Published in final edited form as:

Subst Use Misuse. 2018 September 19; 53(11): 1771–1781. doi:10.1080/10826084.2018.1432651.

Prospective Associations of Actual and Perceived Descriptive Norms With Drinking Among Emerging Adults

Bruce Simons-Morton, EdD, MPH¹ [Senior Investigator], Denise Haynie, PhD¹ [Staff Scientist Health Behavior Branch], Joe Bible, PhD² [Postdoctoral Fellow Biostatistics, Bioinformatics Branch], and Danping Liu, PhD³ [Investigator Biostatistics and Bioinformatics Branch]

¹Health Behavior Branch, Division of Intramural Population Health Research, Eunice Shriver Kennedy National Institute of Child Health and Human Development

²Biostatistics Clemson University

³DCEG National Cancer Institute

Abstract

Background: Descriptive norms are commonly associated with participant drinking. However, study participants may incorrectly perceive that their peers drink about the same amount as they do, which would bias estimates of drinking homogeneity.

Objectives: This research examined the magnitude of associations between emerging adults' reports of their own drinking and peer drinking measured the previous year by measures of (1) participants' perceptions of friends' drinking; and (2) actual drinking reported by nominated peers.

Methods: The data are from annual surveys conducted in 2014 and 2015, Waves 4 and 5 (the first two years after high school) of 7 annual assessments as part of the NEXT Generation Health Study (n=323). Associations of participant alcohol use with perceived friend use (five closest, closest male, and closest female friends), and with actual peer use. Logistic regression analyses estimated the magnitudes of prospective associations between each measure of peer drinking at W4 and participant drinking at W5.

Findings: Odds Ratios of associations between participants' reports of drinking and heavy drinking in the past 30 days and the four different reports of peer norms and actual peer drinking behavior reported the previous year ranged from 2.3 (CI=1.2–4.7) to 3.1 (CI=1.5–6.3). The estimates for perceived norms were higher for male than female participants.

Conclusions/Importance: Associations with drinking among emerging adults of perceived friend norms were of similar magnitude to associations with actual peer drinking; although associations with perceived friend drinking were higher for males than females.

Introduction

The prevalence of drinking and binge drinking increases during adolescence (Johnston et al., 2013) and peaks among 18–25-year-olds (SAMHSA, 2011; Johnston et al., 2012).

According to the Monitoring the Future national survey 30-day drinking prevalence among emerging adults 1–4 years after high school was 63% for college students and 56% for those not attending college; binge drinking (5 or more drinks for men and 4 or more drinks for women on a single occasion) was 35% for college students and 29% for the non-college group (Johnston et al., 2015). Frequent and excessive drinking among adolescents and college-age youth is of particular interest because it is associated with a range of adverse consequences, including academic, cognitive, work, emotional, and future substance use problems, unsafe sex, injuries, violence, and police involvement (Cleveland et al., 2013; Hingson & White, 2013; Martinez et al., 2014).

Peer homogeneity is a dominant characteristic of adolescent relationships in general (Brown et al., 2008; Simons-Morton et al., 2009; Simons-Morton & Farhat, 2010) and drinking behavior in particular (Leung et al., 2014; Burk et al., 2012; Wang et al., 2015). Not surprisingly, peer influence is one of the most frequently and consistently reported predictors of drinking among adolescents and emerging adults (Martens et al., 2006; Leung et al., 2014; Stone et al., 2012; Neighbors et al., 2007). Social influence is an integral part of many prominent theories of development and behavior, including social cognitive (Bandura, 1977), reasoned action (Ajzen & Fishbein, 1980), social norms (Cialdini & Trost, 1998), and related socialization theories (Simons-Morton et al., 2009). Common to social influence theories is the importance of perceptions about proximal social norms. Peer drinking behaviors, whether actual or perceived, could be powerful influences on norms and social pressure to drink (Neighbors et al., 2007).

Perceived norms are sometimes measured as participants' reports of injunctive norms of "perceived social pressure", but more commonly as participants' reports of the descriptive norms of the amount, number, or proportion of peers who drink. Although more proximal referents may be most influential (Collins & Spelman, 2013), for example, best friend (Eisenberg, 2004; Engels et al., 1999; Poelen et al., 2007; Sieving et al., 2000; Van Der Vorst et al., 2009; Jaccard et al., 2005), other measures of proximal referents are associated with youthful drinking, including close friends (Simons-Morton et al., 2016; Eisenberg et al., 2014; Maxwell, 2002), roommates (Eisenberg et al., 2014; Park et al., 2009), and number of friends (D'Amico & McCarthy, 2006; Bray et al., 2003; Marshal & Chassin, 2000; Stice et al., 1998). Significant associations with drinking have also been reported when participants are asked about more distal peers, for example, residence hall members (Park et al., 2009), fraternity and sorority membership (McCabe et al., 2005), popular peers (Bot et al., 2005), and peers in general (Quinn & Fromme, 2011; Urberg et al., 2003). As with high school age youth, descriptive norms measured as the perception that peers drink frequently and heavily is associated with heavier drinking among college students (Simons-Morton et al., 2016; Borsari & Carey, 2003; Lewis & Neighbors, 2006; Martens et al., 2006; Neighbors et al., 2007; Kenney et al., 2016). Moreover, drinking is positively associated with the misperception that peer drinking is greater than actual (i.e., overestimation of peer drinking) (Martens et al., 2006; Neighbors et al., 2007; Kenney et al., 2016), suggesting the potential

utility of prevention programs designed to correct such misperceptions (Carey et al., 2007; Cadigan et al., 2015). Hence, aside from previous drinking, descriptive norms assessed as perceptions about drinking prevalence is perhaps the most consistent predictor of drinking among youth and a common focus of substance use prevention. Therefore, there is substantial interest in the best way to measure descriptive norms in the form of perceived peer prevalence (Simons-Morton & Kuntsche, 2012)

Despite consistently significant associations between perceived peer prevalence and drinking in a variety of studies with a variety of study participants (Neighbors et al., 2007; Knecht et al., 2011; Burk et al., 2012), these measures could be biased. Notably, critics of measures of perceived norms argue that survey respondents may be susceptible to false consensus effects (Marks & Miller, 1987), projecting their own behavior onto perceptions of peer behavior, non-drinkers tending to assume their friends/peers don't drink and drinkers tending to assume their friends/peers do (Bauman & Fisher, 1986). False consensus would increase misperception in the direction of conformity, potentially inflating associations with drinking (Bauman & Ennett, 1996), and reduce confidence in findings about peer influences on drinking (Leung et al., 2014). However, it seems that adolescents may also under-estimate peer drinking (Pape, 2012), which could deflate estimations of homogeneity and peer normative influence on drinking. For example, Kenney et al., (2016) found that the correlation between drinking among college students with a global measure of residence hall student drinking ($r=0.46$) was somewhat lower than the correlation with drinking reported by nominated peers in the same college residence hall ($r=0.72$).

