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Injunctive Peer Misperceptions and the Mediation of Self-Approval on Risk for Driving After Drinking Among College Students

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Abstract

Of the alcohol-related risks faced by college students, it is arguable that none presents a greater public health hazard than driving after drinking (DAD). The present study examined the extent to which students' injunctive misperceptions toward DAD predicted the likelihood to engage in DAD and how this relation was mediated by self-approval of DAD. Participants were 2,848 college students (59.1% female, 64.6% Caucasian) from two U.S. West Coast universities who completed confidential web-based surveys assessing DAD beliefs and behaviors. Results revealed that respondents tended to overestimate their peers' approval toward DAD. Moreover, the subgroups likely to engage in DAD—men, 21+ years of age, Greek affiliated students, Caucasians, students with a family history of alcohol abuse—were also more likely to misperceive (i.e., overestimate) their peers' level of approval toward DAD. Using binary logistic regression analyses, self-approval of DAD emerged as an important statistical mediator in the relation between misperception of typical student approval toward DAD and engagement in DAD. Results point to the considerable role injunctive peer misperceptions may play in the pathways leading to drinking-driving risk. These findings provide preliminary support for DAD-specific social normative interventions, either complementing or supplementing existing alcohol interventions. By targeting high-risk student subgroups and communicating accurate drinking-driving norms, these proposed interventions have the potential to reduce self-approval and incidence of DAD.

Of the potential alcohol-related risks faced by college students, those associated with driving after drinking (DAD) are among the most serious. Not only does DAD pose great risk for vehicular injuries and fatalities, but alcohol-impaired motor vehicle deaths are prevalent among U.S. college students, accounting for approximately 75% of the 1,825 alcohol-related deaths in this population annually (Hingson, Zha, & Weitzman, 2009). In recent studies, 29% (Hingson et al., 2009) to 32% (Rothman, DeJong, Palfai, & Saitz, 2008) of college students have acknowledged driving while intoxicated, and 63% have acknowledged driving after consuming any level of alcohol (Beck et al., 2010) in the past year. Despite strong societal disapproval of DAD and increased prevention efforts aimed at curbing alcohol-related driving fatalities in youth—including national zero-tolerance laws, possession and purchase laws, sobriety checkpoints, and campaigns against driving under the influence

(DUI) (Fell, Fisher, Voas, Blackman, & Tippetts, 2009; Shults et al., 2001)—national estimates have revealed rising rates of alcohol-impaired driving and relatively steady rates of alcohol-related traffic fatalities in college student populations from 1999 to 2005 (Hingson et al., 2009).

DAD-Related Attitudes and Injunctive Normative Beliefs

A number of factors are associated with college students' likelihood to engage in DAD, including sensation-seeking personality dispositions (Green et al., 2000; Jonah, Thiessen, & Au-Yeung, 2001; Zakletskaia, Mundt, Balousek, Wilson, & Fleming, 2009); convenience of DAD (e.g., desire to get to another location, difficulties acquiring alternative transportation; Fairlie et al., 2010; McCarthy, Pedersen, Thompson, & Leuty, 2006); perceptions of risk (e.g., DUI arrest, sobriety checkpoints, accidents; Grube & Voas, 1996); and receipt of mass media messaging against drunk driving (Bass & Keathley, 2008). Among the strongest influences of DAD, however, are personal attitudes (approval or disapproval) and perceptions of peers' or proximal reference groups' attitudes (i.e., injunctive normative beliefs) toward DAD. Although some college-based studies have revealed personal attitudes and injunctive normative beliefs as significant independent predictors of DAD (McCarthy, Lynch, & Pedersen, 2007; McCarthy, Pedersen, & Leuty, 2005), in other studies, injunctive normative beliefs associated with DAD have emerged as a stronger predictor of intentions to drive under the influence than DAD-related self-attitudes (Armitage, Norman, & Connor, 2002; Gastil, 2000). Additional research supports the salience of friends' perceived disapproval of DAD in reducing the likelihood to engage in DAD (Greenberg, Morral, & Jain, 2004; Grube & Voas, 1996).

