

# The Chicken or the Egg: Examining Temporal Precedence Among Attitudes, Injunctive Norms, and College Student Drinking

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**ABSTRACT. Objective:** The present study was designed to test for projection, conformity, or reciprocal associations among attitudes, injunctive norms, and drinking. Assuming that these constructs are not independent, we proposed three possible trajectories. A conformity model would suggest that injunctive norms should temporally precede drinking or attitudes. Alternatively, a projection model would suggest that attitudes or alcohol use would precede injunctive norms. Furthermore, by examining the processes over three time points, the current study would also examine whether both conformity and projection processes were at work, indicating reciprocal relationships. **Method:** Participants included 249 college students (63.1% female), who participated as a control group in a larger intervention trial. Structural equation modeling was used to examine cross-sectional and prospective associations among injunctive

norms, attitudes, and drinking across each of the three time points. **Results:** Findings demonstrated three significant cross-lagged associations. Injunctive norms at Time 1 was significantly associated with drinking at Time 2 (conformity), and both attitudes and drinking at Time 2 were significantly associated with injunctive norms at Time 3 (projection). The pattern of cross-lagged associations suggested one meaningful indirect pathway, from Time 1 injunctive norms to Time 2 drinking to Time 3 injunctive norms (reciprocal association). **Conclusions:** The present study suggests that both the conformity and the projection processes seem to be important and evident for college student drinking when considering injunctive norms and drinking over time. Interventions that focus on both conformity and projection may be particularly effective at reducing longer-term alcohol use. (*J. Stud. Alcohol Drugs*, 76, 594–601, 2015)

RESEARCH CONSISTENTLY DEMONSTRATES that alcohol use is a major concern on college campuses (e.g., Johnston et al., 2014). Commensurately, drinking during young adulthood is associated with increased risk for alcohol-related negative consequences (Hingson et al., 2009; White et al., 2011). In addition, up to 20% of young adults are estimated to have an alcohol use disorder (Blanco et al., 2008). Previous research has shown that perceptions of others' approval of drinking (i.e., injunctive norms) and one's own attitude toward drinking are associated with drinking behavior (Neighbors et al., 2011). However, it is still unclear whether injunctive norms and attitudes are associated with subsequent drinking behavior because of conformity or projection. We aimed to test two possible competing trajectories. A conformity model would suggest that injunctive norms should temporally precede attitudes or drinking. Alternatively, a projection model would suggest that attitudes or alcohol use would precede injunctive norms. Furthermore, the present study examined whether these relationships were reciprocal, meaning that both the conformity and the projection processes occur.

Determining temporal precedence of attitudes and injunctive norms can help inform intervention research. Many college student drinking interventions are guided by theory (Miller et al., 2015). If study findings support one theoretical process over another, this would provide support for the application of that process, over another, to future interventions. For example, understanding the temporal precedence of injunctive norms and attitudes in predicting college student drinking would have important clinical implications by providing evidence for which constructs (i.e., injunctive norms, attitudes, or both) to target in interventions.

Many brief interventions focus on finding a "hook" or a reason to change by using motivational interviewing principles and strategies for building students' motivations to change their drinking behavior. Feedback has been highlighted as an active ingredient in brief interventions with demonstrated efficacy (Miller & Rollnick, 2002). For example, if the current study findings support conformity, then it would be recommended that brief personalized feedback interventions focus more heavily on reduction of overestimated normative perceptions. Creating a discrepancy between perceived and actual injunctive norms would be addressing the need to conform by motivating students to adjust their own attitudes and behavior to be closer to actual injunctive norms rather than perceived injunctive norms. However, if the current study supported projection over conformity, then the intervention's focus might be on how to reduce favorable attitudes toward drinking. For example, feedback on how current attitudes toward drinking do not contribute

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to future goals may help create a discrepancy (current self vs. future self), or motivation to change. Last, if the study provides support for both projection and conformity, then interventions may consider multiple components to address the multiple temporal associations of attitudes and injunctive norms on alcohol use over time.

