

Social Comparison as a Moderator of the Association Between Perceived Norms and Alcohol Use and Negative Consequences Among College Students

DANA M. LITT, PH.D.,^{a,*} MELISSA A. LEWIS, PH.D.,^a HENRIETTAE STAHLBRANDT, M.D., PH.D.,^a PERRY FIRTH, B.A.,^a AND CLAYTON NEIGHBORS, PH.D.^b

^aUniversity of Washington, Seattle, Washington

^bUniversity of Houston, Houston, Texas

ABSTRACT. Objective: The present study aimed to extend previous research examining the relationships among perceived drinking norms, alcohol use, and related negative consequences by examining the moderating influence of social comparison orientation. **Method:** A sample of 481 college students (44% male) completed a Web-based survey that assessed perceptions of drinking behavior, social comparison orientation, and alcohol use. **Results:** The results suggested that social comparison orientation moderated the norm-behavior relationship such that the as-

sociation between perceived drinking norms and alcohol-related negative consequences was stronger for those higher in social comparison. Results also showed that there was no moderation effect for alcohol consumption as the dependent variable. **Conclusions:** The findings of the present study are potentially important when developing efficacious alcohol prevention and intervention programs at colleges and universities and in considering more complex models of social influences on drinking. (*J. Stud. Alcohol Drugs*, 73, 961–967, 2012)

RESEARCH HAS SHOWN THAT roughly 75% of the alcohol consumption in the United States (Office of Juvenile Justice and Delinquency Prevention, 2005) is in the form of heavy episodic drinking (often referred to as binge drinking; Office of Applied Studies, 2006), which is typically defined as having at least four/five drinks on a single occasion during a specified period for women/men, respectively. As a consequence of risky alcohol use, young adults experience a range of negative outcomes, including poor class and/or work attendance, damaging property, trouble with authorities, injuries, unprotected sex, sexual assault, and death (Hingson et al., 2009). As such, reducing the proportion of young adults who engage in risky consumption of alcoholic beverages has been listed as a major objective of Healthy People 2010 and has been proposed as an objective for Healthy People 2020 (U.S. Department of Health and Human Services, 2011). To address alcohol prevention, it is important to consider the theoretical basis for health behavior decision making among young adults, especially in relation to alcohol use. Descriptive normative perceptions are defined as people's perceptions of how most people behave in given situations (Borsari and Carey, 2001). Several

researchers have argued that descriptive norms are among the most important predictors of behavior in adolescent and young adult populations (Beal et al., 2001; D'Amico and McCarthy, 2006) and, as such, are particularly important to include in models of health risk behavior (e.g., Gerrard et al., 2008; Ravis and Sheeran, 2003).

Research examining social norms for alcohol use has consistently shown that young adults overestimate peer drinking behavior (i.e., quantity of alcohol consumed by their peers and the frequency of drinking by their peers; for a review, see Borsari and Carey, 2003). Moreover, perceived peer drinking behavior has been shown to be associated with heavier alcohol use and related negative consequences (Borsari and Carey, 2001, 2003; Lewis and Neighbors, 2004). Examining the relationship between perceived peer drinking behavior and alcohol use and related negative consequences is important because research has demonstrated that perceived peer drinking behavior was among the strongest predictors of college student drinking (Neighbors et al., 2007; Neighbors et al., 2006a) and that reducing overestimated drinking norms has been shown to mediate the efficacy of initiatives for preventing drinking by college students (e.g., Lewis and Neighbors, 2007; Neighbors et al., 2004).

Recent research has begun to evaluate moderators of the relationship between social norms and alcohol consumption, which may help identify those at greatest risk for social influences on drinking and those who might make good candidates for norms-based interventions. Previously examined moderators include social identity, social anxiety,

Received: January 23, 2012. Revision: June 20, 2012.

This research was supported by National Institute on Alcohol Abuse and Alcoholism Grants K99AA020869, K01AA016966, and T32AA07455.

