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Perceived Danger while Intoxicated Uniquely Contributes to Driving after Drinking

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Abstract

Background—Previous findings suggest that alcohol alters perceptions of risky behaviors such as drinking and driving. However, studies testing these perceptions as a predictor of drinking and driving typically measure these perceptions while participants are sober. The present study tested whether the perceived danger of driving after drinking assessed while intoxicated was associated with increased willingness to drive and self-reported drinking-and-driving behavior over and above perceptions assessed while sober. Additionally, we tested the effect of acute tolerance on the perceived danger of driving after drinking assessed on the ascending and descending limbs of the breath alcohol concentration (BrAC) curve.

Methods—Eighty-two young adults attended two counterbalanced laboratory sessions. In one session, participants consumed a moderate dose of alcohol (men: .72 g/kg, women: .65 g/kg) and reported the perceived danger of driving and their willingness to drive at multiple points across the BrAC curve. On a separate occasion, participants remained sober and appraised the dangerousness of driving at a hypothetical, illegal BrAC.

Results—Perceptions of the dangerousness of driving following alcohol administration were associated with increased willingness to drive and higher rates of self-reported drinking-and-driving behavior over and above perceptions reported when sober. Furthermore, perceived danger was reduced on the descending limb of the BrAC curve, compared to the ascending limb, suggesting the occurrence of acute tolerance.

Conclusions—Results from this study suggest that intoxicated perceptions are uniquely associated with drinking-and-driving decisions and that the perceived danger of drinking and driving is lower on the descending limb of the BrAC curve. Efforts to prevent alcohol-impaired driving have focused on increasing awareness of the danger of driving after drinking. Prevention efforts may be enhanced by educating drivers about how intoxication can alter perceived danger, and interventions may benefit from targeting perceptions of dangerousness while individuals are intoxicated in addition to when they are sober.

Keywords

Drinking and Driving; Alcohol Administration; Perceived Danger; College Students

Introduction

More than 110 million instances of driving after drinking occur in the United States each year (Bergen et al., 2011). Approximately one-third of all fatal crashes each year in the United States involve an alcohol-impaired driver, corresponding to more than 10,000

preventable alcohol-related traffic fatalities in 2010 (National Highway Traffic Safety Administration [NHTSA], 2010). Due to the high costs of this behavior, a number of intervention/prevention efforts (e.g., per se laws, sobriety checkpoints, media awareness campaigns) have been implemented to deter driving after drinking. These efforts contributed to significant reductions in the incidence of driving after drinking and fatalities from the early 1980s to mid-1990s (Hingson and Winter, 2003). However, drinking-and-driving fatalities have been fairly stable since the mid-90s (Yi et al., 2006), which calls into question whether current efforts can produce further reductions in driving after drinking.

Many drinking-and-driving prevention efforts (e.g., Lacey et al., 2008; National Impaired Driving High-Visibility Enforcement Campaign and Checkpoint Strikeforce Program; NHTSA, 2007; Solomon et al., 2008) are premised, at least in part, on the notion that increasing the perceived danger of driving after drinking and/or the perceived probability of negative consequences can reduce the likelihood of engagement in the behavior (Piquero and Paternoster, 1998; Ross, 1984; Shults et al., 2001). However, despite widely negative views of driving after drinking, approximately 1 in 5 driving age adults report driving within two hours of drinking in the past year (Drew et al., 2010). One potential explanation for this discrepancy is that attitudes about drinking and driving differ when people are sober and when they are intoxicated, and this difference influences drinking-and-driving decisions. The present study tested whether the perceived danger of driving after drinking assessed while participants are intoxicated is uniquely associated with engagement in the behavior.