*Injunctive norms, attitudes, and drinking behavior:  
Conformity versus projection*

Many major models of health-risk behavior focus on attitudes and injunctive norms, perhaps most notably the Theory of Reasoned Action (Fishbein & Ajzen, 1975). *Injunctive norms* refer to the perceived approval of drinking (the norms of “ought”) and represent perceived moral rules of the peer group. Injunctive norms assist an individual in determining what is acceptable versus unacceptable social behavior (Cialdini et al., 1990). A large body of research has documented the importance of injunctive norms in predicting college student drinking behavior (Borsari & Carey, 2003; Neighbors et al., 2007). Although much social norms research has focused on descriptive norms (e.g., Lewis & Neighbors, 2006; Litt et al., 2012; Neighbors et al., 2004), as a mediator of intervention effects and on various moderators of the descriptive norms–alcohol use relationship, injunctive norms are worthy of further investigation and may have more significance when examining alcohol-related negative consequences (Larimer et al., 2004). *Attitudes*, defined as the degree to which people hold favorable or unfavorable appraisals toward a behavior (Ajzen & Fishbein, 1977), are generally regarded as important predictors of a large variety of human behaviors (Kim & Hunter, 1993; Wallace et al., 2005), including college student alcohol use (Collins & Carey, 2007).

Although both attitudes and injunctive norms are commonly included in theories of health-risk behavior (Ajzen & Fishbein, 1977; Gerrard et al., 2008), they are often examined as predictors of behavior and are not examined temporally. Given the interrelatedness of injunctive norms, attitudes, and drinking behavior, it is important that research document the temporal relationships among these variables in addition to how they predict drinking behavior over time.

In considering these variables, there are three possible relationships over time. First, it is possible that in line with a conformity explanation, whereby individuals adjust their own attitudes and behaviors to that of their peer group, injunctive norms should precede attitudes or drinking. Social learning theory asserts that adolescents affiliating with deviant peers often observe and imitate problem behaviors (Petraitis et al., 1995; Svensson, 2003). It is likely that some of these socialization processes are specific to alcohol use. For example, light-drinking young adults who start college may begin to be more approving of heavy alcohol use to match what they perceive their new college student peers

to approve of. A crucial aspect of social learning theory is that adolescents do not have to observe peers engaging in a behavior for it to be reinforced. Simply believing that peers approve of the behaviors or perceiving pressure to adopt and conform to peers’ attitudes promotes engagement in the behavior (Petraitis et al., 1995). Therefore, individuals are likely to alter their drinking behavior to conform to perceived drinking norms in an effort to fit in with their social group (Baer et al., 1992). Support for conformity has been demonstrated in a number of studies on alcohol use among adolescents and college students (Neighbors et al., 2006a, 2006b; Suls & Green, 2003).

A second possible temporal sequence more in line with a projection hypothesis, whereby individuals may base their estimates of others’ drinking on their own behavior, suggests that attitudes or drinking precedes injunctive norms. There is evidence for projection in alcohol consumption, such that individuals view others’ drinking behavior as similar to their own so that they can view their own drinking behavior as being in line with the norm (Wild, 2002). *Projection* is sometimes referred to as *false consensus*, whereby an individual infers others’ standing on a dimension to be similar to their own (Krueger & Clement, 1997; Ross et al., 1977). Projection may occur even when the effects of conformity are controlled for (Marks et al., 1992; Neighbors et al., 2006a).

Last, it may be that both processes are relevant to college student drinking over time, such that both projection and conformity are at work and the relationship is reciprocal. According to the principle of reciprocal determinism (Bandura, 1977), injunctive norms should be reciprocally associated with alcohol use, each influencing one another over time. For example, injunctive norms may be associated with increased drinking, and increased drinking may continue to support or strengthen subsequent injunctive norms.

Most of the research to date has examined temporal precedence of descriptive norms (perceptions of how common or prevalent a behavior is) and college student drinking. Research regarding descriptive norms is mixed in that some studies provide support for conformity but not projection (Neighbors et al., 2006a), whereas other studies show support for a reciprocal relationship between descriptive norms and drinking (Wardell & Read, 2013). Although these studies provide important insight into the temporal relationships between descriptive norms and college student drinking, they did not consider injunctive norms or attitudes, which as previously reviewed are important determinants of alcohol use among college students and are worthy of further investigation.