Alternatively, prospective analyses of participant and peer drinking, when baseline values are controlled, could result in lower predictive power of perceived peer use. Using two waves of Add Health data, Deutsch et al (2015) examined the relative magnitude of associations between participant drinking at W2 with measures of perceived vs actual peer drinking measured at W1. The magnitude of associations with participant drinking at W2, controlling for drinking at W1, was greater for perceived friend use ($r=.45$) than with actual friend use ($r=.25$), suggesting that possible false consensus did not reduce the association with perceived norms in prospective analyses.

Given the criticisms of measures of perceived peer substance use as measures of adolescent and peer homogeneity (Henry et al., 2011) and lack of prospective studies (Kenney et al., 2016) additional research is warranted. In previous prospective analyses of data from the NEXT Generation Health Study, a national cohort assessed from 10th grade, we found that the prevalence of recent and binge drinking the first year after high school were predicted by peer influence measured by descriptive norms (five closest friends) assessed the previous year (Simons-Morton et al., 2016), however, actual peer norms were not assessed. The current analyses extend our previous research and build on the work of Deutsch et al. (2015) by assessing a contemporary national sample of emerging adults the 1st and 2nd years after high school and including multiple measures of perceived friend drinking in addition to actual peer drinking. The research seeks to determine the relative utility of measures of perceived and actual peer drinking. The specific aims of this research are to examine the prospective relationships between drinking among emerging adults and the following: (1)

multiple measures of perceived drinking among close friends; (2) actual peer drinking; and (3) variability by gender.

Methods

Sample

This study utilized data from the NEXT PLUS subsample (n=567), selected for intensive data collection from the larger NEXT Generation Health Study. The NEXT Generation Health Study is a longitudinal investigation of a cohort of 10th-grade U.S. students ascertained through multistage sampling. Primary-sampling units consisted of school districts or groups of school districts stratified across the nine U.S. census divisions. Within this sampling framework, 81 schools out of 137 (58.4%) randomly selected schools agreed to participate starting in the 2009–2010 school year (Conway et al, 2013). Within each participating school, 10th grade classes were randomly selected to participate; student assent and parental consent were obtained. Participants were surveyed annually, with a school-based assessment in the spring semester of 10th grade and web-based assessments in 11th and 12th grades, and the first two years after high school. Of the 567 respondents selected for NEXT Plus, 472 participated at Wave 4 (W4, first year after high school) and 449 at Wave 5 (W5, second year after high school).

Peer sample

At W4 we asked NEXT Plus participants to recruit up to 6 of their close friends who were at least 15 years old. Study participants received \$25 for each nominated peer who completed the sample, while participating peers received \$25. Peers over 18 years of age provided consent; those under 18 provided assent, and their parents provided consent, for participation. Of the 567 NEXT Plus participants 323 nominated 1 or more peers who completed the survey and were included in the analyses. NEXT Plus participants provided a total of 1128 peers, 130 of whom were over age 35 (most of whom were also relatives of participant) who were eliminated from these analysis, resulting in 998 peers (over 95% were friends, siblings, or romantic partners). The protocol was approved by Institutional Review Board of the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development.

Measures

Participants (W4 and W5) and peers (W4 only) completed identical surveys.

Participant self-reported alcohol use (W4 and W5): Drinking prevalence was assessed by asking on how many occasions in the last 30 days the participant drank alcohol. Response options were never, 1–2, 3–5, 6–9, 10–19, 20–39, and 40 or more. Binge drinking was assessed by asking “...how many times have you had five (for boys)/four (for girls) drinks in a row on an occasion?” Response options were never, 1, 2, 3–5, 6–9, and 10 or more. Variables were dichotomized as *never* versus *ever*.

Peer self-reported alcohol use at (W4): Same questions as above were answered by the participant nominated peers to assess the peer drinking and binge drinking in the past 30 days, and dichotomized as never versus ever. Responses from multiple peers recruited by the

same participant were aggregated: peer-reported drinking was coded 0 if *all* the peers reported *never* drinking, and 1 if *at least one* peer reported *ever* drinking. The same rule was applied to create the binary peer-reported binge drinking.

Participant perception of peer alcohol use (descriptive norms) at W4.: The following measures of peer drinking were asked of the study participants: (1) How often do your five closest friends (A) Drink alcohol? (B) Get drunk? (2) How often does your closest male friend do the following: (A) Drink alcohol? (B) Get drunk? (3) How often does your closest female friend do the following: (A) Drink alcohol? (B) Get drunk? Response options were *1=never, 2=almost never, 3=sometimes, 4=often, and 5=almost always*. Because of sparsity in some of the categories, we collapsed each of the variables to two levels, as follows: 1–2 = *never/almost never, 3–5 = sometimes/often/almost always*.

Demographic covariates.: Baseline demographic variables included the following: gender; race/ethnicity (White, African American, Hispanic, other); family structure (two biological parents, biological parent and stepparent, single parent); and parental education as reported by the parent at the study enrollment (high school or less, some college or technical school, bachelor's degree or higher).

Analyses—Summary statistics were tabulated for the participant sample (n=323) and the peer sample (n=998), respectively. In the primary analyses, logistic regressions estimated the association of peer influence with the odds of drinking and binge drinking, respectively. The drinking outcome at W5 was analyzed separately in relation to four binary peer exposures of drinking measured at W4: actual peer-reported drinking, and perceived drinking among five closest friends, closest male friend, and closest female friend. The binge drinking outcome was analyzed in relation to actual peer-reported heavy drinking, and perceived getting drunk by five closest friends, closest male friend, and closest female friend. The logistic regressions were adjusted for the lagged response at W4 (previous behavior) and the demographic variables above. By including the lagged response in the logistic regression, the associations are interpreted as the probabilities of transitioning over a 1-year period from drinking or bingeing to not drinking or bingeing, or from not drinking or bingeing to drinking or bingeing. Subjects with missing data were excluded. Subsequent sensitivity analyses were conducted with other cut points for the peer drinking variables. Secondary analyses included a participant gender-by-peer interaction term in the logistic regressions, which examined differences in peer influence between male and female participants.