These findings are consistent with social norms approaches that evidence the importance of college students' alcohol-related injunctive norms (e.g., perceptions of peers' approval or disapproval of drinking; see Cialdini et al., 1990) as well as descriptive norms (e.g., perceptions of peers' typical drinking behaviors; see Borsari & Carey, 2001) in shaping personal drinking attitudes and behaviors. The theoretical social norms framework postulates that higher perceived drinking norms tend to make heavy drinking seem normative and acceptable, thereby encouraging students to drink at levels consistent with their perceptions of peer drinking behavior and attitudes (Berkowitz, 2004; Borsari & Carey, 2003). Making behavioral decisions based on perceived norms is problematic, as perceived rather than actual norms directly influence behavior (Rimal & Real, 2003; 2005); and research consistently shows that students overestimate the drinking norms of other students (Borsari & Carey, 2003; Larimer et al., 2009; Neighbors, Lee, Lewis, Fossos, & Larimer, 2007; Perkins, Haines, & Rice, 2005). Thus, social norms intervention programs have attempted to correct students' misperceptions regarding the prevalence and acceptability of heavy drinking by providing students with information regarding the actual prevalence and acceptability of drinking among peers (Larimer & Cronce, 2007). Overall, research supports the efficacy of social norms interventions to correct individual misperceptions and subsequently modify students' drinking behaviors (e.g., DeJong et al., 2006; Nelson, Toomey, Lenk, Erickson, & Winters, 2010; for a review, see Zisserson, Palfai, & Saitz, 2007).

It is surprising that only a few studies have examined the accuracy of DAD-specific social norms or their potential application in harm reduction interventions. Linkenbach and Perkins (2003) revealed that youth significantly overestimated peers' drinking-driving behaviors (i.e., descriptive normative beliefs). In addition, the researchers conducted a social norms intervention using a mass media campaign to disseminate actual DAD behaviors, and subsequently found reduced drinking-driving descriptive norms and behavior in a general population of young adults (Linkenbach & Perkins, 2005; Perkins, Linkenbach, Lewis, & Neighbors, 2010). This work reveals a promising approach by which to target and reduce DAD among college students, and highlights the need for research examining the role that drinking-driving attitudes (i.e., injunctive normative beliefs) may play in fostering this at-risk behavior. Research has not yet examined the accuracy of students' injunctive normative beliefs, and especially how they may impinge upon one's own approval of DAD and engagement in DAD. Given the substantial effect that perceived and personal DAD-related attitudinal beliefs are shown to have on DAD risk (e.g., Armitage et al., 2002; Gastil, 2000; Greenberg et al., 2004; Grube & Voas, 1996; McCarthy et al., 2005, 2007), further developing this understanding may be valuable in informing and extending current social norms interventions to address DAD-specific risks. For example, if students are shown to overestimate peers' approval of DAD, social norms interventions that challenge students' misperceptions by conveying accurate injunctive DAD norms have the potential to alter students' personal DAD-related attitudes and possibly behavior.

Proximity of DAD-Related Injunctive Normative Beliefs

In accordance with conventional social psychological theories (e.g., social comparison theory; Festinger, 1954) normative perceptions of proximal referents appear to be more salient than distal referents in influencing behaviors. For example, compared with broader campus alcohol social norms marketing campaigns that have received only limited support (DeJong et al., 2006; Wechsler et al., 2003), more recent studies have evidenced the efficacy of individual- and group-level social norms interventions that focus on more proximal and thus salient student reference groups (Borsari & Carey, 2003; LaBrie, Hummer, Grant, & Lac, 2010; LaBrie, Hummer, Neighbors, & Pedersen, 2008; Larimer, 2009; Lewis & Neighbors, 2004, 2006). Thus far, perceived attitudes of friends and peers are shown to be significant predictors of DAD intentions and behaviors. Therefore, DAD-based social norms interventions that address individual student's injunctive normative beliefs as they relate to salient reference groups may be most promising in reducing DAD. Moreover, gaining insight into injunctive normative beliefs held by students most at risk for DAD is warranted. For example, research has documented that certain subgroups of young adults are at heightened risk for DAD, including men (Harford, Wechsler, & Muthen, 2002; Marelich, Berger, & McKenna, 2000; Schwartz, 2008), heavier drinkers (Fairlie et al., 2010; Lewis, Thombs, & Olds, 2005; Wechsler, Davenport, Dowdall, & Moeykens, 1994), those of legal drinking age (Beck et al., 2010; Fairlie et al., 2010; Fromme, Wetherill, & Neal, 2010), and those with a family history of alcohol abuse (Turrisi & Wiersma, 1999).