*Correspondence may be sent to Dana Litt at the Department of Psychiatry and Behavioral Sciences, Center for the Study of Health and Risk Behaviors, University of Washington, 1100 NE 45th St., Suite 300, Seattle, WA 98195, or via email at: dlitt@uw.edu.

and social drinking motives and expectancies. Neighbors and colleagues (2010) found that the relationship between perceived descriptive drinking norms and alcohol consumption was moderated by level of identification with the normative referent (i.e., typical same-sex student, typical same-race student, and typical same-fraternity/sorority status student), such that descriptive normative perceptions for the normative referent were more strongly associated with drinking when participants reported stronger identification to the normative referent. In a related study, Reed et al. (2007) found that identity moderated the relationship between perceived injunctive drinking norms for friends, other university peers, and fraternity/sorority members with alcohol consumption such that these relationships were stronger for those more strongly identified with the normative referent. These two studies indicate that the relationship between both perceived descriptive and perceived injunctive norms with alcohol consumption may depend on how strongly students identify with the normative referent. Furthermore, the degree to which one identifies with his or her normative referent group may play an important role in the norms-behavior relationship. For example, Lewis and Neighbors (2007) found that same-sex normative drinking information was especially efficacious in reducing drinking for women who more closely identified with their sex. Beyond social identity, previous research has shown that perceived norms are more strongly associated with drinking among students who report higher levels of social anxiety (Neighbors et al., 2007). Normative feedback interventions have also been found to be more effective in reducing drinking and alcohol-related problems among those who are more socially motivated to drink, those who view social effects of drinking as more likely and favorable, and those who are lower in self-determination (Neighbors et al., 2004, 2006b).

All of the above moderators share a common origin in that they presuppose direct or indirect social comparisons with other individuals. Social comparison theory's (Festinger, 1954) basic premise is that people have a natural drive to evaluate themselves and, in the absence of objective criteria, compare themselves with other people. Although social norms are implied and implicitly connected to social comparison theory, they are not central to social comparison theory. For example, in order for others to have indirect influence on oneself (as opposed to direct requests to engage in a particular behavior), one must consider others' expectations. Moreover, social comparison can arguably be considered a foundation or prerequisite for social influences to occur (Lewis et al., 2010). Research has suggested that individual differences in social comparison (social comparison orientation [SCO]) are associated with the degree of sensitivity to the attitudes and behaviors of peers; thus, those higher in SCO should be more influenced by peers (Buunk and Gibbons, 1997).

Surprisingly little work has considered social comparison per se as a potential moderator of normative influences on drinking. Recently, SCO has been found to moderate the relationship between perceived descriptive drinking norms and behavioral willingness to engage in drinking behavior and drinking attitudes (Litt et al., 2012). Specifically, adolescents who perceived that more of their peers used alcohol and who were higher in SCO reported the greatest willingness to use and most favorable attitudes toward alcohol use, whereas the lowest willingness and least favorable attitudes were reported by individuals with lower perceived norms and who were higher in SCO. However, although Litt et al. (2012) examined drinking cognitions, research has yet to examine SCO as a moderator of the norms-behavior relationship.

In the present study, we sought to extend previous research examining the relationship between perceived drinking norms, alcohol use, and related negative consequences by examining the moderating influence of SCO. It was hypothesized that there would be an effect of perceived descriptive norms on drinks per week and alcohol-related negative consequences such that perceiving that more same-sex peers use alcohol would be positively associated with drinks per week and alcohol-related negative consequences. In addition, it was predicted that the main effect of perceived descriptive norms would be moderated by SCO such that relationships between perceived descriptive drinking norms and both use and consequences would be stronger among those higher in SCO.

Method

Participants and procedures

A random sample ($N = 3,224$) of 18- to 25-year-old undergraduate students received mailed and emailed invitations to participate in a 20-minute Web-based screening survey for a larger study on sexual behavior and alcohol use. A total of 1,468 students (56.4% female) participated in the study, and of those, 1,387 completed the survey. Recruitment rates were comparable to other large-scale studies in this population (e.g., Marlatt et al., 1998; McCabe et al., 2002). Participants received \$10 for completing the screening survey. Of these participants, 575 were eligible and invited to an additional survey. Eligibility criteria were consumption of at least four/five drinks on one occasion in the past month for women/men and being sexually active in the past 12 months. A total of 481 students (44% male) completed the Web-based baseline survey from which the present study measures were drawn and were paid \$15 for doing so. Sample ethnicity was 61.0% White, 23.2% Asian, 9.4% multiracial, 5.6% Hispanic, and 0.8% other. The mean age for participants was 19.90 years old ($SD = 1.52$). All study procedures were approved by the university's institutional review board.