Results

As shown in Table 1, the participant sample (n=323) included 38% males, 46% white, 31% Hispanic, and 18% African Americans. Most participants (78%) were attending college or technical school at W4 and most of their parents (66%) completed at least some college. The average number of nominated peers was three, resulting in a total of 998 peers, most of whom were friends the same age as the participants.

Shown in Table 2, participants' 30-day drinking prevalence was 44.1% at W4 and 49.2% at W5, while binge drinking was 28.0% at W4 and 30.8% at W5. These rates were within a

few percentage points to those for the full NEXT sample (W4 drinking = 48.5%, W5 drinking = 50.8%; W4 binge drinking = 33.1%, W5 binge drinking = 34.9%) and those who invited but failed to provide a suitable number of peers (W4 drinking = 45.1%, W5 drinking = 47.6%; W4 binge drinking = 29.6%, W5 binge drinking = 32.8%). With respect to perceived friend use, at W4, 30.0% of participants reported that their 5 closest friends drank sometimes/often/almost always, 28.4% reported that their best male friend drank in the last 30 days, and 25.5% reported that their best female friend drank at least once in the past 30 days. With respect to reports by nominated peers, 76.2% of participants had at least one peer who reported drinking and 61.4% had at least one peer who reported binge drinking in the last 30 days.

Shown in Table 3 is a correlation matrix of the variables of interest. Notably, W5 drinking was correlated at 0.648 with W4 drinking, 0.625 with W4 binge drinking, and 0.945 with W5 binge drinking. The correlations with W4 predictors were in the range of .446 – 0.625.

Separate regression models, adjusted for drinking at W4, sex, race, parent education, and family structure, shown in Table 4, indicate the associations with participant 30-day drinking and binge drinking at W5 (controlling for W4 drinking) for each measure of peer use. Participants who reported that their 5 closest friends drank sometimes/often/almost always had 3.02 (95% CI: 1.58–5.79) higher odds of drinking (versus never drinking) than participants who reported that their friends drank never/almost never. Participants had 2.94 (95% CI: 1.53–5.63) higher odds of drinking if they reported that their closest male friend and 3.10 (95% CI: 1.49–6.41) higher odds of drinking if they reported that their closest female friend drink often/always vs never/seldom drank. Compared to participants with no peers who reported drinking, participants with at least one peer who reported drinking had 2.67 (95% CI: 1.35–5.28) higher odds of drinking.

Shown in the bottom half of Table 4, participants had 2.64 (95% CI: 1.29–5.40) higher odds of binge drinking if they reported that their 5 closest friends got drunk often/always compared with those who reported that their friends got drunk never/seldom. Similarly, participants had 2.83 (95% CI: 1.33–6.01) higher odds of binge drinking if they reported their closest male friend and 2.87 (95% CI: 1.33–6.20) if they reported their closest female friend got drunk often/almost always relative to those who reported that their closest friends got drunk never/seldom. (Separate analyses examining associations among same-sex and opposite-sex peers were not significant, data not shown). Participants with at least one peer who reported any binge drinking had 2.38 (95% CI: 1.19–4.76) higher odds of heavy drinking than those who had no peers who reported heavy drinking.

Additional analyses were conducted to determine if the peer use cut points might alter the findings. As shown in Table 5, perceived norms of close friends were defined as never versus some drinking/binge and actual peer drinking behavior and drinking among actual peers was defined at the low cut-point as “at least one peer reported drinking at least 3 times” and at the high cut point as at least one peer reported drinking at least 6 times. The associations in models using these cut off points are similar to those shown in Table 4, with ORs ranging from 2.5–2.7 for peer drinking and 2.4–3.4 for actual peer drinking; 3.3–5.3 for perceived peers getting drunk and 1.7–2.3 for actual peer binge drinking.

Table 6 shows the findings for the data in Table 4, with additional gender-peer interaction terms to allow for different degrees of peer norm influence among male and female participants. The interaction term is the ratio of the odds ratios of the cell probabilities (therefore not directly interpretable as main effects) for each gender. The gender interactions were significant for several measures of perceived drinking. In the model examining 30-day alcohol use, females were 1.69 (95% CI: 0.78, 3.66) and males were 8.87 (95%, CI: 2.68–29.37 times more likely to drink when they perceived their closest male friend drinks. Similarly, in the models examining binge drinking, females were not more likely to report binge drinking when they perceived their closest male friend got drunk (OR=1.20, 95% CI: 0.46–3.13) but males were (OR:13.82, 95% CI: 3.36–54.12). Similarly, females were not more likely to binge drink when their closest female friend reported bingeing at least some of the time (OR:1.63, 95% CI: 0.67, 3.97), but males were (OR:24.71, 95%CI: 3.28–186.87). The reported confidence intervals are large due to relatively small sample sizes in some cells.

DISCUSSION

The NEXT Generation Health Survey provided a unique opportunity to examine the variability in prospective associations between peer drinking norms and drinking among emerging adults. The unique sample included emerging adults their first two years after high school. In our sample 44% at W4 and 49% at W5 reported drinking and 28% at W4 and 31% at W2 reporting binge drinking in the past 30-days, similar to other reports for this age group (Johnston et al., 2015). In addition, the study measured participants' perceptions at W4 of the drinking behavior of their closest male, and closest female, 5 closest friends, and actual drinking reported by peers nominated by the participants. At W4, 44.1% reported drinking, but perceived that only 30% of their close friends, 28.4% of the closest male friends, and 25.6% of their closest female friends drink at least sometimes. Our finding that emerging adults estimated that peer drinking was less prevalent than participant drinking is contrary to previous criticism that respondents project their own drinking behavior on their peers, undermining the utility of these measures as predictors of drinking (Bauman and Ennett, 1996), but consistent with other research that has reported relatively lower and possibly under-estimated peer substance use (Pape, 2012). Homogeneity of substance use behavior has frequently been reported among adolescents (Leung et al, 2014; Wang et al, 2015), including late adolescents (Burk et al., 2012). We would expect emerging adults, for whom drinking is a relatively common and open social activity (Thrul & Kuntsche, 2016), to provide reasonably accurate perceptions of their friends drinking behavior.