Study Aims

In the present study, we aimed to document misperceptions of DAD attitudes and subsequently examine differences in students' injunctive peer misperceptions of DAD among student subgroups: men/women; younger than/older than 21 years of age; Caucasian/non-Caucasian; Greek-affiliated/non-Greek-affiliated; and family history positive/negative. Misperceptions are defined as the level of perceived approval minus the level of actual approval. Further, we assessed how students' alcohol consumption, self-approval (personal approval) of DAD, and injunctive peer misperceptions of DAD differed as a function of DAD (i.e., whether or not respondents drove shortly after having more than two drinks), and within the aforementioned subgroups. Next, this study investigated how the relation between misperception of DAD and engagement in DAD was mediated statistically by self-approval of DAD. In this model, the statistical control of critical rival predictors (gender, age, race, Greek affiliation, family history status, and total weekly drinks) helped isolate the true effects of the proposed meditational pathway. Although perceptions of others' approval and personal approval toward DAD are established risk factors of DAD, studies have not explicated their pathways of influence or examined injunctive misperceptions and self-attitudes, concurrently, in the same model. The present study proposes a theoretical model in which misperception of peer injunctive DAD norms was expected to influence self-approval of DAD, which, in turn, was expected to influence the likelihood of engaging in DAD. This model aligns with a social norms framework in which students' perceptions influence behavior through personal attitudes (e.g., Huchting, Lac, & LaBrie, 2008). Moreover, exploring the meditational pathways by which injunctive misperception and self-approval may associate with DAD behavior is important in establishing the role of injunctive misperceptions and their potential to be applied to DAD-specific social norms interventions.

In summary, this study examined how different collegiate subgroups misperceived peers' approval of DAD, and tested a model proposing the mechanisms in which misperceptions and personal attitudes towards DAD predicted the likelihood to engage in DAD. Results derived from this study are anticipated to elaborate upon and extend prior research linking accuracy of injunctive norms to DAD and, consequently, should illuminate the need for social normative interventions designed to minimize this dangerous behavior among college students.

Method

Sample

Participants were students from two West Coast universities—a large public institution with approximately 30,000 undergraduates and a midsized private institution with approximately 6,000 undergraduates—who completed online surveys. The sample used in the present study included 2,848 students. Mean age was 19.97 years ($SD = 1.37$ years), and 59.1% of respondents were female. Racial composition was 64.6% Caucasian, 22.3% Asian, 2.9% African American, 1.8% Pacific Islander, 0.5% American Indian, and 7.9% multiracial/other while ethnic makeup was 87.3% non-Hispanic and 12.7% Hispanic. In the present sample, Caucasians were slightly overrepresented—institutional demographic data show that Caucasians comprised 52% and 54% of the respective campus populations.

Design and Procedure

In the initial weeks of the Fall 2007 semester, a random sample of 7,000 students (3,500 from each university) received mailed letters and emails inviting them to complete confidential surveys regarding alcohol-related behaviors and beliefs. If a student consented to participate, he/she clicked on a designated link included in the email, and then entered a unique identification number that allowed him or her to access a brief institutional review board–approved online survey. A total of 3,753 students (53.6% response rate) completed the 20-minute survey and received nominal stipends of US\$20. Of these, because of randomized receipt of a subsample of measures in order to reduce the time required to complete the entire survey, only 76.9% students ($N = 2,885$) received all survey questions used in our analyses. After excluding 37 cases with missing values, the final sample used in the present study comprised 2,848 participants.

Measures

In addition to gender, race, and Greek affiliation, the following measures were used in the present analyses.

Age—Age was operationalized as a dichotomous variable to classify respondents as younger than (<21 years) or older than (21+ years) the legal drinking age in the United States.

Family History of Alcohol Abuse—Respondents reported if any of their biological relatives “had a significant drinking problem—one that should or did lead to treatment?” (Miller & Marlatt, 1984). Respondents indicating “yes” were categorized as family history positive and “no” as family history negative.

Total Weekly Drinks—College drinking was assessed using the Daily Drinking Questionnaire (Collins, Parks, and Marlatt, 1985; Dimeff, Baer, Kivlahan, & Marlatt, 1999), a valid and reliable measure used in previous studies (Larimer et al., 2001; Marlatt et al., 1998; Neighbors, Lewis, Bergstrom, Larimer, 2006). Participants were instructed to consider a typical week in the past month before answering the question, “How many drinks did you typically consume on a Monday?” then “Tuesday?” and so on. Students’ open-ended responses across these 7 days were summed to form the total weekly drinks variable.

Perceived Approval of DAD—The Injunctive Norms Questionnaire (Baer, 1994) instructed all respondents to estimate the extent to which they felt “typical students” at their college approved of “driving a car after drinking” on a 7-point scale ranging from 1 (*strongly disapprove*) to 7 (*strongly approve*). Furthermore, for group-targeted injunctive norms measures using this same format and scale, male and female respondents reported on their perceived DAD approval of “typical same-sex students,” but only Greek affiliated respondents reported on their perceived DAD approval of “typical Greek students.”

Self-Approval of DAD—Respondents answered the same Injunctive Norms Questionnaire, albeit with respect to their self-approval of “driving a car after drinking.”

This measure was on the same 1 (*strongly disapprove*) to 7 (*strongly approve*) scale as perceived approval of DAD.