Measures

Typical weekly drinking. The Daily Drinking Questionnaire (Collins et al., 1985) is a four-item measure that was used to assess typical weekly drinking habits. The Daily Drinking Questionnaire has been used in previous studies of college student drinking, demonstrating good convergent validity and high test–retest reliability (Marlatt et al., 1998). The current study took only the first item, “Consider a typical week during the last 3 months. How much alcohol, on average (measured in number of drinks), do you drink each day of a typical week?” Typical weekly drinking was the sum of the standard number of drinks for each day of the week. In previous research examining quantity measures of alcohol consumption, typical weekly consumption has been suggested to be among the best predictors of alcohol-related problems (Borsari et al., 2001).

Alcohol-related negative consequences. Drinking problems were measured with the Young Adult Alcohol Problems Screening Test (Hurlbut and Sher, 1992), which assesses the frequency of alcohol-related negative consequences and risk behaviors ($\alpha = .78$). Participants were asked to report the number of times 27 specific problems occurred during the past 3 months. Endorsements indicating occurrence during the past 3 months were summed to obtain a final score. Sample items include, “Have you had a headache (hangover) the morning after you had been drinking?” and “Has your drinking ever gotten you into sexual situations which you later regretted?”

Social comparison. The degree to which participants compared themselves to their peers was measured with the Iowa–Netherlands Comparison Orientation Measure (Gibbons and Buunk, 1999), an 11-item self-report instrument. Response options were rated on a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), where higher scores indicated higher levels of SCO (sample item: “I always pay a lot of attention to how I do things compared to how the typical male/female college student does things”). For the purposes of our study, we added an additional researcher-developed item, “I often compare myself with the typical male/female college student with respect to my drinking behavior,” to specifically assess social comparison around drinking. Because of the additional item, the final social comparison score was averaged from 12 instead of 11 items ($\alpha = .89$).

Perceived descriptive norms. The Drinking Norms Rating Form (Baer et al., 1991) was used to assess perceived peer group drinking. The current study used only the first question, “Consider a typical week during the last 3 months. How much alcohol, on average (measured in number of drinks), does a typical male/female (sex in question was that of respondent) [University Name] student drink on each day of a typical week?” Total weekly drinks were summed for the final score.

Results

Data analysis

Preliminary analyses revealed nonnormal distributions for both drinking outcomes (drinks per week and alcohol-related negative consequences). Because of the violation of normality assumption and the positive skew of the data, negative binomial regression was selected as the primary analysis strategy (Atkins and Gallop, 2007; Hilbe, 2007; Simons et al., 2006). Because the variance was substantially greater than the mean, typical drinks per week and alcohol-related negative consequences closely followed a negative binomial probability distribution. Thus, we used the generalized linear modeling approach with the distribution specified as negative binomial (i.e., negative binomial regression) to evaluate typical drinks per week and alcohol-related negative consequences as a function of perceived descriptive norms, SCO, and the interaction between the two variables. Sex and age were included in all analyses as a covariate based on previous associations with alcohol consumption (Neighbors et al., 2007; O’Malley and Johnston, 2002; Read et al., 2002; Wechsler et al., 2000). However, because sex was not a primary focus of this study, we did not test interactions with these variables. All predictors were mean centered to facilitate interpretation of parameter estimates (Aiken and West, 1991; Cohen et al., 2003).

Descriptive results

Participants reported that, on average, they had 7.10 drinks in the previous week, and they perceived that the typical same-sex student had consumed 13.47 drinks in the past week (Table 1). On average, participants reported that they had experienced 4.09 negative consequences. In addition, the average SCO score was 2.73. As seen in Table 1, perceived descriptive norms were positively correlated with personal drinks per week and negative alcohol-related problems ($ps < .01$). SCO was positively associated with alcohol-related negative consequences and age ($p < .01$), indicating that older students reported greater levels of social comparison.