Almost all investigations of the association between perceived danger and driving after drinking have focused on individuals' perceptions when sober (Bingham et al., 2007; Fairlie et al., 2010; Grube and Voas, 1996; McCarthy et al., 2007; McCarthy and Pedersen, 2009; Quinn and Fromme, 2012). These studies have demonstrated that perceiving driving after drinking as dangerous while sober is associated with reduced odds of engaging in the behavior. Although informative, this research neglects the fact that the decision to drive after drinking is made when intoxicated. The consistency between cognitions and behavior is reliant, in part, on basic information-processing operations (e.g., information retrieval from memory; Posavac et al., 1997). A number of these operations, such as attention (Mocaiber et al., 2011; Steele and Joseph, 1990), memory retrieval (Kirchner and Sayette, 2003; Sayette, 1993), and behavioral inhibition (Marczinski et al., 2005; Noël et al., 2010), are impaired by alcohol consumption. Similarly, perceptions of the dangerousness of driving after drinking may be altered by intoxication. This effect may partially explain why individuals who perceive driving after drinking as dangerous when sober continue to engage in the behavior when intoxicated.

Laboratory studies have demonstrated that the acute effects of alcohol contribute to risky behaviors by reducing perceptions of the dangerousness of these behaviors (Davis et al., 2007; Fromme et al., 1997, 1999; MacDonald et al., 1995, 2000; Maisto et al., 2002). Although the majority of these studies have focused on risky sexual activity and risky behaviors in general, MacDonald and colleagues (1995) conducted a series of studies specifically testing alcohol's effect on perceptions about driving after drinking. They found that intoxicated participants reported greater intentions to drive and perceived the behavior as more acceptable than their sober counterparts. These findings support the notion that perceptions about the dangerousness of driving after drinking differ between sober and intoxicated states.

The present study extended this previous research by testing whether intoxicated perceptions are a unique risk factor for drinking and driving, above and beyond more typically measured sober perceptions. We assessed participants' perceptions about the dangerousness of driving after drinking when sober (i.e., sober perceptions) and following the consumption of a

moderate dose of alcohol (i.e., intoxicated perceptions). We hypothesized that intoxicated perceptions would explain unique variance in both in-the-moment willingness to drive while intoxicated and self-reported recent drinking-and-driving behavior over and above that explained by sober perceptions.

A secondary aim of the present study was to test whether intoxicated perceptions differed between the ascending and descending limb of the blood alcohol curve. Previous work has observed a reduction in the effects of alcohol as blood alcohol concentrations decrease due to acute tolerance (Cromer et al., 2010; Marcziński and Fillmore, 2009; Schweizer and Vogel-Sprott, 2008). For instance, Marcziński and Fillmore (2009) found that participants perceived themselves as less impaired by alcohol on the descending limb compared to the ascending, despite no difference on an objective measure of impairment. We anticipated a similar pattern would be observed for perceptions about the dangerousness of driving after drinking. We assessed participants' intoxicated perceptions on both the ascending and descending limb. We hypothesized that perceptions assessed on the descending limb would be reduced relative to those on the ascending limb.

Materials and Methods

Participants

Eighty-nine participants took part in the present study; however, four were excluded from analyses due to incomplete data. Three additional participants were excluded for not having access to a car and not driving in the past month.¹ The 82 remaining participants (43 men) ranged in age from 21 to 29 years old ($M = 22.34$, $SD = 1.79$). The majority of participants were Caucasian ($n = 73$), with 3 African American, 2 Asian, 1 Pacific Islander, and 2 multi-racial participants (1 participant did not indicate race).

Participants were recruited from a large, Midwestern university and its surrounding community via flyers and university informational emails. Respondents completed a telephone screen which assessed typical drinking habits and physical and mental health status. Respondents had to report consuming approximately 5 or more drinks on one occasion within the past 6 months to reduce the odds of experiencing ill effects during the study. Individuals who reported a current or lifetime psychiatric disorder, substance abuse disorder, or head trauma were excluded. Additionally, those who reported having a medical condition or taking any medication with which alcohol use is contraindicated were excluded. Finally, women were excluded if they reported being pregnant or nursing.

Measures (Alcohol Session)

Intoxicated Perception of Dangerousness—Intoxicated perception of the dangerousness of driving after drinking was assessed using a single item that asked, “How dangerous do you feel it is for you to drive right now?” The four possible responses to this item were “not at all”, “a little”, “somewhat”, and “extremely”. Participants answered this question at 7 equally-spaced measurement points following alcohol administration.