Despite the research focusing on descriptive norms, to our knowledge only one study has examined temporal relationships among injunctive norms, attitudes, and drinking among college students. Ferrer et al. (2012) found that alcohol use among first-year college students worked through both conformity and projection mechanisms such that at-

attitudes predicted injunctive norms and alcohol consumption predicted descriptive norms (projection), while, at the same time, injunctive norms predicted attitudes and descriptive norms predicted behavior (conformity). Although this work shed important light on the possible temporal relationships between norms, attitudes, and behavior, the reliance on single-item measures that assessed these constructs globally (i.e., how comfortable are you with students' drinking habits at your university?) were noted as a limitation. Therefore, the present study aimed to operationalize attitudes, injunctive norms, and behavior in a way that looked at acceptability of specific quantities of alcohol over 7 days. The approach in the present study also has the advantage of direct comparison of values across the three constructs (i.e., attitudes, injunctive norms, and drinking quantity).

It should also be noted that the lag time in the associations between injunctive norms, attitudes, and drinking is likely to be short. For example, research examining temporal precedence has used time frames from 2 months to 3 years. Moreover, Ferrer et al. (2012) found that temporal precedence of constructs changed from the first year of college to the second year of college. If these constructs are highly related and have a short lag time in temporal precedence or temporal precedence changes over time, interventions may need to focus on both processes rather than following one theoretical process over another. Moreover, this short lag time may also contribute to a reciprocal relationship over time.

### *Present study*

The present study was designed to test the projection and conformity processes for attitudes, injunctive norms, and drinking or to determine whether these relationships were reciprocal. Because norms and attitudes are correlated with both drinking cognitions, it is necessary to examine both norms and attitudes in a single model, controlling for shared variance. Thus, we examined a model that included cross-sectional and prospective associations among injunctive norms, attitudes, and drinking across each of the three time points.

## **Method**

### *Participants and procedures*

Undergraduate students from two west coast universities were randomly selected and contacted via mail and email to participate in a web-based screening survey. Campus 1 is a large, public university that has an enrollment of approximately 30,000 undergraduate students. Campus 2, a mid-sized private university, has an enrollment of approximately 6,000 undergraduates. Of 5,998 (Campus 1 = 2,998; Campus 2 = 3,000) invited participants, 2,688 (Campus

1 = 1,476; Campus 2 = 1,212; 44.8%) responded to and completed the online screening survey. More than half of the students (1,494; 55.5%) who completed the screening survey met inclusion criteria for longitudinal participation in an intervention trial (i.e., they consumed 4/5 drinks in one sitting for women/men at least once in the past month). For the current study, because other study conditions involved drinking interventions or minimal assessment, we elected to limit analyses to control group data at baseline ( $n = 249$ ; 63.1% female), the 3-month follow-up ( $n = 200$ ), and the 6-month follow-up ( $n = 198$ ). Participants in the final control group sample were between 18 and 24 years old ( $M = 20.15$ ,  $SD = 1.34$ ). Racial composition was 69.0% White, 11.2% Asian, 10.7% multiracial, 2.9% other, 2.9% African American, 2.5% Hawaiian/Pacific Islander, and 0.8% American Indian/Alaskan Native. Furthermore, 14.1% of participants self-identified as Hispanic across all races.

Letters and emails were sent inviting students to participate in a study of alcohol use in college. The invitations included a URL linking participants to a 20-minute online screening survey. Participants received \$15 for completing the screening. On completion of the screening survey, students included in the longitudinal study were stratified by total drinks per week (10 or fewer, 11 or more) and were randomly assigned within strata to one of the six different conditions using a web-based randomization algorithm. National Institute on Alcohol Abuse and Alcoholism guidelines for at-risk drinking for drinks per week are more than 7 for women and more than 14 for men. We selected the average of these numbers and thus used the 11 drinks or more or 10 or fewer per week to stratify participants. The 10/11 stratification criterion was appropriate for the drinking distributions at the campuses where the study was conducted.