Drinks per week. For the model examining drinks per week, the likelihood ratio for the full model was $\chi^2(5) = 124.09$, $p < .001$, which indicated that the overall model was significant. The Cragg-Uhler R^2 for the overall model was .230. The likelihood ratio (LR) test of overdispersion was significant, LR $\chi^2(1) = 1,665.87$, $p < .001$, supporting the use of a negative binomial model over a Poisson model. Results of the negative binomial regression evaluating typical drinks per week as the dependent variable are presented in Table 2. Results from the negative binomial regression indicated that sex, but not age, was positively associated with typical drinks consumed per week such that men reported

TABLE 1. Means, standard deviations, and Kendall's tau rank correlations

Variable	1.	2.	3.	4.
1. Perceived descriptive norms	—			
2. Number of drinks per week	.31**	—		
3. Alcohol-related consequences	.22**	.63**	—	
4. Social comparison orientation	.01	.04	.11**	—
<i>M</i>	13.47	7.10	4.09	2.73
<i>SD</i>	8.65	9.16	5.26	0.76
Range	0–41	0–43	0–35	1–5

***p* < .01.

drinking more than women. Consistent with expectations, perceived descriptive norms for typical drinks per week were positively and significantly associated with typical drinks consumed per week. There was not an overall association between SCO and typical drinks per week. When examining the interaction, results revealed that the two-way interaction was nonsignificant.

Alcohol-related negative consequences. When evaluating the model for alcohol-related negative consequences, the likelihood ratio for the full model was $\chi^2(5) = 22.69, p < .001$, which indicated that the overall model was significant. The Cragg-Uhler *R*² for the overall model was .251. The LR test of overdispersion was significant, LR $\chi^2(1) = 785.87, p < .001$, supporting the use of a negative binomial model over a Poisson model. Results of the negative binomial regression evaluating alcohol-related negative consequences as the dependent variable are presented in Table 3. Results indicated that neither sex nor age was significantly associated with alcohol-related negative consequences, whereas drinks per week predicted alcohol-related negative consequences. In terms of main effects, there was a significant relationship between SCO and alcohol-related negative consequences and between perceived descriptive norms and

alcohol-related consequences such that both individuals who perceived that the typical student drinks greater numbers of drinks per week as well as those with high SCO predicted higher reports of alcohol-related negative consequences. When examining the interaction, results revealed that the two-way interaction was significant. The interaction between perceived descriptive norms and SCO was significant such that perceived descriptive norms were positively associated with alcohol-related negative consequences, particularly for those higher in SCO (Figure 1). Simple effects analyses (using 1 *SD* above and below the conditional mean) revealed that perceived typical drinks per week was a predictor of alcohol-related negative consequences for individuals who were high in SCO (*B* = 0.13, *z* = 2.98, *p* < .01) but not for those who were lower in SCO (*B* = 0.04, *z* = 1.44, *p* > .10).

Discussion

The current study expands on previous research demonstrating the important influence of perceived descriptive norms on drinking behaviors among college students. In support of the central hypotheses, SCO moderated the norm-behavior relationship such that perceived descriptive norms

TABLE 2. Negative binomial regression results examining typical drinks per week

Predictor	Ratio	[95% CI]	<i>B</i>	<i>SE B</i>	<i>Z</i>
Sex	1.324	[1.158, 1.515]	0.281	0.068	4.10**
Age	1.002	[0.958, 1.047]	0.002	0.022	0.090
Social comparison (SCO)	1.015	[0.930, 1.108]	0.015	0.044	0.340
Perceived typical drinks/week	1.031	[1.023, 1.041]	0.031	0.004	7.020**
SCO × Perceived Typical Drinks/Week	1.004	[0.994, 1.013]	0.004	0.005	0.073

Notes: *n* = 472; ratio = negative binomial incidence rate ratios.
***p* < .01.