Willingness to Drive—Willingness to drive was assessed using a single dichotomous (yes = 1, no = 0) item, asking whether the participant would drive right now. This variable was also assessed at each post-consumption measurement point.

¹This exclusion criterion was applied because access to a car or regular driving behavior is a natural prerequisite to driving after drinking. However, the same pattern of significance was observed for the full sample.

Breath Alcohol Concentration—Breath alcohol concentration (BrAC) was assessed at each post-consumption measurement point using a FST Alco-Sensor (Intoximeters, Inc., St. Louis).

Measures (Sober Session)

Demographic Information—Demographic information such as age, gender, race, accessibility to a car, and past month driving activity was assessed with a self-report questionnaire.

Alcohol Use—Past month alcohol use was assessed using questions modified from the Monitoring the Future project (Johnston et al., 2011). Participants were asked to report the number of days they consumed alcohol and the number of drinks consumed on days they drank over the past 30 days.

Sober Perception of Dangerousness—Sober perception of the dangerousness of driving after drinking were assessed by asking participants how dangerous it is to drive after consuming 3 and 5 drinks within a 2 hour time frame. Participants responded using a 4-point Likert style scale ranging from “not at all” to “extremely.” Due to gender differences in the metabolism rate of alcohol, men and women’s perceived danger was based on 3 and 5 drinks, respectively, to increase the likelihood that their perception was based on similar estimated levels of intoxication across gender.

Estimated Blood Alcohol Concentration—The National Highway Traffic and Safety Association’s (1994) formula was used to estimate what each participant’s blood alcohol concentration (eBAC) would be if they consumed 3 drinks or 5 drinks in two hours. These quantities were chosen to correspond with items assessing sober perceptions of the dangerousness of driving after 3 drinks or 5 drinks. This formula takes into account the amount of alcohol consumed, the weight of the participant, the gender difference in total body water, the time for consumption, and the metabolism rate of alcohol.

Recent Drinking-and-Driving Behavior—Recent drinking-and-driving behavior was evaluated with two open-ended items, asking participants how many times they drove after consuming 3 drinks or 5 drinks in a 2 hour time frame in the past three months.

Procedure

Participants completed two counterbalanced sessions (i.e., sober, intoxicated), which were scheduled approximately one to two weeks apart. Sober sessions began at 11:00 AM and intoxicated sessions at 1:00 PM. Participants were instructed to abstain from drugs and alcohol for 24 hours prior to each session. At the onset of the sessions, participants provided informed consent and verified pre-session sobriety (i.e., BrAC = 0.00 g%). Female participants were required to complete a urine pregnancy test prior to alcohol consumption, with a positive test resulting in exclusion from the study. No participants were excluded as a result of a positive test. Participants were tested individually in a private room by a trained research assistant who was blind to hypotheses. The University of Missouri Campus Institutional Review Board approved the procedures for this study.

Alcohol Session—Alcohol dose was calculated based on gender and weight. Men received a dose of .72 g/kg of alcohol, while women received a dose of .65 g/kg. This dose of alcohol was chosen because it results in a peak BrAC around .080 g% (Sher and Walitzer, 1986). A dose consisted of 50% alcohol per volume Smirnoff vodka and uncaffeinated tonic in a 1 to 4 ratio. The dose was divided into three isovolumic drinks. Participants were allowed 5 minutes to consume each drink for a total consumption time of 15 minutes,

followed by a 15 minute absorption period. Breath alcohol concentrations and ratings for perceived danger of driving were assessed at seven measurement points post-consumption with 15 minutes between each assessment. The last assessment occurred 105 minutes after the onset of drinking. Task measures unrelated to the present hypotheses but pertinent to other study interests were administered between assessments. Upon the completion of the session, participants were provided a light meal and remained in the lab until their BrAC descended to .02 g%. Participants agreed not to operate a vehicle or large machinery and were transported home via a prepaid taxi or a friend.

Sober Session—The procedure for the sober session was a shortened version of the alcohol session. Participants' perceptions of the dangerousness associated with driving after drinking were assessed in a small packet of questionnaires. Task measures completed in the alcohol session were also completed in the sober session following the questionnaires. As no alcohol was administered, participants were allowed to transport themselves home at the end of the session. Upon the completion of their last session, participants were paid \$12 per hour and received a \$15 bonus for completing both sessions.