Not surprisingly, for both 30-day drinking and binge drinking, measures of perceived and actual peer drinking were consistently associated the participant drinking at W5 and binge drinking (controlling for drinking at W4). The estimates of associations between the participants drinking and actual peer reports, 2.67 for drinking and 2.38 for binge drinking were slightly lower, but not much different than the estimates of the associations between participant and perceived peer drinking (OR's ~ 2.9, 3.0, 3.1) and binge drinking (O's ~ 2.6, 2.8, 2.9). These findings were similar for various configurations of the measures of perceived and actual peer use. Based on these findings it appears that measures of perceived peer use provide estimates of homogeneity of participant and peer drinking that are similar

to estimates from measures of actual peer group substance use, at least for participants in this study. Examination of these associations between participant and peer drinking defined as never vs ever and with actual peer drinking defined as at least one or at least two peers report drinking or bingeing provided similar estimates.

The magnitude of associations of with perceived closest friend drinking were similar to the associations for 5 closest friends and for actual peer use, suggesting that a variety of ways of assessing perceived peer use may be useful. Previous research with adolescents and college students indicated that measures of descriptive norms of proximal peers may be more accurate than more distal measures of peer norms (Collins and Spelman, 2013). Also, a recent study of college students reported that the college students accurately perceived the drinking norms of nominate residence hall peers, but overestimated global residential peer drinking norms (Kenney et al., 2016). Deutsch et al., (2015) examined these issues for the Add Health sample of adolescents while in high school, but we could find no previous research that reported prospective associations with drinking among emerging adults of multiple measures of descriptive peer norms and the actual peer drinking.

Examination of gender-by-peer interaction terms indicated that among those who perceived their closest male drink friend got drunk at least sometimes, males had higher odds than females of drinking and binge drinking, and males who perceived their closest male or closest female friend got drunk at last some of the time were more likely to report binge drinking. The estimates for actual peer drinking were somewhat higher for males than females, but much higher for perceived peer drinking, particularly for closest female friend drinking. These findings could indicate that males relative to females may (1) perceive greater homogeneity between their own drinking and that of their close friends; (2) overestimate peer use; and/or (3) be more susceptible to perceived normative influence.

Strengths of the current study include a reasonably large national sample, prospective analyses of the change from W4 to W5 in drinking and binge drinking over time, multiple measures of descriptive norms in the form of perceived friend drinking, and actual norms from nominated peers, allowing a sensitivity analyses of the estimates of the association between participant and measures of perceived and actual peer drinking. While we controlled for W4 drinking, we did not conduct analyses to predict changes in drinking. We dichotomized our measures of emerging adult and peer drinking and binge drinking because the distributions warranted and because our measure of actual peer drinking was an aggregate measure of multiple peers, making associations with average peer drinking difficult to interpret, while associations with having at least one peer who drinks or gets drunk are logically interpreted. Sensitivity analyses of various configurations of peer drinking (never vs any, never/almost never vs sometimes/often/always) provided consistent estimates.

However, study limitations should be noted. The nominated peers included in this study were predominately similarly-aged friends, but it is unknown how representative they are of the peer networks most important to the participants' drinking behavior. There was variability in the number of peers nominated and the relationships with the participants, which could introduce unwanted variability. Moreover, the extent to which the nominated

peers served as the referents when the participants responded to questions about the behavior of their closest or 5 closest friends could not be known. Although we examined commonly used measures of descriptive drinking norms, including five closest, closest male and closest female friend, no measure of general peer norms, such as people your age, was included. Notably, we asked participants if their friends got drunk, but not if they engage in binge drinking. Finally, we did not control for or stratify the analyses by college attendance because the resulting cell sizes would not have allowed meaningful interpretation of the analyses.

Despite these limitations, this study was among the first to use both perceived peer drinking and actual peer drinking data to examine prospective associations with drinking behaviors a year later (controlling for previous wave drinking) in a national sample of emerging adults. Our estimates for both perceived friend, with ORs that ranged from about 2.0 to 3.0, and actual peer use, with similar ORs of 2.0–3.0, were higher than the OR=1.7 for perceived and 1.4 (n.s.) for actual friend use calculated by Deutsch et al. (2015) for a sample of adolescent assessed in the mid-1990's. Findings indicate that participant reports of proximal descriptive norms and direct peer reports of drinking provided consistent longitudinal predictions of participant drinking. The close correspondence of associations between emerging adult drinking of descriptive norms of proximal peers and actual drinking of nominated peers suggests that the predictive value of descriptive norms were reasonably equivalent to actual peer use, reflecting only very small inflation that could be attributed to false consensus effects. The ORs for males were somewhat less consistent between the perceived and the actual peer drinking, while the ORs for females were more consistent.

It has been argued that direct measures of actual peer use, are more true than perceived measures because the latter are internal and not objective constructs (Bauman and Ennett, 1996). However, relative to perceived peer use, direct assessment of peer drinking is vastly more complicated and expensive to measure in most contexts. Therefore, it is of use to examine the estimates from both sources as in this research. Additional research is needed to determine the reliability of measures of descriptive norms in relation to actual peer drinking behavior in other populations of adolescents and emerging adults and to determine if these associations vary according to participant college status and residence. Also, further research is needed to confirm the finding that associations between drinking and some measures of descriptive norms were greater for males than females.

With respect to the specific aims addressed in this study, the findings are consistent with the following with respect to prospective associations with emerging adult drinking: (1) multiple measures of perceived drinking among close friends were significantly associated at similar levels; (2) the associations with actual peer drinking were similar in magnitude to associations with perceived peer drinking; and (3) there was substantial variability by gender, with larger estimates for perceived peer drinking measures for males than females and relative to actual peer drinking. We conclude that measures of perceived peer drinking provide similar estimates of peer homogeneity in drinking behavior among emerging adults to actual peer-reported drinking behavior, although male relative to female drinking behavior may be particularly sensitive to perceived peer norms.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements

This research (contract number HHSN2752012000011) was supported by the intramural research program of the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) and the Maternal and Child Health Bureau (MCHB) of the Health Resources and Services Administration (HRSA).