TABLE 3. Negative binomial regression results examining alcohol-related negative consequences

Predictor	Ratio	[95% CI]	<i>B</i>	<i>SE B</i>	<i>Z</i>
Sex	0.969	[0.837, 1.122]	-0.030	0.075	-0.041
Age	0.991	[0.943, 1.041]	-0.009	0.025	-0.370
Typical drinks/week	1.037	[1.030, 1.045]	0.037	0.004	10.07**
Social comparison (SCO)	1.148	[1.064, 1.239]	0.138	0.038	3.550**
Perceived typical drinks/week	1.118	[1.043, 1.225]	0.122	0.045	2.660**
SCO × Perceived Typical Drinks/Week	1.100	[1.011, 1.197]	0.087	0.510	1.980*

Notes: *n* = 472; ratio = negative binomial incidence rate ratios.
p* < .05; *p* < .01.

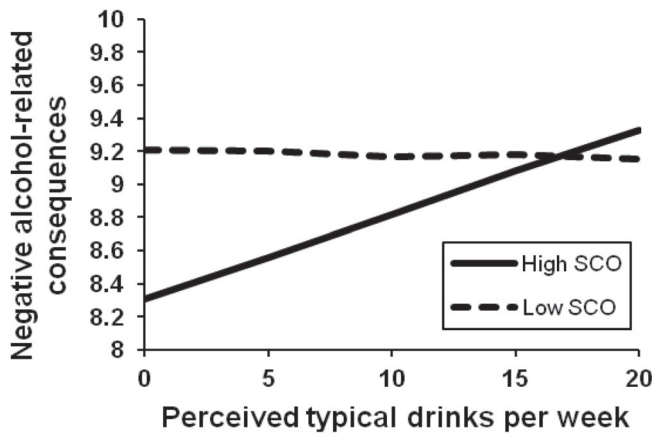


FIGURE 1. Graphical representation of the interaction between social comparison orientation and descriptive norms on alcohol-related negative consequences. SCO = social comparison orientation.

were positively associated with negative consequences, particularly for those individuals higher in SCO. Surprisingly, the results indicate that SCO did not moderate the relationship between norms and actual alcohol consumption. However, these results can be viewed in light of past research indicating that alcohol consumption and negative consequences should be viewed as two distinct outcomes when evaluating problematic drinking and that social anxiety was negatively related to consumption and positively related to negative consequences (Lewis et al., 2008). Social anxiety is a trait that likely underlies the uncertainty that can lead to social comparisons (Festinger, 1954). Therefore, it could be that individuals higher in SCO, similar to those with social anxiety, are more likely to experience negative consequences, especially if motivated to reduce negative affect and to fit in (Lewis et al., 2008).

The present study provides a unique contribution to the social norms and alcohol literature. Findings reveal that individuals who have a greater tendency to compare themselves with their peers are more strongly influenced by their perception of drinking norms. The literature suggests that perceptions of typical drinking are more strongly associated with own drinking among individuals who identify more with other students (Lewis and Neighbors, 2007; Neighbors et al., 2010; Reed et al., 2007), are more socially anxious (Neighbors et al., 2007), and are lower in self-determination (Neighbors et al., 2006b). At minimum, the present study adds social comparison to this list. Furthermore, the present findings provide a stronger empirical foundation for disentangling social influences on drinking and, more specifically, helping us to understand why, for whom, and under what conditions social acceptance, conformity, and fear of rejection may be stronger influences than personal values or well-being. An original proposition by Festinger (1954) is that, as individuals, we look to others as a means of comparison,

which helps us judge our own merit. The present findings provide evidence that this tendency contributes to more problematic drinking in the college population, particularly for those who believe their peers regularly consume alcohol. In addition, the present findings set the stage for evaluation of more complex models (e.g., moderated-mediation and mediated-moderation), which we suspect may reveal social comparison as a cornerstone in the foundation of social influences on alcohol use.

Intervention implications

By considering SCO as an individual difference variable that may influence college students' alcohol use and related negative consequences, this study can potentially increase the efficacy of existing alcohol prevention programs. A strong literature has found that interventions for college student alcohol drinking that use a normative component are particularly efficacious (Carey et al., 2007b; Larimer and Cronce, 2007; Walters and Neighbors, 2005). Identification of moderators can increase scientific knowledge by stimulating improvement of and better targeting of preventative interventions. Research has shown that using social comparison as a component in interventions can enhance the normative support of the desired behavior (such as condom use as an AIDS-preventive behavior; Misovich et al, 1997), and the results of the current study provide further evidence for the preventative utility of considering an individual's propensity to socially compare with peers, especially in tandem with their perceived norms.