Data Analytic Plan

STATA version 12 (STATA Corp, College Station, TX) was used to conduct all analyses. Estimated BACs based on sober perceptions of the dangerousness of driving after 3 drinks and 5 drinks in two hours were calculated for each participant using the NHTSA's formula (1994). On average, men's eBACs after 3 drinks and 5 drinks were 0.032 and 0.072 g%, respectively, while women's were 0.064 and 0.130 g%, respectively. Men and women's average peak BrACs post-consumption were 0.082 and 0.084 g%, respectively. As men's peak BrACs were more comparable to their eBACs after 5 drinks, their sober perceptions used in analyses were based on driving after 5 drinks in 2 hours. For women, their peak BrACs were more comparable to their eBACs after 3 drinks; therefore, their sober perceptions used in analyses were based on driving after 3 drinks in 2 hours. Estimated BACs based on men and women's sober perceptions were used to match ascending and descending limb assessments. Difference scores between each participant's eBAC and their BrAC at each of 7 post-consumption measurement points were computed. The least discrepant points on the ascending and descending limb of the BAC curve were identified for each participant and used in all analyses. For men, perceptions on the ascending limb were primarily assessed at the first two time points (60.46%), while those on the descending limb were most frequently assessed at the last time point (34.88%). Similarly, a majority of women's perceptions on the ascending and descending limb were assessed at the first (51.28%) and last (43.59%) time points, respectively.

Odds ratios (ORs) were calculated using logistic regression models to test the association of intoxicated and sober perceptions with willingness to drive. Willingness to drive assessments at the same time points as those chosen for intoxicated perceptions were used in analyses. Incident rate ratios (IRRs) were calculated using negative binomial regression models to assess the association between intoxicated and sober perceptions and self-reported drinking-and-driving behavior.² For ease of interpretation, sober and intoxicated perceived danger variables were reverse coded for regression analyses such that larger ORs indicated increased odds of willingness to drive and larger IRRs indicated the expected increase in the

²Preliminary analyses indicated a negative binomial model better accounted for the overdispersion of the count outcome variable (likelihood-ratio test of dispersion parameter $[\alpha]$, $p < .001$; Vuong, 1989) than other commonly recommended models for count variables (e.g., Poisson, zero-inflated Poisson, zero-inflated negative binomial model: Gardner et al., 1995; Neal and Simons, 2007). While the negative binomial model best accounted for the data, a marked number of participants (68%) reported never driving after drinking over the past three months. Therefore, we also dichotomized the past drinking-and-driving variable and submitted it to logistic regression analyses. Results were similar to those from the negative binomial regression models.

rate of driving after drinking in the past three months for every unit *decrease* in perceived danger.

In both the logistic and negative binomial regression models, intoxicated and sober perceptions and covariates were entered in a hierarchical manner. Gender, drinking frequency, and drinking quantity were simultaneously entered on the first step. Due to the strong relation between these covariates and driving after drinking (Birdsall et al., 2012; Chou et al., 2006; Flowers et al., 2008; Quinlan et al., 2005), their inclusion granted a more stringent test of the relation between perceptions of dangerousness and the outcome variables. Sober perceptions were then entered on the second step, and intoxicated perceptions were entered on the final step. This method of entry allowed us to test the incremental validity (Hunsley & Meyer, 2003) of intoxicated perceptions over the more typically assessed sober perceptions. Likelihood ratio χ^2 difference tests (G^2) were used to examine the predictive information gained from the inclusion of the predictors at each step.

The effect of acute tolerance on perceived danger was evaluated by a 2 (gender: male vs. female) $\times$ 2 (limb: ascending vs. descending) mixed factorial analysis of covariance (ANCOVA). Analyses were conducted with gender as the between-subject factor and limb as the within-subject factor. Drinking frequency and quantity were included as covariates.