DAD—The 25-item Rutgers Alcohol Problem Index (White & Labouvie, 1989) assessed a range of self-reported alcohol-related consequences experienced in the past three months. For our analyses, one item, “drove shortly after having more than two drinks,” was used to measure the frequency with which respondents drove after drinking. Likert options included 0 (*never*), 1 (*1–2 times*), 2 (*3–5 times*), 3 (*6–10 times*), and 4 (*more than 10 times*).

Analytic Plan

The DAD variable indicated the following distribution: never (84.6%), 1–2 times (12.0%), 3–5 times (2.5%), 6–10 times (0.7%), and more than 10 times (0.3%). As the variable possessed nonnormal distributional properties, in all analyses, it was binary recoded into whether respondents had engaged in DAD at least once (yes or no). Chisquare tests assessed differences in proportion of respondents reporting whether or not they engaged in DAD for various demographic subgroups, including gender (male or female), age (21+ years or <21 years), race (Caucasian or non-Caucasian), Greek affiliation (Greek or non-Greek), and family history of alcohol abuse (positive or negative).

Then, we compared perceived versus actual approval of DAD to determine respondents’ typical student misperception toward DAD. Next, we computed typical student misperception toward DAD by taking each respondent’s perceived level of typical student approval and subtracting the constant of 1.22 (the actual sample mean for students’ self-approval of DAD). In other words, the typical student misperception variable was constructed from perceived approval minus actual approval, such that positive misperception scores represented overestimation, but negative scores represented underestimation, of typical student approval. Similarly, group-targeted measures capturing misperception of approval towards DAD were constructed for each of the male, female, and Greek samples. For example, in the Greek sample, the measure of “typical Greek student misperception” toward DAD was computed by taking each Greek respondent’s perceived approval of Greek students and subtracting the sample mean of Greek students’ actual self-approval.

Next, independent-samples *t* tests assessed mean differences on total weekly drinks, self-approval of DAD, and misperceptions of approval toward DAD as a function of DAD for each subgroup.

Explanatory models were estimated to determine whether typical student misperception toward DAD (predictor) was related to self-approval of DAD (mediator), which, in turn, was proposed to be the antecedent of DAD behavior (outcome). To examine this mediational process statistically, four models were estimated. In Model 1, a multiple regression model assessed the influence of typical student misperception on self-approval. As the DAD behavior consisted of only two levels, the next three models used binary logistic regression. In Model 2, a logistic regression assessed the contribution of self-approval on the DAD outcome. The direct effect between typical student misperception and DAD was estimated in Model 3. In Model 4, self-approval and typical student misperception were simultaneously specified to influence DAD, to determine if the magnitude of the direct effect was reduced

after inclusion of the mediator. To rule out contextual variables, a relevant set of covariates (gender, age, race, Greek affiliation, family history status, and total weekly drinks) were entered into all four models. In summary, using Baron and Kenny's (1986) criteria for establishing mediation, we aimed to evaluate the relation between the predictor and the mediator (Model 1), the mediator and the outcome (Model 2), and the predictor and the outcome (Model 3). Upon determining that these paths were significant, mediation is achieved if the predictor on the outcome is attenuated after accounting for the mediator (Model 4). The parameter of interest in a multiple regression is the standardized coefficient (β), with a null hypothesis of 0; and in a logistic regression, it is the odds ratio (OR), with a null hypothesis of 1.

Results

Mean Differences in Perceived and Actual Approval of DAD

Overall, participants overestimated typical student approval of DAD ($M = 1.79$, $SD = 1.00$) versus students' actual self-approval of DAD ($M = 1.22$, $SD = 0.65$), one-sample $t = 30.88$, $p < .001$. The correlation between perceived typical student approval and actual self-approval was $.36$, $p < .001$. The measures targeting group-specific approval of DAD were examined next. In the male sample, their perceived same-sex student approval ($M = 1.85$, $SD = 1.04$) was significantly higher than men's actual self-approval ($M = 1.27$, $SD = 0.70$), one-sample $t = 19.12$, $p < .001$. For men, perceived same-sex norms were positively correlated with their own self-approval ($r = .35$, $p < .001$). In the female sample, their perceived same-sex student approval ($M = 1.67$, $SD = 1.67$) was significantly higher than women's actual self-approval ($M = 1.18$, $SD = 0.62$), one-sample $t = 21.08$, $p < .001$. Also for women, perceived same-sex approval positively correlated with their own self-approval ($r = .40$, $p < .001$). In the Greek sample, significantly higher perceived typical Greek student approval ($M = 1.75$, $SD = 1.04$) was found over Greek students' actual self-approval ($M = 1.23$, $SD = 0.67$), one-sample $t = 12.55$, $p < .001$. For Greeks, their perceived Greek student approval correlated with their self-approval ($r = .52$, $p < .001$). These difference scores of perceived approval and actual approval were used to compute the corresponding measures of "typical student misperception," "typical same-sex student misperception," and "typical Greek student misperception."