Thus, future research evaluating social comparison as a moderator of norms-based interventions may reveal that the same tendency that exacerbates the influence of norms on drinking-related negative consequences (i.e., social comparison) may be advantageous with respect to the efficacy of norms interventions. However, Carey et al. (2007a) found that an intervention aimed at reducing high-risk drinking and negative consequences was less efficacious for individuals who were higher in social comparison. The present findings suggest that individuals who are higher in social comparison are strongly influenced by the perceived behavior of others. And as Carey et al. (2007a) found, the influence of perceived behavior may be more difficult to change for those higher in social comparison. One reason for this could be that individuals who are higher in social comparison may be more aware of the drinking behavior and negative drinking-related consequences around them. Thus, when taking into consideration the normative feedback presented in an intervention study, they may also have more instances of perceived drinking behaviors and negative consequences they are relying on. Having more sources of information to draw from may lead those higher in social comparison to be defensive or to disregard the normative information, which in turn may lead to smaller reductions in negative consequences.

For those higher in social comparison, interventions may need to be framed such that normative feedback is presented along with information aimed to enable individuals to recognize instances in which students are not drinking, or are drinking very little, rather than to focus only on heavy drinking instances. Furthermore, normative information may need to be framed such that individuals higher in social comparison select their own normative referent, as they may be more likely to identify with self-selected referents rather than researcher-selected referents. In addition, interventions aimed at those individuals higher in social comparison may benefit from elements intended to enhance self-ideal discrepancy (i.e., feedback on the impact of alcohol on other activities/goals), develop alternatives to drinking, challenge expectancies, or enhance protective behaviors.

Limitations/future directions

The results of the present study should be considered in light of several limitations. First, the present data were part of a larger study on alcohol use and sexual risk behavior. As such, all participants used in the present analyses had to meet screening criteria for the larger study, including having at least four/five drinks on one occasion in the past month for women/men and being sexually active in the past 12 months. Therefore, the sample used in the present study may represent individuals with riskier behavior, and it is unclear whether these results would generalize to people who report less frequent occurrence of alcohol use and sexual activity. Because we only assessed SCO at baseline, the present study cannot directly test this notion. Second, because participants in the present study were all university students, it is not clear that the results would generalize to those who were not enrolled in college or to individuals who were younger or older. Future studies should determine whether SCO has more or less of an impact on drinking behavior depending on one's developmental stage. Furthermore, although the single alcohol-related social comparison item showed good reliability when included with the standard Iowa–Netherlands Comparison Orientation Measure (Gibbons and Buunk, 1999), future research should examine whether alcohol-related social comparison can stand as a domain-specific construct separate from traditional measures of SCO. Last, because the data from the present study are cross-sectional in nature, future longitudinal research is needed to elucidate the temporal precedence of study variables.

Conclusions

This research shows that college students' alcohol habits and negative consequences are related to the students' degree of social comparison. This finding is potentially important when developing more efficacious alcohol prevention and intervention programs at colleges and universities and in

considering more complex models of social influences on drinking.