Results

Descriptive Statistics

Approximately 32% ($n = 26$) of the sample reported driving within 2 hours of consuming 3 (women) or 5 (men) alcoholic drinks over the past three months. Men and women were equally likely to report driving after drinking in the past three months. Neither drinking frequency ($r = .15$, $p = .25$) nor typical quantity consumed ($r = .11$, $p = .32$) were significantly associated with participants' self-reported drinking-and-driving behavior. On average, participants reported drinking about eight days a month and consumed four drinks each occasion. Independent-sample t -tests indicated that men consumed a larger quantity of alcohol, $t(80) = 2.16$, $p < .05$, $d = .47$, 95% CI [.10, .84], but did not differ from women on drinking frequency.

Breath alcohol concentrations at the ascending and descending limb measurement points chosen for each participant approximated the legal limit to drive. On average, BrACs for men were .072 g% (ascending) and .074 g% (descending), and BrACs for women were .071 g% (ascending) and .076 g% (descending). Men and women's BrACs did not significantly differ on the ascending or descending limbs. Estimated BACs based on sober perceptions of the dangerousness of driving after 3 drinks (women) or 5 drinks (men) in two hours were .064 g% for women and .072 g% for men. While men's eBACs and BrACs did not differ, small but nontrivial mean differences between women's eBACs and BrACs were observed (ascending: $M = -.007$, $t(39) = 3.32$, $p < .01$, $d = .53$, 95% CI [.25, .81]; descending: $M = -.012$, $t(39) = 3.85$, $p < .001$, $d = .62$, 95% CI [.33, .90]).

Sober and Intoxicated Perceptions of Dangerousness

Sober—Mean ratings of danger after 3 and 5 drinks for women were 2.69 ($SD = .77$) and 3.79 ($SD = .52$), respectively, while mean ratings for men were 2.14 ($SD = .83$) and 3.23 ($SD = .81$), respectively. Drinking frequency was associated with sober perceptions ($r = -.32$, $p < .01$), while typical drinking quantity was not. Sober perceptions were significantly associated with intoxicated perceptions on both the ascending ($r = .25$, $p < .05$) and descending ($r = .42$, $p < .001$) limbs.

Intoxicated—Men and women's mean ratings of danger on the ascending limb were 2.56 ($SD = .80$) and 2.82 ($SD = .79$), respectively. On the descending limb, mean ratings for men and women were 2.30 ($SD = .91$) and 2.08 ($SD = .81$), respectively. Drinking frequency was related to intoxicated perceptions on the descending limb ($r = -.23, p < .05$), such that greater frequency of drinking was related to lower perceptions of dangerousness. No significant relation was found between drinking frequency and perceptions on the ascending limb. There was no relation between typical drinking quantity and intoxicated perceptions. Perceptions on the ascending and descending limbs were strongly and positively associated ($r = .68, p < .001$). Diagnostic analyses did not suggest any issues of multicollinearity among the predictors (all variance inflation factors < 1.50).

Relation of Willingness to Drive and Perceptions of Dangerousness

Table 1 summarizes results of analyses evaluating the relation of willingness to drive with both sober and intoxicated perceptions of dangerousness. At step 1, gender, drinking frequency, and drinking quantity were not significantly associated with reported willingness to drive. At step 2, the odds of being willing to drive on the ascending and descending limbs were approximately 3 times higher for each unit decrease in sober perceived danger of driving after drinking. Following the inclusion of intoxicated perceptions (step 3), sober perceived danger was marginally significant on the ascending limb and non-significant on the descending limb. As hypothesized, intoxicated perceptions were significantly associated with willingness to drive apart from sober perceptions. The odds of being willing to drive on the ascending limb were 3.83 times higher for each unit decrease in intoxicated perceived danger. The odds of being willing to drive on the descending limb were 11.46 times higher for each unit decrease in intoxicated perceived danger.

Relation of Drinking-and-Driving Behavior and Perceptions of Dangerousness

Table 1 also summarizes results of analyses evaluating the relation of past drinking-and-driving behavior and both sober and intoxicated perceptions of dangerousness. At step 1, covariates were not significantly associated with drinking-and-driving behavior. At step 2, the rate of driving after drinking in the past three months increased by 2.88 times for each unit decrease in sober perceptions of dangerousness. Sober perceptions remained significant following the inclusion of intoxicated perceptions reported on both the ascending and descending limb of the BrAC curve (step 3). The rate of driving after drinking was 2.11 times higher for each unit decrease in intoxicated perceived danger on the ascending limb and 1.68 times higher for each unit decrease in intoxicated perceived danger on the descending limb.