Demographic Differences in DAD

Demographic differences of participants who engaged in DAD are reported in Table 1. In terms of gender, a significantly greater percentage of men drove after drinking than did women, $p < .001$. In addition, the following student subgroups were also disproportionately more likely to have engaged in DAD: Students 21 years of age or older compared with those younger than 21 years of age ($p < .001$), Caucasians compared with non-Caucasians ($p < .01$), Greeks compared with non-Greeks ($p < .001$), and those with (versus without) a family history of alcohol abuse ($p < .001$).

Subgroup Mean Differences on DAD

As shown in Table 2, a series of t tests, as a function of whether respondents engaged in DAD, were performed on the set of measures. Results show that within each of the five

demographic subgroups (gender, age, race, Greek affiliation, and family history status), respondents who engaged in DAD (compared to those who did not) reported significantly greater levels of total weekly drinks (all $p < .001$) and self-approval of DAD (all $p < .001$).

Noteworthy mean differences, as a function of whether respondents engaged in DAD, emerged on the derived misperception measures. Whereas men reporting DAD held significantly greater misperception of both typical student approval and same-sex student approval of DAD than men not reporting DAD, neither misperception measure differed among women. With reference to age, those 21 years and older engaging in DAD held significantly greater typical student misperception than did those not engaging in DAD ($p < .01$); however, this mean difference was nonsignificant among those younger than 21 years. In the Caucasian sample, typical student misperception was significantly higher in those who had engaged in DAD versus those who did not ($p < .001$), but this difference was not significant among the non-Caucasian sample. In the Greek affiliated sample, although typical student misperception was not significantly different, typical Greek student misperception was significantly higher in those who drove after drinking versus those who did not, ($p < .05$). In non-Greeks, a significant mean difference emerged on typical student misperception as a function of engaging in DAD. In the family history negative sample, typical student misperception was significantly higher in those who engaged in DAD compared to those who did not ($p < .001$), but this mean difference was not evidenced in the family history positive sample. In summary, respondents were more likely to overestimate injunctive misperceptions if they had previously engaged in DAD.

Models Predicting DAD

Analyses then evaluated the proposition that typical student misperception toward DAD (predictor) influenced engagement in DAD (outcome), and that this pathway operated through the intermediate mechanism of self-approval of DAD (mediator). We adhered to established procedures for evaluating mediation statistically (Baron & Kenny, 1986). The multiple regression analysis to account for variance in the mediator of self-approval was assessed first (Model 1), with the following estimates: gender ($\beta = .05, p < .01$), age ($\beta = .05, p < .01$), race ($-.04, p < .05$), Greek ($\beta = .03, ns$), family history ($\beta = -.01, ns$), drinks per week ($\beta = .27, p < .001$), and typical student approval ($\beta = .38, p < .001$). This particular analysis revealed that higher typical student misperception explicated higher self-approval of DAD. The three binary logistic regression models, with DAD behavior (yes or no) as the outcome, are presented in Table 3. As shown in Model 2, the mediator of self-approval explained significant variance on the outcome of DAD (OR = 2.56, $p < .001$). Model 3 supported that the direct effect of typical student misperception on DAD was significant (OR = 1.31, $p < .001$). Last, Model 4 shows that in estimating both effects simultaneously, the mediator of self-approval (OR = 2.97, $p < .001$) emerged as significant, but the direct effect of typical student misperception (OR = 0.92, ns) was no longer significant, indicating that the direct effect on DAD was attenuated after inclusion of the mediator.

We conducted a test of indirect effect to further explore the mediational process. We followed the approach recommend by Preacher and Hayes (2008), as it allows for the indirect effect to partial out the set of previously described covariates, and it also allows for

sample bootstrapping, a procedure that is advocated over the traditional normal-theory procedure because it generates estimates based on the distribution of sampling data. Results confirmed a significant indirect effect of typical student misperception on DAD behavior via the intermediate variable of self-approval, $p < .001$. In the final logistic regression (Model 4), the following risk variables were found to significantly and uniquely contribute to DAD: being 21 years old or older ($OR = 2.27, p < .001$), being a member of a Greek student organization ($OR = 1.44, p < .01$), having a family history of alcohol abuse ($OR = 1.67, p < .001$), consuming higher total weekly drinks ($OR = 1.07, p < .001$), and endorsing higher self-approval of DAD ($OR = 2.97, p < .001$).

