky response. Because the expected utility was designed to be equal (expected value X probability) for the safe and risky choice in the present study, it may not have been ideally suited for testing group monitoring processes in which an objectively correct value might exist. It should be noted, though, that we are not alone in failing to observe alcohol consumption to boost risk-taking in participants tested alone (MacDonald, Fong, Zanna, & Martineau, 2000; McMillen & Wells-Parker, 1987) (For review see also Steele & Josephs, 1990.) Future research to specify the conditions under which alcohol enhances risk-seeking behavior is warranted.

We believe that our coin toss task offered a clean test of risk seeking in that the prospect of completing additional questionnaires was unpleasant. That is, we believe that participants did not want to complete additional questionnaires. Following the initial questionnaire session and the initial baseline questionnaires completed earlier in the experimental session, participants were already quite familiar with the tediousness associated with completing forms. There also is evidence that when an expected outcome is aversive, the tendency to choose the safe (no coin toss) option increases (see Keren & Teigen, 2010). Consistent with the notion that completing these questionnaires was unpleasant, the clear majority of participants did not select the coin toss. Moreover, prior to arriving for the experimental session, participants were encouraged to bring with them something to read or listen to while waiting for alcohol to leave their systems. Consequently, nearly all participants came with something to occupy them (book, etc.), so that the alternative to the questionnaires was likely viewed as a preferred option. The significant associations of the coin toss decision to both impulsivity/sensation seeking and (inversely) to neuroticism also supported its validity as a measure of risk-seeking. Despite these various findings supporting the validity of the coin toss task, we cannot definitively rule out that the groups' decision to toss the coin resulted more from a desire to avoid making any decision rather than choosing a risky option. It would be useful to link the coin toss decision to real world risk taking.

In the current study all participants drank in groups prior to completing the coin toss task. While such an approach allows group decision making not to be entirely confounded with initial group formation (Kirchner, Sayette, Cohn, Moreland & Levine, 2006), an alternative would have been to have all participants drink alone prior to the task.

Additional research using decision paradigms that encourage riskier behavior might detect different effects of drinking than those found here. It also would be useful to contrast tasks that vary on other characteristics such as the degree to which analytic reasoning is required (Abrams et al., 2006). This study advances prior work by examining the extent to which initial choices were modified during the course of the discussion. We did not record participants' initial choice preferences prior to discussion, however, due to concerns that such assessment might influence subsequent group behavior (Gaskell, Thomas, & Farr, 1973). Future research would benefit from additional efforts to unpack the social and cognitive mechanisms underlying risk-seeking behavior in groups. These might include measures of social information processing (Sayette, Wilson, & Elias, 1993), including risk perception (Fromme, D'Amico, & Katz., 1999) and response time measures (Abrams et al., 2006). Further research, with a more diverse age range, that included multiple alcohol doses and tested participants on the descending limb of the BAC curve also would be useful.

In sum, using a sample significantly larger than that used in prior studies, a design that included both a placebo and a no-alcohol control condition, and a task that aimed to offer an actual risk with behavioral choice data rather than self-reported responses to hypothetical scenarios, the present study provided support for the impact of dosage-set on risk-seeking behavior in groups. These experimental data suggest a link between alcohol dosage-set and risky behavior in groups. More broadly it is hoped that, along with other research (Abrams et al. 2006), this work will stimulate further social psychological studies of alcohol and risk.

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Table 1

Beverage Response Variables

	Alcohol		Placebo		Control		
Characteristic	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**F**
Pre-cointask BAC	0.055 [a]	0.012	0.001 [b]	0.001	0.001 [b]	0.001	4825.72 **
Post-cointask BAC †	0.062 [a]	0.011	0.001 [b]	0.001	—	—	7116.15 **
Pre-cointask SIS	38.50 [a]	17.31	14.90 [b]	10.44	0.20 [c]	1.49	647.7 **
Post-cointask SIS †	35.12 [a]	16.90	8.90 [b]	10.80	—	—	410.12 **
Vodka Estimate	7.11 [a]	9.85	4.64 [b]	5.44	0.44 [c]	3.51	57.95 **
Highest Intox.	43.53 [a]	18.71	16.15 [b]	11.11	0.61 [c]	3.19	698.07 **

* $p = < .05$

** $p = < .001$

† analyses did not include control participants as they were not asked to provide these data

Notes. BAC = blood alcohol concentration. SIS = subjective intoxication scale. SIS and highest Intox. scored on scales ranging from 0 to 100. BAC and SIS were not recorded post-cointask for the Control group. Groups with nonoverlapping superscripts differed significantly ($p < .05$).

Table 2

Effects of Drink Condition and Setting on Risk-Seeking Behavior

	Model 1	Model 2
Constant	−.876* (.241) [.416]	−1.386* (.337) [.250]
Alcohol	.530 (.289) [1.699]	1.248* (.428) [3.484]
Placebo	.471 (.291) [1.601]	1.139* (.430) [3.125]
Isolation	−.426 (.231) [.653]	.539 (.439) [1.714]
Alcohol × Isolation	— — —	−1.412* (.590) [.244]
Placebo × Isolation	— — —	−1.304* (.591) [.272]
Pseudo R^2	.029	.057
X^2	7.468^t	14.489*
X^2 Difference	--	7.021*

$^t p < .10$

$^* p < .05$

Note. Logistic regression coefficients are presented first with standard errors in parentheses and odds ratios in brackets.