Effect of Acute Tolerance on Perceived Danger of Drinking and Driving

Results from mixed factorial ANCOVA indicated a significant main effect of limb on perceptions of dangerousness, ($F(1,78) = 6.87, p < .05, \eta_p^2 = .08$), with driving after drinking rated as less dangerous on the descending compared to ascending limb of intoxication. This effect was qualified by a significant limb by gender interaction ($F(1, 78) = 11.59, p < .01, \eta_p^2 = .13$). Figure 1 depicts the mean ratings of perceived danger on the ascending and descending limb of the BAC curve for men and women. Post-hoc simple effects tests indicated that both men and women reported driving after drinking as less dangerous on the descending limb, compared to the ascending limb, (men: $M = -.26, t(43) = 2.64, p < .01, d = .40, 95\% \text{ CI } [.14, .66]$; women: $M = -.74, t(39) = 7.31, p < .001, d = 1.17, 95\% \text{ CI } [.82, 1.51]$).

Discussion

There is considerable evidence that the perceived danger of driving after drinking, assessed when sober, is associated with engagement in drinking-and-driving behavior. Given that alcohol intoxication alters perceptions about driving after drinking (McDonald et al., 1995), we tested whether sober and intoxicated perceived danger were uniquely associated with (1) in-the-moment affirmations of willingness to drive after acute alcohol administration in the laboratory, and (2) self-reported drinking-and-driving behavior in the past three months. Perceived danger reported on the ascending and descending limbs of blood alcohol curve significantly predicted willingness to drive and drinking-and-driving behavior apart from perceived danger reported when sober. A one-unit decrease in perceived danger increased the odds of willingness to drive by 3.83 times on the ascending limb and 11.46 times on the descending limb of the BrAC curve. Similarly, a one-unit decrease in perceived danger was associated with an approximate doubling of the rates of self-reported drinking-and-driving behavior in the past three months. The present findings suggest that the influence of intoxicated perceptions on the decision to drive after drinking is distinct from that of sober perceptions.

The fact that perceptions of drinking and driving when intoxicated may have a distinct influence on engagement in the behavior can have important implications for efforts to reduce drinking and driving. Most existing prevention and intervention strategies focus on communicating information to drivers when they are sober, but ultimately the decision to drive while intoxicated is made when intoxicated. Results from this study suggest that intervention efforts may benefit from targeting perceptions of dangerousness while individuals are intoxicated. At present, server training and intervention programs designed to limit or discourage heavy drinking or driving when impaired are the only widely implemented in-the-moment intervention strategies. Additional intervention strategies to increase awareness of the dangerousness of driving after drinking, such as reminders via a smart phone or increased environmental cues relating to the dangers of the behavior, may be easily and cost-effectively incorporated into existing intervention efforts.

Perceived danger was lower on the descending limb of the BrAC curve compared to the ascending limb, with more pronounced difference exhibited in women. Additionally, perceived danger on the descending limb was strongly associated with willingness to drive and rates of past drinking-and-driving incidents. These findings are particularly unsettling, as forensic toxicology analysis in driving fatality cases has indicated that approximately two-thirds of drinking drivers are on the descending limb of the blood alcohol curve at the time of the accident (Levine and Smialek, 2000). Decreased perceptions of the dangerousness of driving on the descending limb may be a result of acute tolerance, i.e., perceived tolerance to the impairing effects of alcohol on the descending versus ascending limb of the BAC curve (Schweizer and Vogel-Sprott, 2008). Recent work has demonstrated that heavy drinkers view themselves as less intoxicated and more able to drive on the descending limb of the BAC curve, despite significant impairment in their actual cognitive ability and driving performance (Cromer et al., 2010; Marczinski and Fillmore, 2009). In the same way, individuals may be aware of the dangers of driving after drinking when sober but misperceive their ability to drive when intoxicated, particularly as their BAC is falling and decisions to drive after drinking are made.