References

- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.
- Atkins, D. C., & Gallop, R. J. (2007). Rethinking how family researchers model infrequent outcomes: A tutorial on count regression and zero-inflated models. *Journal of Family Psychology, 21*, 726–735.
- Baer, J. S., Stacy, A., & Larimer, M. (1991). Biases in the perception of drinking norms among college students. *Journal of Studies on Alcohol, 52*, 580–586.
- Beal, A., Ausiello, J., & Perrin, J. (2001). Social influences on health-risk behaviors among minority middle school students. *Journal of Adolescent Health, 28*, 474–480.
- Borsari, B., & Carey, K. B. (2001). Peer influences on college drinking: A review of the research. *Journal of Substance Abuse, 13*, 391–424.
- Borsari, B., & Carey, K. B. (2003). Descriptive and injunctive norms in college drinking: A meta-analytic integration. *Journal of Studies on Alcohol, 64*, 331–341.
- Borsari, B., Neal, D. J., Collins, S. E., & Carey, K. B. (2001). Differential utility of three indexes of risky drinking for predicting alcohol problems in college students. *Psychology of Addictive Behaviors, 15*, 321–324.
- Buunk, B. P., & Gibbons, F. X. (Eds.). (1997). *Health, coping and well-being: Perspectives from social comparison theory*. Hillsdale, NJ: Erlbaum.
- Carey, K. B., Henson, J. M., Carey, M. P., & Maisto, S. A. (2007a). Which heavy drinking college students benefit from a brief motivational intervention? *Journal of Consulting and Clinical Psychology, 75*, 663–669.
- Carey, K. B., Scott-Sheldon, L. A. J., Carey, M. P., & DeMartini, K. S. (2007b). Individual-level interventions to reduce college student drinking: A meta-analytic review. *Addictive Behaviors, 32*, 2469–2494.
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Mahwah, NJ: Erlbaum.
- Collins, R. L., Parks, G. A., & Marlatt, G. A. (1985). Social determinants of alcohol consumption: The effects of social interaction and model status on the self-administration of alcohol. *Journal of Consulting and Clinical Psychology, 53*, 189–200.
- D'Amico, E., & McCarthy, D. (2006). Escalation and initiation of younger adolescents' substance use: The impact of perceived peer use. *Journal of Adolescent Health, 39*, 481–487.
- Festinger, L. (1954). A theory of social comparison processes. *Human Relations, 7*, 117–140.
- Gerrard, M., Gibbons, F. X., Houlihan, A. F., Pomery, E. A., & Stock, M. L. (2008). A dual-process approach to health risk decision making: The prototype willingness model. *Developmental Review, 28*, 29–61.
- Gibbons, F. X., & Buunk, B. P. (1999). Individual differences in social comparison: Development of a scale of social comparison orientation. *Journal of Personality and Social Psychology, 76*, 129–142.
- Hingson, R. W., Zha, W., & Weitzman, E. R. (2009). Magnitude of and trends in alcohol-related mortality and morbidity among U.S. college students ages 18–24, 1998–2005. *Journal of Studies on Alcohol and Drugs, Supplement 16*, 12–20.
- Hilbe, J. M. (2007). *Negative binomial regression*. New York, NY: Cambridge University Press.
- Hurlbut, S. C., & Sher, K. J. (1992). Assessing alcohol problems in college students. *Journal of American College Health, 41*, 49–58.
- Larimer, M. E., & Cronce, J. M. (2007). Identification, prevention, and treatment revisited: Individual-focused college drinking prevention strategies 1999–2006. *Addictive Behaviors, 32*, 2439–2468.