Students who met inclusion criteria were immediately invited to participate in the longitudinal intervention trial by being presented with a web invitation, which provided a URL directing them to the baseline survey. Baseline survey completers received a \$25 stipend. Participants in the control group, those included in the present study, received attention control feedback focused on texting, music, and TV use. Participants in the control group did not receive the alcohol intervention following the final assessment.

Participants were invited to take a series of online follow-up surveys at 3- and 6-month time points after completing the baseline survey. Participants received \$25 for completing the 3-month follow-up survey and \$30 for completing the 6-month follow-up survey. Follow-up rates were 1,017 (89.6%) at 3 months (Time 2) and 1,010 (89.3%) at 6 months (Time 3). Retention rates were similar to previous web-based intervention studies among college students (i.e., LaBrie, et al., 2013; Walters et al., 2009). To protect research participants, we obtained a Federal Certificate of Confidentiality, and study procedures were approved by the Institutional Review Boards of both universities.

### Measures

A standard drink definition was included for all alcohol consumption measures (i.e., 12 oz. beer, 10 oz. wine cooler, 5 oz. wine, 1 oz. 100 proof [1.25 oz. 80 proof] distilled spirits).

**Alcohol consumption.** The Daily Drinking Questionnaire (Collins et al., 1985) was used to assess the number of typical drinks per week. Participants were asked to "Consider a typical week in the past month. How much alcohol, on average (measured in number of drinks), do you drink on each day of a typical week?" Weekly drinking was computed by summing the standard number of drinks for each day of the week.

**Attitudes.** Students were asked to report on their own personal attitudes (the referent was self) toward typical weekly drinking. Participants were asked to report the maximum number of drinks they would have considered acceptable on each day of a typical week in the past 3 months. Attitude toward drinking was computed by summing the standard number of maximum drinks considered acceptable for each day of the week.

**Injunctive normative perceptions.** The measure for injunctive normative perceptions was identical to the measure for respondent attitudes with modified stem questions to refer to the typical student at their university (the referent was a typical student at their university). To assess perceived injunctive norms for drinks per week, participants were asked to report the maximum number of drinks they think that a typical student would have considered acceptable on each day of the week in the past 3 months. Injunctive normative perceptions were computed by summing the standard number of maximum drinks students perceive the typical student considers to be acceptable for each day of the week.

### Data analytic plan

Structural equation modeling was used to examine cross-sectional and prospective associations among injunctive

norms, attitudes, and drinking across each of the three time points. Analyses used full information maximum likelihood estimation to handle missing data in structural equation modeling (Shafer & Graham, 2002). We first fit a fully saturated model for the full sample with all cross-sectional and prospective paths estimated. Because there are gender differences in drinking cognitions and alcohol consumption (e.g., Lewis & Neighbors, 2004; Wilsnack et al., 2009), we included gender as a covariate. We then trimmed nonsignificant paths. Indirect pathways involving significant cross-lagged associations were evaluated using the *ab* products method suggested by MacKinnon and colleagues (2007). Asymmetric 95% confidence intervals (CIs) for indirect effects were estimated with the PRODCLIN program (MacKinnon et al., 2007).

Model fit was assessed with the following fit indices: the normed fit index (NFI; Bentler & Bonett, 1980), the comparative fit index (CFI; Bentler, 1990), and the root mean square error of approximation (RMSEA; Browne & Cudeck, 1993). The criterion for good fit on the NFI includes values above .90. Values above .95 or close to 1 on the CFI indicate good fit. Finally, for the RMSEA, values below .05 indicate close fit, values around .08 indicate reasonable fit, and values above .10 indicate poor fit (Browne & Cudeck, 1993). Chi-square and degrees of freedom are also reported, as they are helpful when determining model fit. Generally, a ratio of the chi-square to the degrees of freedom is indicative of a good-fitting model if it is less than 2.

### Results

Correlations, means, standard deviations, and ranges are presented in Table 1. Women reported fewer positive attitudes as well as lower perceived injunctive norms and reported drinking less than men at all time points. Attitudes, injunctive norms, and drinks per week were correlated at all time points.