The present study is not without limitations. Our primary aim was to determine whether intoxicated perceptions uniquely influence engagement in driving after drinking apart from sober perceptions. As such, a placebo session was not included in the study, prohibiting tests of whether the intoxicated perceived danger assessment was a result of the pharmacological effects of alcohol or alcohol expectancy. Moreover, methodological differences in the

assessment of sober and intoxicated perceptions of dangerousness limited our ability to directly compare these variables. Intoxicated assessments were in-the-moment judgments based on one's current level of intoxication, while sober assessments were based on hypothetical scenarios and required participants to estimate the perceived danger after drinking a set number of drinks. Although the definition of a standard drink was provided, there is some evidence that the alcohol content of alcoholic beverages can be overestimated (De Visser and Birch, 2012; Lemmens, 1994). Such overestimation of the alcohol content in 3 or 5 drinks would reduce the accuracy of the sober assessments. Additionally, the setting of a laboratory is atypical compared to natural drinking settings, such as bars and parties, and there are many factors in real-world settings that influence decisions to drive after drinking in addition to level of intoxication. Finally, while the sample size is relatively large compared to similar alcohol challenge studies, participants were from one geographical location, and the majority were Caucasian, restricting our ability to generalize to larger, more diverse populations.

The current study provides evidence for the utility of assessing perceptions of danger from drinking and driving while participants are intoxicated. While sober perceptions are a strong determinant of the decision to drive after drinking, our results indicate that intoxicated perceptions may have a distinct effect on the decision-making process, especially on the descending limb of intoxication. Further investigation is needed to test whether in-the-moment perceptions of drinking and driving influence specific drinking-and-driving decisions. Improving our understanding of how intoxication may alter risk for drinking and driving can potentially aid prevention and intervention strategies. Prevention efforts may benefit from educating drivers about the unique effects of intoxicated perceptions on drinking-and-driving decisions. Future studies could also test whether intervention strategies that target such perceptions are effective. The present findings suggest that such strategies could complement current ones aimed at the perceptions individuals hold while sober.

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Figure 1.

Means for perceived danger of driving after drinking for men and women on the ascending and descending limbs of the breath alcohol concentration curve. Larger values on the vertical axis are associated with greater perceived danger of driving after drinking. Error bars are based on the standard error of the mean.

Regression Models Predicting Odds of Willingness to Drive Following Alcohol Consumption and Rate Ratios of Self-reported Drinking-and-Driving Behavior for Each Unit Decrease in Sober and Intoxicated Perceptions of Danger

Table 1

Perceptions of Danger	Ascending Limb				Descending Limb			
	Willingness to Drive		Drinking and Driving behavior		Willingness to Drive		Drinking and Driving behavior	
	OR (95% CI)	G ² (df = 1)	IRR (95% CI)	G ² (df = 1)	OR (95% CI)	G ² (df = 1)	IRR (95% CI)	G ² (df = 1)
Step2		8.50**		11.18***		9.72**		11.18***
Sober	3.07** (1.36, 6.93)		2.88** (1.56, 5.34)		2.88** (1.41, 5.85)		2.88** (1.56, 5.34)	
Step 3		10.05**		4.85*		31.85***		2.86 [†]
Sober	2.30 (0.94, 5.64)		2.43** (1.29, 4.59)		1.93 (0.79, 4.69)		2.40** (1.26, 4.58)	
Intoxicated	3.83** (1.51, 9.74)		2.11* (1.06, 4.21)		11.46*** (2.46, 37.95)		1.68 [†] (0.91, 3.11)	

Note: In both analyses, Step 1 was comprised of gender, drinking frequency and quantity. OR = odds ratio; IRR = incidence rate ratio; CI = confidence interval; G² = likelihood ratio chi-squared statistic. Perceived danger variables were reverse coded such that ORs indicated the change in odds of willingness to drive and IRRs indicated the expected change in the rate of driving after drinking in the past three months for every unit *decrease* in perceived danger.

[†] $p < .10$,
 * $p < .05$,
 ** $p < .01$,
 *** $p < .001$