- Lewis, M. A., Hove, M. C., Whiteside, U., Lee, C. M., Kirkeby, B. S., Oster-Aaland, L., . . . Larimer, M. E. (2008). Fitting in and feeling fine: Conformity and coping motives as mediators of the relationship between social anxiety and problematic drinking. *Psychology of Addictive Behaviors, 22*, 58–67.
- Lewis, M. A., & Neighbors, C. (2004). Gender-specific misperceptions of college student drinking norms. *Psychology of Addictive Behaviors, 18*, 334–339.
- Lewis, M. A., & Neighbors, C. (2007). Optimizing personalized normative feedback: The use of gender-specific referents. *Journal of Studies on Alcohol and Drugs, 68*, 228–237.
- Lewis, M. A., Neighbors, C., Lindgren, K. P., Buckingham, K. G., & Hoang, M. (2010). *Theories of social influence on adolescent and young adult alcohol use*. Hauppauge, NY: Nova Science Publishers.
- Litt, D., Stock, M., & Gibbons, F. X. (2012). *The impact of peer and sibling substance use on adolescent substance use cognitions and behaviors: Do social comparison tendencies matter?* Manuscript in preparation.
- Marlatt, G. A., Baer, J. S., Kivlahan, D. R., Dimeff, L. A., Larimer, M. E., Quigley, L. A., . . . Williams, E. (1998). Screening and brief intervention for high-risk college student drinkers: Results from a 2-year follow-up assessment. *Journal of Consulting and Clinical Psychology, 66*, 604–615.
- McCabe, S. E., Boyd, C. J., Couper, M. P., Crawford, S., & D'Arcy, H. (2002). Mode effects for collecting alcohol and other drug use data: Web and U.S. mail. *Journal of Studies on Alcohol, 63*, 755–761.
- Misovich, S. J., Fisher, J. D., & Fisher, W. A. (1997). Close relationships and elevated HIV risk behavior: Evidence and possible underlying psychological processes. *Review of General Psychology, 1*, 72–107.
- Neighbors, C., Dillard, A. J., Lewis, M. A., Bergstrom, R. L., & Neil, T. A. (2006a). Normative misperceptions and temporal precedence of perceived norms and drinking. *Journal of Studies on Alcohol, 67*, 290–299.
- Neighbors, C., LaBrie, J. W., Hummer, J. F., Lewis, M. A., Lee, C. M., Desai, S., . . . Larimer, M. E. (2010). Group identification as a moderator of the relationship between perceived social norms and alcohol consumption. *Psychology of Addictive Behaviors, 24*, 522–528.
- Neighbors, C., Larimer, M. E., & Lewis, M. A. (2004). Targeting misperceptions of descriptive drinking norms: Efficacy of a computer-delivered personalized normative feedback intervention. *Journal of Consulting and Clinical Psychology, 72*, 434–447.
- Neighbors, C., Lee, C. M., Lewis, M. A., Fossos, N., & Larimer, M. E. (2007). Are social norms the best predictor of outcomes among heavy-drinking college students? *Journal of Studies on Alcohol and Drugs, 68*, 556–565.
- Neighbors, C., Lewis, M. A., Bergstrom, R. L., & Larimer, M. E. (2006b). Being controlled by normative influences: Self-determination as a moderator of a normative feedback alcohol intervention. *Health Psychology, 25*, 571–579.
- Office of Applied Studies. (2006). *Results from the 2005 National Survey on Drug Use and Health: National findings* (DHHS Publication No. SMA 06-4194, NSDUH Series H-30). Rockville, MD: Substance Abuse and Mental Health Services Administration.
- Office of Juvenile Justice and Delinquency Prevention. (2005). *Drinking in America: Myths, realities, and prevention policy*. Washington, DC: U.S. Department of Justice, Office of Justice Programs, Office of Juvenile Justice and Delinquency Prevention. Available at http://www.udetc.org/documents/Drinking_in_America.pdf
- O'Malley, P. M., & Johnston, L. D. (2002). Epidemiology of alcohol and other drug use among American college students. *Journal of Studies on Alcohol, Supplement 14*, 23–39.
- Read, J. P., Wood, M. D., Davidoff, O. J., McLacken, J., & Campbell, J. F. (2002). Making the transition from high school to college: The role of alcohol-related social influence factors in students' drinking. *Substance Abuse, 23*, 53–65.
- Reed, M. B., Lange, J. E., Ketchie, J. M., & Clapp, J. D. (2007). The relationship between social identity, normative information, and college student drinking. *Social Influence, 2*, 269–294.
- Rivis, A., & Sheeran, P. (2003). Descriptive norms as an additional predictor in the theory of planned behaviour: A meta-analysis. *Current Psychology: Developmental, Learning, Personality, Social, 22*, 218–233.
- Simons, J. S., Neal, D. J., & Gaher, R. M. (2006). Risk for marijuana-related problems among college students: An application of zero-inflated negative binomial regression. *American Journal of Drug and Alcohol Abuse, 32*, 41–53.
- U.S. Department of Health and Human Services. (2011). Healthy People 2020. Diabetes: overview. Retrieved from <http://www.healthypeople.gov/2020>
- Walters, S. T., & Neighbors, C. (2005). Feedback interventions for college alcohol misuse: What, why and for whom? *Addictive Behaviors, 30*, 1168–1182.
- Wechsler, H., Lee, J. E., Kuo, M., & Lee, H. (2000). College binge drinking in the 1990s: A continuing problem. Results of the Harvard School of Public Health 1999 College Alcohol Study. *Journal of American College Health, 48*, 199–210.