TABLE 1. Correlations, means, standard deviations, and ranges

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Sex	—								
2. T1 attitudes	-.212**	—							
3. T2 attitudes	-.249***	.570***	—						
4. T3 attitudes	-.219**	.534***	.788***	—					
5. T1 injunctive norms	-.420***	.574***	.344***	.313***	—				
6. T2 injunctive norms	-.412***	.395***	.616***	.502***	.711***	—			
7. T3 injunctive norms	-.401***	.394***	.519***	.623***	.670***	.826***	—		
8. T1 drinks per week	-.337***	.387***	.213***	.156*	.739***	.557***	.524***	—	
9. T2 drinks per week	-.328***	.242**	.314***	.250***	.553***	.771***	.678***	.653***	—
10. T3 drinks per week	-.297***	.180*	.241**	.316***	.481***	.604***	.676***	.591***	.825***
<i>M</i>	0.63	24.50	24.72	25.54	23.63	23.07	23.32	11.73	12.03
<i>SD</i>	0.48	13.34	15.48	16.28	19.39	18.52	17.61	11.88	12.04
Range	0–1	4–90	0–108	0–115	2–140	1–125	0–125	0–101	0–85

Notes: Sex was dummy coded: 1 = female; 0 = male. *N*'s ranged from 193 to 249, depending on missing data. T = Time.