Discussion

The present findings are the first to document that college students hold significant injunctive misperceptions of peers' attitudes toward DAD, such that peers are perceived to be more approving of DAD than they actually are. This is notable given the magnitude of national resources devoted to drinking-driving prevention campaigns among youth. Although respondents' self-approval and perceptions of peers' level of approval of DAD were still in the disapproving range—suggesting that prevention efforts have been somewhat successful in reducing perceived acceptability of the high-risk behavior—the misperceptions that do exist nonetheless appear to play a considerable role in DAD risk, especially among those groups most likely to engage in DAD. In Table 1, mean differences emerged as a function of DAD for the majority of measures within all subgroups. Because injunctive misperceptions may play a role in informing DAD behaviors among higher risk students, injunctive normative reeducation targeting these subgroups of heavy drinking students may be valuable.

Consistent with more general research of alcohol-related norms, the present findings also indicate that self-approval mediates the relation between typical student injunctive misperception of DAD and likelihood to engage in DAD, over and above alcohol consumption and other covariates. By demonstrating that injunctive norms specific to DAD appear to follow an established theoretical pathway by which injunctive overestimations motivate riskier drinking-related attitudes and in turn behaviors, this study offers a number of implications. First, when examining antecedents of DAD, it may not be sufficient to apply only frameworks in which subjective norms and personal attitudes serve as independent, simultaneous predictors of intentions, which then affect behavior (e.g., the theory of reasoned action; Ajzen & Fishbein, 1980; theory of planned behavior; Ajzen, 1985, 1991). By demonstrating that one's own attitudes related to DAD mediated the relation between injunctive DAD norms and DAD, the present findings underscore the need to account for additional pathways of influence. Moreover, future studies employing longitudinal designs are needed to confirm the directional hypothesis that perceived norms influence personal attitudes, and not the other way around. It may be that the relation between perceived norms and personal attitudes is reciprocal with each influencing the other iteratively. However, the final regression model showed that only personal attitudes predicted DAD independently when accounting for all the other variables in the model suggesting that the influence of normative perceptions on DAD is mediated by one's own attitudes.

Second, findings indicate that general alcohol interventions may be enhanced by communicating accurate injunctive norms specific to drinking-driving. Complementing existing alcohol interventions with this information offers an efficient and cost-effective approach to correcting inaccurate normative perceptions, reducing approval, and potentially modifying behavioral choices related to DAD. Interactive normative feedback approaches, such as BLING (Brief Live Interactive Normative Group-Specific; LaBrie et al., 2008), in which norms are derived in vivo with high-risk groups using handheld wireless devices, have demonstrated efficacy in reducing student misperceptions of injunctive drinking norms as well as drinking (LaBrie et al., 2010; LaBrie, Hummer, Huchting, & Neighbors, 2009; LaBrie et al., 2008). Therefore, using BLING to target groups at risk for DAD may be effective at reducing both misperceptions of peer approval of DAD and actual incidence of DAD.

Also in accordance with more general norms research, these results indicate that, like alcohol-based norms, the salience of injunctive perceptions of DAD may differ as they relate to more distal (e.g., typical students) and proximal (e.g., fellow Greeks, close friends) referent groups. For example, among Greeks—the subgroup found to be at highest risk for DAD in the present study—respondents reporting DAD held considerably higher Greek-specific, but not typical student-specific, injunctive overestimations than Greeks not reporting DAD. Future studies accounting for students' proximity and perceived connectedness to assessed referent groups may be important. In addition to communicating accurate injunctive norms of the most salient individuals in a student's social network, anti-DAD campaigns may benefit from more broadly reaching out to these significant others. As in the "Friends Don't Let Friends Drive Drunk" campaign of the 1990s, the goal of these targeted interventions would be to influence individuals' DAD-related attitudes and behaviors by motivating salient others to more openly demonstrate accurate norms.

Taken as a whole, a better understanding of the collegiate drinking culture in which students are embedded is needed to identify why DAD remains fairly common in this population, despite disapproval and awareness of risks in general. Alcohol myopia theory (Steele & Josephs, 1990) suggests that intoxication may compromise adherence to personal principles (e.g., disapproval of DAD) or discernment of potential risks (e.g., car accidents, arrest), while emphasizing immediate needs (e.g., convenience of getting to another location by driving). This psychological propensity may help explain why context-specific environmental initiatives have been effective in reducing DAD among college students (Elder et al., 2002; Fell, Lacey, & Voas, 2004; Shults et al., 2001; Wechsler, Lee, Nelson, & Lee, 2003). Environmental inhibitory cues that accentuate possible negative consequences, and that target students already consuming alcohol (e.g., sobriety checkpoints, poster campaigns featuring enforcement of legal penalties, accident statistics, accurate student norms) may compel students to reconsider DAD. Alternatively, promoting practical options (e.g., college-sponsored transportation, taxi cab business cards, designated driver programs) may reduce the likelihood that students will drive after consuming alcohol. An important caveat of these contextual-based approaches, however, may be that they be accompanied with DAD-specific injunctive normative interventions aimed at facilitating students' internal motivations to avoid potentially hazardous drinking-driving related behavior. Students with

enhanced cognitions for avoid DAD should be less susceptible to the myopic effects of drinking, which typically draw attention to the convenience of engaging in DAD.