REFERENCES

- Ajzen I, & Fishbein M (1980). Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice Hall.
- Bandura A (1977). Social learning theory. Englewood Cliffs, NJ: Prentice Hall.
- Bauman KE, & Fisher LA (1986). On the measurement of friend behavior in research on friend influence and selection: Findings from longitudinal studies of adolescent smoking and drinking. *Journal of Youth and Adolescence*. 15(4), 345–53. 10.1007/bf02145731. [PubMed: 24301833]
- Bauman KE, Ennett ST (1996). On the importance of peer influence for adolescent drug use: Commonly neglected considerations. *Addiction*, 91(2), 185–98. 10.1046/j.1360-0443.1996.9121852.x. [PubMed: 8835276]
- Borsari B & Carey KB (2003). Descriptive and injunctive norms in college drinking: A meta-analytic integration. *Journal of Studies on Alcohol*, 64(3), 331–341. <http://dx.doi.org/10.15288/jsa.2003.64.331>. [PubMed: 12817821]
- Bot SM, Engels RC, Knibbe RA, & Meeus WH (2005). Friend's drinking behaviour and adolescent alcohol consumption: The moderating role of friendship characteristics. *Addictive Behaviors*, 30(5), 929–947. 10.1016/j.addbeh.2004.09.012. [PubMed: 15893090]
- Bray JH, Adams GJ, Getz JG, & McQueen A (2003). Individuation, peers, and adolescent alcohol use: A latent growth analysis. *Journal of Consulting and Clinical Psychology*, 71(3), 553–564. 10.1037/0022-006x.71.3.553. [PubMed: 12795578]
- Brown SA, McGue M, Maggs J, Schulenberg J, Hingson R, Swartzwelder S, & et al. (2008). A developmental perspective on alcohol and youths 16 to 20 years of age. *Pediatrics*, 121(Supplement 4), S290–S310. 10.1542/peds.2007-2243d. [PubMed: 18381495]
- Burk WJ, Van Der Vorst H, Kerr M, & Stattin H (2012). Alcohol use and friendship dynamics: Selection and socialization in early-, middle-, and late-adolescent peer networks. *Journal of Studies on Alcohol and Drugs*. 73(1), 89–98. <http://dx.doi.org/10.15288/jsad.2012.73.89>. [PubMed: 22152666]
- Cadigan JM, Haeny AM, Martens MP, Weaver CC, Takamatsu SK, & Arterberry BJ (2015). Personalized drinking feedback: A meta-analysis of in-person versus computer-delivered interventions. *Journal of Consulting and Clinical Psychology*, 83(2), 430–437. 10.1037/a0038394. [PubMed: 25486373]
- Carey KB, Scott-Sheldon LAJ, Carey MP, & DeMartini KS (2007). Individual-level interventions to reduce college student drinking: A meta-analytic review. *Addictive Behaviors*, 32(11), 2469–2494. 10.1016/j.addbeh.2007.05.004. [PubMed: 17590277]
- Cialdini RB, & Trost MR (1998). Social influence: Social norms, conformity, compliance In Gilbert DT, Fiske ST, & Lindzey G (Eds.), *The Handbook of Social Psychology* (pp. 151–192). New York, NY: McGraw-Hill, Inc.
- Cleveland MJ, Mallett KA, White HR, Turrisi R, & Favero S (2013). Patterns of alcohol use and related consequences in non-college-attending emerging adults. *Journal of Studies on Alcohol and Drugs*, 74(1), 84–93. <http://dx.doi.org/10.15288/jsad.2013.74.84>. [PubMed: 23200153]
- Collins SE, & Spelman PJ (2013). Associations of descriptive and reflective injunctive norms with risky college drinking. *Psychology of Addictive Behaviors*, 27(4), 1175–1181. 10.1037/a0032828. [PubMed: 24364691]

- Conway KP, Vullo GC, Nichter B, Wang J, Compton WM, Iannotti RJ, & et al. (2013). Prevalence and patterns of polysubstance use in a nationally representative sample of 10th graders in the United States. *Journal of Adolescent Health*, 52(6), 716–23. 10.1016/j.jadohealth.2012.12.006. [PubMed: 23465320]
- D'Amico EJ, & McCarthy DM (2006). Escalation and initiation of younger adolescents' substance use: The impact of perceived peer use. *Journal of Adolescent Health*, 39(4), 481–487. 10.1016/j.jadohealth.2006.02.010. [PubMed: 16982381]
- Deutsch AR, Chernyavskiy P, Steinley D, & Slutske WS (2015). Measuring peer socialization for adolescent substance use" A comparison of perceived and actual friends' substance use effects. *Journal of Studies of Alcohol and other Drugs*, 76, 267–277. <https://doi.org/10.15288/jsad.2015.76.267>
- Eisenberg D (2004). Peer effects for adolescent substance use: Do they really exist? Health Economics Resource Center, Veterans Health Affairs Menlo Park, CA <http://www-personal.umich.edu/~daneis/papers/peereffects.pdf>. Access 14 Nov 2016.
- Eisenberg D, Golberstein E, & Whitlock JL (2014). Peer effects on risky behaviors: New evidence from college roommate assignments. *Journal of Health Economics*, 33, 126–138. [PubMed: 24316458]
- Engels RC, Knibbe RA, Vries HD, Drop MJ, & Breukelen GJ (1999). Influences of parental and best friends' smoking and drinking on adolescent use: A longitudinal study. *Journal of Applied Social Psychology*, 29(2), 337–361. 10.1111/j.1559-1816.1999.tb01390.x.
- Henry DB, Kobus K & Schony ME, (2011). Accuracy and bias in adolescents' perceptions of friend' substance use. *Psychology of Addictive Behaviors*, 25, 80–89. [PubMed: 21244119]
- Hingson RW, & White A (2013). Trends in extreme binge drinking among US high school seniors. *JAMA Pediatrics*, 167(11), 996–998. 10.1001/jamapediatrics.2013.3083. [PubMed: 24042186]
- Jaccard J, Blanton H, & Dodge T (2005). Peer influences on risk behavior: An analysis of the effects of a close friend. *Developmental Psychology*, 41(1), 135–147. 10.1037/0012-1649.41.1.135. [PubMed: 15656744]
- Johnston LD, O'Malley PM, Bachman JG, & Schulenberg JE (2012). Monitoring the Future national survey results on drug use, 1975–2011 Volume I, Secondary school students. Ann Arbor: Institute for Social Research, The University of Michigan http://www.monitoringthefuture.org/pubs/monographs/mtf-vol1_2011.pdf. Accessed 14 Nov 2016.
- Johnston LD, O'Malley PM, Bachman JG, & Schulenberg JE, (2013) Monitoring the Future national survey results on drug use, 1975–2012 Volume I, Secondary school students. Ann Arbor: Institute for Social Research, The University of Michigan http://monitoringthefuture.org/pubs/monographs/mtf-vol1_2012.pdf. Access 14 Nov 2016.
- Johnston LD, O'Malley PM, Bachman JG, & Schulenberg JE, Miech (2015). Monitoring the Future national survey results on drug use: 1975–2014: Volume 2: College Students and Adults ages 19–55 Ann Arbor: Insitute for Social Research, The University of Michigan, http://www.monitoringthefuture.org/pubs/monographs/mtf-vol2_2014.pdf Accessed 14 Nov 2016.
- Kenney RS, Ott M, Meisel MK, & Barnett NP (2016). Alcohol perceptions and behavior in a residential peer social network. *Addictive Behaviors*, 64, 143–147. 10.1016/j.addbeh.2016.08.047. [PubMed: 27614052]
- Knecht AB., Burk WJ. Weesie J., & Steglich C. (2011). Friendship and alcohol use in early adolescence: A multilevel social network approach. *Journal of Research on Adolescence*, 21, 475–487.
- Leung RK, Toumbourou JW, & Hemphill SA (2014). The effect of peer influence and selection processes on adolescent alcohol use: A systematic review of longitudinal studies. *Health Psychology Review*, 8(4), 426–457. 10.1080/17437199.2011.587961. [PubMed: 25211209]
- Lewis MA, & Neighbors C (2006). Social norms approaches using descriptive drinking norms education: A review of the research on personalized normative feedback. *Journal of American College Health*, 54(4), 213–218. 10.3200/jach.54.4.213-218. [PubMed: 16450845]
- Marks G, & Miller N (1987). Ten years of research on the false-consensus effect: An empirical and theoretical review. *Psychological Bulletin*, 102(1), 72–90. 10.1037/0033-2909.102.1.72.