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

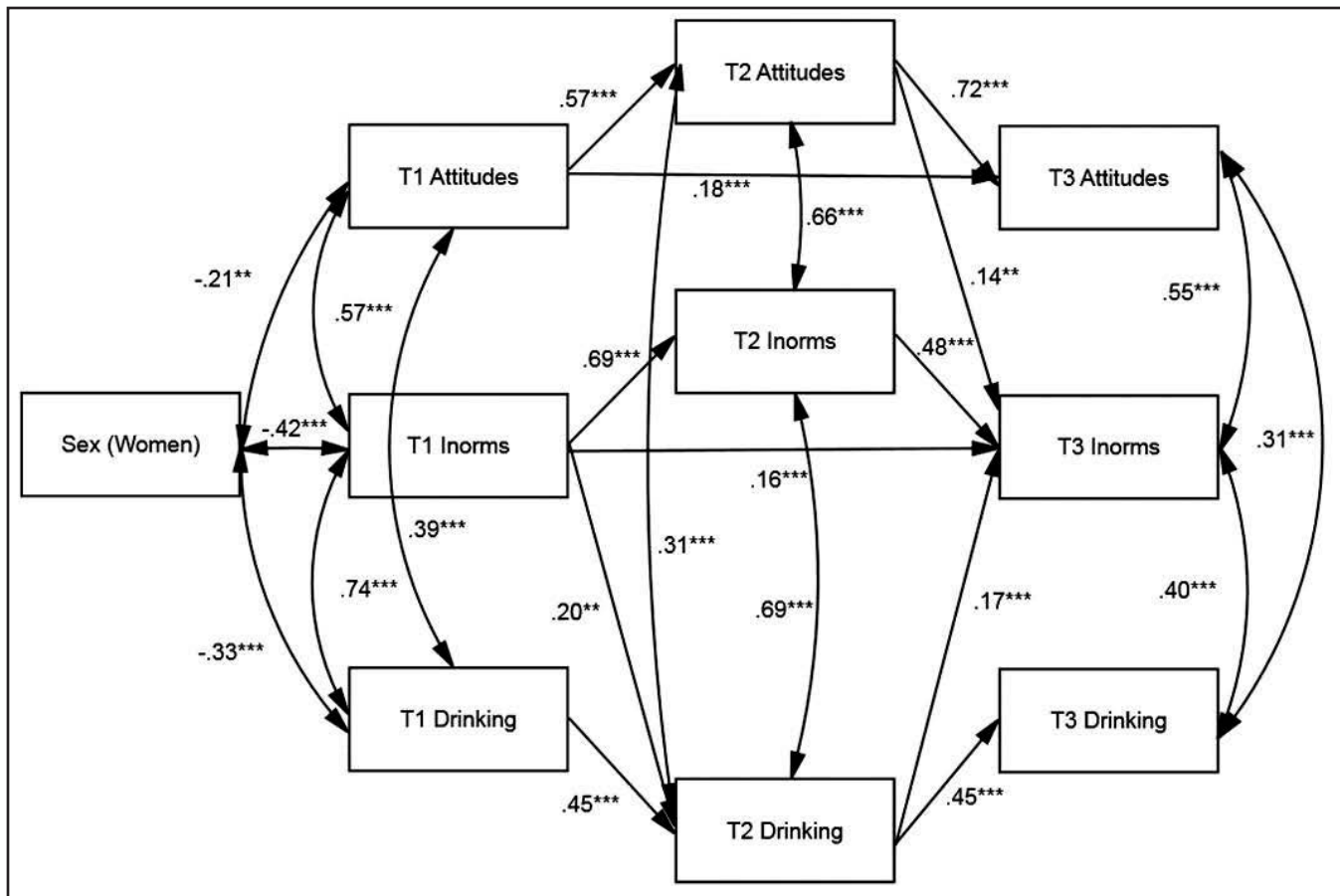


FIGURE 1. Cross-lagged model with significant pathways. T = time.

When controlling for gender, we first fit a fully saturated model for the full sample with all cross-sectional and prospective paths estimated. We next trimmed nonsignificant paths. Figure 1 presents the resulting significant parameter estimates. Removal of nonsignificant paths from the saturated model resulted in reasonable model fit,  $\chi^2(22) = 45.28$ ,  $p = .002$ ,  $\chi^2/df = 2.06$ , CFI = .986, NFI = .974, RMSEA = .065.

At baseline women had fewer positive attitudes as well as lower perceived injunctive norms and reported drinking less than men; however, gender was not uniquely associated with Time 2 or Time 3 constructs. Results indicated significant cross-sectional associations between all constructs at all time points. Each construct was also significantly associated with itself over time in all cases with the exception of the pathway Time 1 drinking to Time 3 drinking. Findings demonstrated only three significant cross-lagged associations. Injunctive norms at Time 1 were significantly associated with drinking at Time 2, and both attitudes and drinking at Time 2 were significantly associated with injunctive norms at Time 3. The pattern of cross-lagged associations suggested one meaningful indirect pathway, from Time 1 injunctive norms  $\rightarrow$  Time

2 drinking  $\rightarrow$  Time 3 injunctive norms. PROCLIN results confirmed this pathway to be significant ( $ab = 0.031$ , 95% CI [0.009, 0.062]).

## Discussion

The present findings add to the college student drinking literature by both replicating and extending previous work on temporal relationships between injunctive norms, attitudes, and drinking. As found with descriptive (Neighbors et al., 2006a; Wardell & Read, 2013) and injunctive norms (Ferrer et al., 2012), the present study, which uses injunctive norms and attitudes, supports both the conformity and the projection processes. In support of conformity, injunctive norms at Time 1 were significantly associated with drinking at Time 2. Supporting projection, both Time 2 attitudes and Time 2 drinking predicted Time 3 injunctive norms. Moreover, the current results also suggested a reciprocal relationship. Findings indicated that Time 1 injunctive norms were associated with Time 2 drinking, and Time 2 drinking was associated with Time 3 injunctive norms. Thus, the present study results suggest that both the conformity and the projection pro-

cesses seem to be important and evident for college student drinking when considering injunctive norms and drinking over time. The significant indirect pathway between Time 1 injunctive norms and Time 3 injunctive norms through Time 2 drinking further provides some evidence for reciprocal effects. The reciprocal relationship between injunctive norms and drinking is consistent with reciprocal determinism, a principle of social learning theory.