This study's findings are limited in several ways. First, the meditational models implemented in this study assessed the intervening effects of personal attitudes in the relation between injunctive misperceptions and DAD among typical students only. Examining the meditation of personal attitudes as they relate to misperceptions among more proximal referent groups (e.g., same-sex typical students, close friends, fellow Greeks/athletes) is warranted. A second limitation of this study is the use of a cross-sectional design. Future studies would benefit from longitudinal analyses that confirm the directional pathways leading to DAD. Third, the operationalization of DAD does not account for the physiological impact of respondent gender or weight, both of which are used to gauge true blood alcohol concentration. Because women tend to reach greater levels of intoxication more rapidly than male counterparts, the operationalization for DAD in terms of driving after consuming more than two drinks in the present study was somewhat disproportionate. For example, among respondents of mean sample weight (men of 169 lbs and women of 135 lbs), women would reach blood alcohol concentrations triple those of men (.09% vs. .03%) after consuming three drinks in a 2-hour period. Interpreted in this light, the reported DAD among women in this sample (12.7% reported DAD) is alarming. Analysis of national fatal vehicular accident statistics has revealed heightened risk even for drivers with low blood alcohol concentrations. For example, compared with sober drivers, drivers with blood alcohol concentrations of only .01%—levels considerably lower than both what was assessed in the present study and the legal limit of .08% for persons 21 years or older—are found to experience greater accident severity (Phillips & Brewer, 2011).

The present findings demonstrate that college students, particularly those most likely to engage in DAD, tend to significantly overestimate peers' approval of DAD, and that these injunctive misperceptions are associated with a greater likelihood for DAD. Further, one's self-approval of DAD mediated the relation between injunctive misperceptions and DAD risk. These results are informative for student affairs and public health professionals seeking to reduce risk associated with DAD in this population. In particular, it appears that collegiate drinking-driving prevention initiatives may be enhanced by DAD-specific injunctive normative interventions aimed at correcting misperceptions and therefore reducing both DAD self-approval and engagement.

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Table 1

Demographic differences in driving after drinking

Variable	Driving after drinking				χ^2 test
	No		Yes		
	%	<i>n</i>	%	<i>n</i>	
Gender					24.58***
Male	80.5	938	19.5	227	
Female	87.3	1,470	12.7	213	
Age (years)					68.55***
21 and older	76.9	761	23.1	229	
Younger than 21	88.6	1,647	11.4	211	
Race					8.06**
Caucasian	83.1	1,527	16.9	310	
Non-Caucasian	87.1	881	12.9	130	
Greek affiliation					46.39***
Greek	75.8	470	24.2	150	
Non-Greek	87.0	1,938	13.0	290	
Family history of alcohol abuse					21.44***
FH+	80.2	787	19.8	194	
FH-	86.8	1,621	13.2	246	

Note. The driving after drinking variable represents driving after more than two drinks. Within each row, the 2% values sum to 100%.

* $p < .05$;

** $p < .01$;

*** $p < .001$.

Table 2
Mean differences in measures as a function of drinking after drinking, by subgroup

Measure	Gender									
	Male			Female						
	<u>No (n = 938)</u>	<u>Yes (n = 227)</u>	<u>No (n = 1,470)</u>	<u>Yes (n = 213)</u>	<u>t test</u>	<u>t test</u>				
M	SD	M	SD	M	SD	M	SD	t test		
Total weekly drinks	6.44	9.96	16.34	13.07	12.59***	3.75	4.96	10.03	8.24	15.64***
Self-approval	1.12	0.46	1.86	1.10	15.59***	1.12	0.49	1.67	1.04	12.69***
Typical student misperception	0.36	0.86	0.67	1.02	4.75***	0.66	1.02	0.79	1.12	1.82
Typical same-sex student misperception	0.51	0.99	0.82	1.14	4.09***	0.47	0.92	0.56	1.06	1.23