- Marshal MP, & Chassin L (2000). Peer influence on adolescent alcohol use: The moderating role of parental support and discipline. *Applied Developmental Science*, 20(4), 80–88. 10.1207/s1532480xads0402_3.
- Martens MP, Page JC, Mowry ES, Damann KM, Taylor KK, & Cimini MD (2006). Differences between actual and perceived student norms: An examination of alcohol use, drug use, and sexual behavior. *Journal of American College Health*, 54(5), 295–300. 10.3200/jach.54.5.295-300. [PubMed: 16539222]
- Martinez JA, Sher KJ, & Wood PK (2014). Drinking consequences and subsequent drinking in college students over 4 years. *Psychology of Addictive Behaviors*, 28(4), 1240–1245. 10.1037/a0038352. [PubMed: 25528051]
- Maxwell KA (2002). Friends: The role of peer influence across adolescent risk behaviors. *Journal of Youth and Adolescence*, 31(4), 267–277. 10.1023/A:1015493316865.
- McCabe SE, Schulenberg JE, Johnston LD, O'Malley PM, Bachman JG, & Kloska DD (2005). Selection and socialization effects of fraternities and sororities on US college student substance use: A multi-cohort national longitudinal study. *Addiction*, 100(4), 512–524. 10.1111/j.1360-0443.2005.01038.x. [PubMed: 15784066]
- Neighbors C Lee CM., Lewis MA., Fossons N., & Larimer ME. (2007). Are social norms the best predictor of outcomes among heavy-drinking college students? *Journal of Studies of Alcohol and Drugs*, 68(4), 556–565. <http://dx.doi.org/10.15288/jsad.2007.68.556>.
- Pape H (2012). Young people's over-estimation of peer substance use: An exaggerated phenomenon. *Addiction*, 107(5), 878–884. 10.1111/j.1360-0443.2011.03680.x. [PubMed: 22324656]
- Park A, Sher KJ, & Krull JL (2009). Selection and socialization of risky drinking during the college transition: The importance of microenvironments associated with specific living units. *Psychology of Addictive Behaviors*, 23(3), 404–414. 10.1037/a0016293. [PubMed: 19769425]
- Poelen EA, Engels RC, Van Der Vorst H, Scholte RH, & Vermulst AA (2007). Best friends and alcohol consumption in adolescence: A within-family analysis. *Drug and Alcohol Dependence*, 88(2), 163–173. 10.1016/j.drugalcdep.2006.10.008. [PubMed: 17127016]
- Quinn PD, & Fromme K (2011). Alcohol use and related problems among college students and their noncollege peers: The competing roles of personality and peer influence. *Journal of Studies on Alcohol and Drugs*, 72(4), 622–632. <http://dx.doi.org/10.15288/jsad.2011.72.622>. [PubMed: 21683044]
- Sieving RE, Perry CL, & Williams CL (2000). Do friendships change behaviors, or do behaviors change friendships? Examining paths of influence in young adolescents' alcohol use. *Journal of Adolescent Health*, 26(1), 27–35. 10.1016/S1054-139X(99)00056-7. [PubMed: 10638715]
- Simons-Morton B, Haynie D, & Noelke E (2009). Social influences: The effects of socialization, selection and social normative processes on health behavior In DiClemente R, Crosby RA, & Kegler M (Eds.), *Emerging theories in health promotion practice and research* (pp. 65–95). San Francisco, CA: Jossey-Bass.
- Simons-Morton BG, & Farhat T (2010). Recent findings on peer group influences on adolescent smoking. *The Journal of Primary Prevention*, 31(4), 191–208. 10.1007/s10935-010-0220-x. [PubMed: 20614184]
- Simons-Morton BG, & Kuntsche E (2012). Adolescent overestimation of peer substance use: Why it matters. *Addiction*, 107(5), 885–886. 10.1111/j.1360-0443.2011.03744.x. [PubMed: 22471569]
- Simons-Morton B, Haynie D, Liu D, Chaurasia A, Li K, & Hingson R (2016). The effect of residence, school status, work status, and social influence on the prevalence of alcohol use among emerging adults. *Journal of Studies on Alcohol and Drugs*, 77(1), 121–132. <http://dx.doi.org/10.15288/jsad.2016.77.121>. [PubMed: 26751362]
- Stice E, Myers MG, & Brown SA (1998). A longitudinal grouping analysis of adolescent substance use escalation and de-escalation. *Psychology of Addictive Behaviors*, 12(1), 14–27. 10.1037/0893-164x.12.1.14.
- Stone AL, Becker LG, Huber AM, & Catalano RF (2012). Review of risk and protective factors of substance use and problem use in emerging adulthood. *Addictive Behaviors*, 37(7), 747–775. 10.1016/j.addbeh.2012.02.014. [PubMed: 22445418]