The reciprocal relationships between injunctive norms and drinking are similar to findings by Wardell and Read (2013), who found that descriptive norms and drinking had a reciprocal association over 3 years of college. Moreover, the current reciprocal findings are similar to those of a recent study that examined injunctive norms, personal disapproval, and abstinence over time (Rinker & Neighbors, 2013). Rinker and Neighbors (2013) found injunctive norms to have an indirect effect on abstinence through personal disapproval, suggesting a reciprocal effect. Specifically, this study found that Time 1 injunctive norms predicted Time 2 personal disapproval and Time 2 personal disapproval predicted abstinence at Time 3. Also, similar to the current findings, Rinker and Neighbors indicated support for projection, as there was a direct effect of personal disapproval at Time 1 on abstinence at Time 3. Together, the findings from these studies suggest that college student drinking is influenced by both the projection and the conformity processes and that there is evidence of a reciprocal association. However, unlike previous studies, the current study used compatible measures of injunctive norms, attitudes, and drinking measures (i.e., drinks per week), which according to the principle of compatibility (Ajzen & Fishbein, 2005) should maximize the predictive power of constructs. In addition, the focus on these reciprocal relationships among heavier drinkers (women/men who had 4/5 drinks in one sitting in the past month) allows us to test these important relationships among those most at risk for negative consequences related to alcohol use.

#### *Clinical implications*

The present findings have important clinical implications for college student drinking prevention. Because the findings indicated a reciprocal relationship, interventions that focus on both conformity and projection may be particularly effective at reducing longer term alcohol use among college students, as they can address both the conformity and the projection processes. A personalized normative feedback (PNF) approach (Lewis & Neighbors, 2006) could be ideal, because this approach would focus on reducing both norms and behavior. For example, a PNF approach could provide the following three pieces of information: one's own attitude toward drinking, actual typical student injunctive norms, and perceived typical student injunctive norms. Presented together, this information would highlight a discrepancy of deviation from the approved drinking norm as well as

normative misperception. The present findings suggest that highlighting two discrepancies may have independent contributions: "most people do not approve of heavy drinking as much as you do" and "most people do not approve of heavy drinking as much as you think they do."

Several studies have shown that PNF interventions that reduce normative perceptions subsequently lead to reduction in alcohol use (e.g., Lewis et al., 2014; Neighbors et al., 2004). One recent study by Neighbors et al. (2015) examined the efficacy of two drinking interventions, a traditional PNF intervention (own drinking, normative perceptions, actual norms), and a drinking intervention that highlighted the discrepancy between one's own drinking and actual campus drinking norms (own drinking, actual norms). For this condition, mediation results testing projection indicated that a reduction of drinking at 3 months was associated with a reduction of normative perceptions at 6 months. Conformity was found for both conditions, as changes in normative perceptions at 3 months were associated with lower drinking at 6 months.

#### *Limitations*

The present study has a number of limitations worth noting. First, because we only evaluated these relationships among college students, we cannot know if these same findings apply to young adults not attending college. Second, we did not examine both descriptive and injunctive normative perceptions. It is unknown how descriptive and injunctive normative perceptions relate over time. Third, the sample size was relatively small and had a higher number of women than men. Future studies should replicate results in a larger sample with equal gender distribution.

In addition, because the eligibility criteria required that participants report a minimum of one past-month episode of consuming at least four (for women) or five (for men) drinks during a drinking occasion, it is unclear how the relationships found in the present study would generalize to lighter drinkers. It is worth noting that the present research used innovative measures of attitudes and injunctive norms that were specifically designed to have comparable scores with the measure of alcohol consumption. It is unclear how these measures might compare with traditional measures of these constructs. Additional research comparing these measures would be useful. It would also be of interest to examine effects over longer periods. This would reduce potential effects of repeated assessments over a short period and would provide additional information regarding the temporal precedence of attitudes, injunctive norms, and drinking over longer periods.

#### *Conclusion*

Limitations notwithstanding, the present study offers an important contribution to the literature. The majority of the

literature on etiology and prevention of college drinking has focused more on descriptive than injunctive norms. This study provides an evaluation of the temporal precedence of injunctive norms and attitudes on drinking, suggesting that neither the conformity nor the projection process is at work alone. Rather, the current findings indicate that it is a combination of conformity and projection resulting in a reciprocal relationship.

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