Measure	Age (years)									
	21 and older			Younger than 21						
	<u>No (n = 761)</u>	<u>Yes (n = 229)</u>	<u>No (n = 1,647)</u>	<u>Yes (n = 211)</u>	<u>t test</u>	<u>t test</u>				
M	SD	M	SD	M	SD	M	SD	t test		
Total weekly drinks	5.27	7.15	11.88	9.95	11.18***	4.59	7.57	14.75	12.61	16.79***
Self-approval	1.17	0.57	1.76	0.99	11.42***	1.10	0.43	1.75	1.16	15.98***
Typical student misperception	0.64	0.97	0.86	1.09	2.9**	0.49	0.97	0.61	1.04	1.70

Measure	Race									
	Caucasian			Non-Caucasian						
	<u>No (n = 1,527)</u>	<u>Yes (n = 310)</u>	<u>No (n = 881)</u>	<u>Yes (n = 130)</u>	<u>t test</u>	<u>t test</u>				
M	SD	M	SD	M	SD	M	SD	t test		
Total weekly drinks	5.94	8.34	14.85	11.83	15.95***	2.81	4.96	9.35	9.12	12.29***
Self-approval	1.10	0.42	1.77	1.08	18.44***	1.16	0.57	1.73	1.07	9.40***
Typical student misperception	0.48	0.91	0.72	1.06	4.05***	0.64	1.07	0.80	1.11	1.64

	Greek affiliation											
	Greek					Non-Greek						
	<u>No (n = 470)</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>Yes (n = 150)</u>	<u>t test</u>	<u>No (n = 1,938)</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>Yes (n = 290)</u>	<u>t test</u>
Total weekly drinks	9.83	10.22	16.32	12.84	6.34***	3.58	6.00	11.68	10.22	19.34***		
Self-approval	1.10	0.44	1.62	1.03	8.71***	1.12	0.49	1.82	1.09	18.63***		
Typical student misperception	0.47	1.03	0.70	1.09	1.72	0.59	0.98	0.88	1.10	4.60***		
Typical Greek student misperception	0.32	0.91	0.47	0.97	2.38*	n/a	n/a	n/a	n/a	n/a	n/a	n/a

	Family history of alcohol abuse											
	FH+					FH-						
	<u>No (n = 787)</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>Yes (n = 194)</u>	<u>t test</u>	<u>No (n = 1621)</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>Yes (n = 246)</u>	<u>t test</u>
Total weekly drinks	5.51	8.48	13.36	11.15	0.83***	4.45	6.86	13.16	11.57	6.73***		
Self-approval	1.11	0.46	1.61	0.96	0.53***	1.13	0.49	1.87	1.14	7.82***		
Typical student misperception	0.53	0.99	0.56	0.96	0.38	0.54	0.97	0.88	1.14	5.03***		

Note. The driving after drinking variable represents driving after more than two drinks. All the measures are phrased in terms of drinking after driving, except for total weekly drinks.

* $p < .05$;
 ** $p < .01$;
 *** $p < .001$.

Table 3

Logistic regression model predicting driving after drinking

Predictor	Model 2			Model 3			Model 4		
	B	SE	Odds ratio	B	SE	Odds ratio	B	SE	Odds ratio
Gender ^a	0.15	0.13	1.17	0.21	0.12	1.24	0.13	0.13	1.14
Age ^b	0.81	0.12	2.25***	0.85	0.11	2.34***	0.82	0.12	2.27***
Race ^c	-0.15	0.14	0.86	-0.21	0.13	0.81	-0.15	0.14	0.86
Greek affiliation ^d	0.38	0.14	1.46**	0.30	0.13	1.35*	0.37	0.14	1.44**
Family history of alcohol abuse ^e	0.51	0.12	1.67**	0.46	0.12	1.58***	0.51	0.12	1.57***
Total weekly drinks	0.07	0.01	1.07***	0.09	0.01	1.09***	0.07	0.01	1.07***
Self-approval	0.94	0.08	2.56***				0.99	0.09	2.97***
Typical student misperception				0.27	0.05	1.31***	-0.08	0.07	0.92
Model χ^2			520.91***			378.85***			522.63***
Model <i>df</i>			7			7			8
Model Nagelkerke <i>R</i> ²			29.0%			21.6%			29.0%

Note. Odds ratios are adjusted, controlling for all other predictors within the model. Outcome is driving after more than two drinks (0 = no, 1 = yes).

^a Gender (0 = female, 1 = male).

^b Age (0 = younger than 21, 1 = 21 or older).

^c Race (0 = non-Caucasian, 1 = Caucasian).

^d Greek affiliation (0 = non-Greek, 1 = Greek).

^e Family history of alcohol abuse (0 = negative, 1 = positive).

* $p < .05$;

** $p < .01$;

*** $p < .001$.