- Substance Abuse and Mental Health Services Administration (SAMHSA). Results from the 2010 National Survey on Drug Use and Health: Summary of National Findings (2011). NSDUH Series H-41, HHS Publication No. (SMA) 11-4658. Rockville, MD <http://www.samhsa.gov/data/sites/default/files/NSDUHNationalFindingsResults2010-web/2k10ResultsRev/NSDUHresultsRev2010.pdf>. Accessed 14 Nov 2016.
- Thrul J, & Kuntsche E (2016). Interactions between drinking motives and friends in predicting young adults' alcohol use. *Prevention Science*, 17(5), 626–635. 10.1007/s11121-016-0660-5. [PubMed: 27165112]
- Urberg KA, Luo Q, Pilgrim C, & Degirmencioglu SM (2003). A two-stage model of peer influence in adolescent substance use: Individual and relationship-specific differences in susceptibility to influence. *Addictive Behaviors*, 28(7), 1243–1256. 10.1016/s0306-4603(02)00256-3. [PubMed: 12915166]
- Van Der Vorst H, Vermulst AA, Meeus WH, Dekovi M, & Engels RC (2009). Identification and prediction of drinking trajectories in early and mid-adolescence. *Journal of Clinical Child & Adolescent Psychology*, 38(3), 329–341. 10.1080/15374410902851648.
- Wang C, Hipp JR, Butts CT, Jose R, & Lakon CM (2015). Alcohol use among adolescent youth: The role of friendship networks and family factors in multiple school studies. *PLOS One*, 10(3), e0119965 10.1371/journal.pone.0119965. [PubMed: 25756364]

Table 1.

Participant and peer characteristics

Participant characteristics (N=323)		N	Percentage
Gender	Male	123	38.1
	Female	200	61.9
Race/Ethnicity	Hispanic	100	31.0
	African American	57	17.7
	White	148	45.8
	Other	18	5.6
School Status (at W4)	High school only	68	19.6
	Tech/community college	112	34.8
	4-yr college	142	44.1
Parent Education	High School or less	106	34.1
	Some College/Technical School	119	38.3
	Bachelor's degree or higher	86	27.7
Family Structure	Two Biological Parents	178	55.1
	One biological parent and step-parent	40	12.4
	Single parent	66	20.4
	Other	39	12.1
Number of peers recruited	1	86	26.6
	2	56	17.3
	3	45	13.9
	4	53	16.4
	5	45	13.9
	6	38	11.8
Peer characteristics (N=998)		N	Percentage
Peer relationship to participant	Friend	741	74.3
	Sibling	112	11.2
	Other family member	46	4.6
	Romantic Partner	99	9.9
Age of peers	Under 18	40	4.0
	18–20	746	74.8
	21–24	182	18.2
	25+	30	3.0
Gender of peers	Male	439	44.0
	Female	559	56.0
Race/Ethnicity of peers	Hispanic	206	20.6
	African American	157	15.7
	White	484	48.5

Participant characteristics (N=323)		
	N	Percentage
Other	151	15.1

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 2.

Reported alcohol use in past 30 days: participant report of own use; participant report of peer use; actual peer use

		Drinking		Binge drinking ^a	
		N	Percentage	N	Percentage
Participant use					
at W4	Never	180	55.9	232	72.1
	At least once	142	44.1	90	28.0
at W5	Never	152	50.8	207	69.2
	At least once	147	49.2	92	30.8
Participant perceived use by peers at W4					
Closest five friends	Never/almost never	224	70.0	----	----
	Sometimes/often/always	96	30.0	----	----
Closest male friend	Never/almost never	229	71.6	----	----
	Sometimes/often/always	82	28.4	----	----
Closest female friend	Never/almost never	239	74.5	----	----
	Sometimes/often/always	82	25.6	----	----
Peer-network actual use					
at W4	No peer-reported use	76	23.8	123	38.6
	At least one peer reported use	243	76.2	196	61.4

^a 5 or more drinks at one time for males; 4 or more for females

Table 3. Polychoric correlations for participant alcohol use, participant perceived peer alcohol use, and peer reported alcohol use

Participant use	Participant Alcohol Use				W4 Participant Perceived Peer Use					Actual Peer Use		
	Drinking		Binge Drinking		Drinking		Binge Drinking		Five friends	Female friend	Drink	Drunk
	W5	W4	W5	W4	Male friend	Female friend	Male friend	Female friend			W4	W4
Drinking W5	---											
Drinking W4	0.648	---										
Binge Drinking W5	0.945	0.696	---									
Binge Drinking W4	0.625	0.896	0.699	---								
W4 Participant Perceived Peer Use												
5 Friends Drinking	0.575	0.679	0.567	0.714	---							
Male Friend Drinking	0.536	0.642	0.566	0.627	0.843	---						
Female Friend Drinking	0.612	0.767	0.633	0.678	0.860	0.849						
5 Friends Drunk	0.532	0.636	0.566	0.683	0.951	0.819	---					
Male Friend Drunk	0.517	0.616	0.575	0.627	0.844	0.956	0.901	---				
Female Friend Drunk	0.533	0.708	0.571	0.657	0.867	0.807	0.881	0.863	---			
Actual Peer Use												
Drink W4	0.446	0.406	0.484	0.300	0.395	0.570	0.297	0.382	0.478	---		
Drunk W4	0.513	0.370	0.513	0.333	0.436	0.451	0.369	0.366	0.411	0.934	---	

Table 4.

Logistic regression models for participant 30-day alcohol use (never versus ever) and 30-day binge drinking (ever versus never) at T2, adjusting for T1 use

Participant 30-Day Alcohol Use				
W4 Perceived Norms/ Peer Drinking		n	Pseudo R ²	OR (95% CI)
Perceived closest five friends drinking	Never/almost never	287	0.30	Ref
	Sometimes/often/always			3.02 (1.58, 5.79)
Perceived closest male friend drinking	Never/almost never	286	0.30	Ref
	Sometimes/often/always			2.94 (1.53, 5.63)
Perceived closest female friend drinking	Never/almost never	287	0.30	Ref
	Sometimes/often/always			3.10 (1.49, 6.41)
Actual peer drinking	No peer reported drinking	283	0.29	Ref
	At least one peer reported drinking			2.67 (1.35, 5.28)
Participant 30-Day Binge Drinking ^a				
Perceived Norms/Peer Binge ^a – W4		n	Pseudo R ²	OR (95% CI)
Perceived closest five friends drunk	Never/almost never	287	0.38	Ref
	Sometimes/often/always			2.64 (1.29, 5.40)
Perceived closest male friend drunk	Never/almost never	286	0.38	Ref
	Sometimes/often/always			2.83 (1.33, 6.01)
Perceived closest female friend drunk	Never/almost never	287	0.38	Ref
	Sometimes/often/always			2.87 (1.33, 6.20)
Actual peer binge drinking	No peer reported binge	283	0.39	Ref
	At least one peer reported binge			2.38 (1.19, 4.76)

^a 5 or more drinks at one time for males; 4 or more for females

Notes: Each peer covariate was examined in a separate model. Models were adjusted for drinking/binge at T1, gender, race, parent education, and family structure.

Significant covariates in models for Participant 30-day alcohol use, OR (95%CI):

Perceived five friends: Participant W4 alcohol use (ref = None), 5.08 (2.83 – 9.12);

Perceived closest male friend: Participant W4 alcohol use (ref = None), 5.35 (3.00 – 9.54);

Perceived closest female friend: Participant W4 alcohol use (ref = None), 4.82 (2.64–8.80);

Actual peer use: Participant W4 alcohol use (ref = None), 6.52 (3.72–11.41)

Significant covariates in models for Participant 30-day binge drinking, OR (95% CI)

Perceived five friends: Participant W4 binge (ref = None), 7.48 (3.74 – 14.96); African American (Ref=White), 0.26 (0.09–0.71)

Perceived closest male friend: Participant W4 binge (ref = None), 8.23 (4.19 – 16.18); African American (Ref=White), 0.28 (0.10–0.7); Other race (ref=White), 0.24 (0.06–0.98)

Perceived closest female friend: Participant W4 binge (ref = None), 7.89 (3.99 – 19.59); African American (Ref=White), 0.26 (0.09–0.70)

Actual peer use: Participant W4 binge (ref = None), 11.01 (5.62 – 21.57); African American (Ref=White), 0.28 (0.10–0.79); Other race (ref=White), 0.25 (0.63–0.97)

Table 5.

Logistic regression models for participant 30-day alcohol use (never versus ever) and 30-day binge drinking (ever versus never) at T2, adjusting for T1 use, using alternate configurations of peer variables.

30-day Participant Alcohol Use					
W4 Perceived Norms - Peer Drinking		Pseudo R ²	OR	95% CI	
Closest 5 friends	Never	0.29		Ref	
	Some ^a		2.50	1.4	4.6
Closest male friend	Never	0.30		Ref	
	Some ^a		2.65	1.5	4.8
Closest female friend	Never	0.29		Ref	
	Some ^a		2.72	1.4	5.2
Actual Peer Drinking			OR	95% CI	
Peer drinking - low cut-off	None	0.33		Ref	
	At least one peer reports drinking 3 or more times		3.44	1.9	6.1
Peer drinking – high cut-off	None	0.29		Ref	
	At least one peer reports drinking 6 or more times		2.42	1.3	4.4
30-day Participant Binge Drinking					
W4 Perceived Norms - Peer Drunk		Pseudo R ²	OR	95% CI	
Closest 5 friends	Never	0.44		Ref	
	Some ^a		5.38	2.7	10.9
Closest male friend	Never	0.42		Ref	
	Some ^a		4.50	2.3	8.9
Closest female friend	Never	0.40		Ref	
	Some ^a		3.30	1.6	6.7
W4 Actual Peer Binge			OR	95% CI	
Peer binge- low cut-off	None	0.38	2.38	1.2	4.8
	At least one peer reports bingeing 2 or more times				
Peer binge – high cut-off	None	0.36	1.72	0.9	3.3
	At least two peers report bingeing 2 or more times				

^aSome includes almost never/sometimes/often/always.

Table 6.

Logistic regression models with interaction term between participant gender and peer exposure.

	Participant 30-day Drinking at W5			
		Male	Female	Interaction ²
	Pseudo R ²	OR (95% CI)		
Perceived five closest friends drinking	0.31	Ref	Ref	Ref
		5.45 (1.88, 15.81)	2.15 (0.98, 4.71)	2.54 (0.70, 9.17)
Perceived closest male friend drinking	0.32	Ref	Ref	Ref
		8.87 (2.68, 29.37)	1.69 (0.78, 3.67)	5.26 (1.30, 21.29)
Perceived closest female friend drinking	0.31	Ref	Ref	Ref
		17.04 (2.05, 141.53)	2.07 (0.93, 4.61)	8.23 (0.89, 76.14)
Actual peer-network reported drinking	0.29	Ref	Ref	Ref
		3.37 (1.00, 11.25)	2.38 (1.04, 5.46)	1.41 (0.33, 6.11)
Participant 30-day Binge ^d Drinking at W4				
	Pseudo R ²			
Perceived five closest friends drunk	0.40	Ref	Ref	Ref
		6.55 (2.01, 21.31)	1.48 (0.59, 3.71)	4.44 (1.00, 19.47)
Perceived closest male friend drunk	0.41	Ref	Ref	Ref
		13.48 (3.36, 54.12)	1.20 (0.46, 3.13)	11.22 (2.08, 60.56)
Perceived closest female friend drunk	0.41	Ref	Ref	Ref
		24.70 (3.28, 186.03)	1.63 (0.67, 3.97)	15.12 (1.63, 139.84)
Actual peer-network reported binge	0.39	Ref	Ref	Ref
		3.25 (1.01, 10.45)	2.00 (0.85, 4.68)	1.62 (0.39, 6.79)

¹Models were adjusted for drinking/binge at wave 4, gender, race, parent education, and family structure. Pattern of significant findings among covariate was consistent with Models in Table 3. Significant odds ratios were in **bold**.

²This column reported the exponentiated coefficient of the interaction term, i.e., the ratio of the ORs for male and female participants. **Bold** indicates significant interaction.

^a5 or more drinks at one time for males; 4 or more for females