Published in final edited form as:

J Consult Clin Psychol. 2015 February ; 83(1): 36–44. doi:10.1037/a0037634.

Social Network Influences on Initiation and Maintenance of Reduced Drinking Among College Students

Allecia E. Reid^a, Kate B. Carey^{a,b}, Jennifer E. Merrill^a, and Michael P. Carey^{b,c,d}

^aCenter for Alcohol and Addiction Studies, Brown University, Box G-S121-4, Providence, RI 02912

^b Department of Behavioral and Social Sciences, Program in Public Health, Brown University

^cCenters for Behavioral and Preventive Medicine, The Miriam Hospital

^dDepartment of Psychiatry and Human Behavior, Alpert Medical School, Brown University

Abstract

Objective—To determine whether (a) social networks influence the extent to which college students initiate and/or maintain reductions in drinking following an alcohol intervention, and (b) students with riskier networks respond better to a counselor-delivered, versus a computer-delivered, intervention.

Method—Mandated students ($N = 316$; 63% male) provided their perceptions of peer network members' drinking statuses (e.g., heavy drinker) and how accepting each friend would be if the participant reduced his/her drinking. Next, they were randomized to receive a brief motivational intervention (BMI) or Alcohol Edu for Sanctions (EDU). In latent growth models controlling for baseline levels on outcomes, influences of social networks on two phases of intervention response were examined: initiation of reductions in drinks per heaviest week, peak BAC, and consequences at 1 month (model intercepts) and maintenance of reductions between 1 and 12 months (model slopes).

Results—Peer drinking status predicted initiation of reductions in drinks per heaviest week and peak BAC; peer acceptability predicted initial reductions in consequences. Peer acceptability by condition interactions were significant or marginal for all outcomes in the *maintenance* phase. In networks with higher perceived acceptability of decreasing use, BMI and EDU exhibited similar growth rates. In less accepting networks, growth rates were significantly steeper among EDU than BMI participants. For consumption outcomes, lower perceived peer acceptability predicted steeper rates of growth in drinking among EDU but not BMI participants.

Conclusions—Understanding how social networks influence behavior change and how interventions mitigate their influence is important for optimizing efficacy of alcohol interventions.

Keywords

brief intervention; computer-delivered intervention; college drinking; alcohol abuse prevention; peer influence

College students are at increased risk for misusing alcohol relative to their non-college attending peers (Blanco et al., 2008; Slutske, 2005), and alcohol use increases markedly following the transition from high school to college (Baer, Kivlahan, Blume, McKnight, & Marlatt, 2001; Sher & Rutledge, 2007). Taken together, these patterns suggest that the residential college environment, characterized by greater personal freedoms and intense peer interaction, promotes heavy alcohol use. Almost 45% of college students report a recent episode of heavy alcohol consumption (Hingson, Zha, Weitzman, Hingson, & Weitzman, 2009), resulting in serious consequences for both drinkers and their peers. Alcohol plays a role in 1,825 deaths, 599,000 injuries, 696,000 physical assaults, and 97,000 sexual assaults each year among college students (Hingson et al., 2009; Johnston, O'malley, Bachman, & Schulenberg, 2011).

Interventions to reduce heavy alcohol use among college students vary in content and delivery context, reflecting a range of active ingredients and delivery modalities. Meta-analyses suggest that brief interventions, whether delivered by counselor or computer, produce initial reductions in alcohol use, consistent with small to medium effect sizes (Carey, Scott-Sheldon, Carey, & Demartini, 2007; Carey, Scott-Sheldon, Elliott, Garey, & Carey, 2012; Carey, Scott-Sheldon, Elliott, Bolles, & Carey, 2009). However, these effects begin to decay relatively soon following interventions. The effects of computer-delivered interventions tend to decay within 3 months whereas the effects of counselor-delivered interventions begin to decay within 3 to 6 months, with few effects remaining by 12 months (Carey et al., 2012). Thus, improved understanding of the factors that hinder maintenance of behavior change is needed to develop interventions with more enduring effects. To the extent that reducing and maintaining reductions in alcohol use depends on having a supportive social environment (Moos, 2007), college students' social networks may play an important role in intervention efficacy and maintenance.

Research on alcohol interventions for college students generally has not focused on factors that predict maintenance of behavior change. Further, no known research has examined whether initiation and maintenance of change in alcohol use depends on the attributes of college students' social networks. The present research sought to address this gap in the literature. We considered whether, following participation in a brief intervention, the extent to which college students initiated changes in alcohol use and maintained changes over time depended on their perceptions of the alcohol-related attitudes and behaviors of individuals in their social networks.

Theoretical models of health behavior suggest that social networks are likely to facilitate or constrain alcohol use. Social cognitive theory and the theory of planned behavior suggest that peers are likely to influence health through various channels, including modeling and normative perceptions (Ajzen, 1991; Bandura, 1998). Social ecological models view behavior as occurring within systems that are external to the individual, recognizing the

interpersonal influence of family members and peers on health (Bronfenbrenner, 1979). From all of these perspectives, being a member of a social network where heavy drinking is common and supported is likely to promote higher levels of individual drinking. If interventions do not address these social network influences either directly or indirectly, efficacy for producing behavior change would be expected to suffer.

Empirical research further supports an influence of social networks on college student drinking. Among college students, alcohol use occurs primarily with peers and is strongly influenced by peer behavior (Borsari & Carey, 2001; Christiansen, Vik, & Jarchow, 2002). Naturalistic social network studies, utilizing both egocentric, respondent reported methods (e.g., Capaldi, Stoolmiller, Kim, & Yoerger, 2009; Lau-Barraco, Braitman, Leonard, & Padilla, 2012; Reifman, Watson, & Mccourt, 2006) and sociocentric, peer reported methods (e.g., Cruz, Emery, & Turkheimer, 2012; Rosenquist, Murabito, Fowler, & Christakis, 2010), show strong, positive associations between peer alcohol use and personal alcohol use. These associations reflect socialization processes, in which personal alcohol use is shaped by peer behavior, as well as selection processes, in which individuals affiliate with peers who have similar levels of alcohol use (Lau-Barraco et al., 2012; Reifman et al., 2006). The present research focuses on the aftermath of an alcohol intervention, wherein both selection and socialization may affect intervention efficacy. Selection processes suggest that students who successfully initiate reductions in drinking may do so by spending less time with risky peers; maintaining reduced drinking over time may require permanently moving into a lighter drinking peer group. Our hypotheses primarily draw on socialization processes, which suggest the potential for the attitudes and behaviors of participants' existing peer groups to influence the extent to which they initially reduce and subsequently maintain changes in behavior over time.

The broader alcohol treatment literature also provides support for the influence of social networks on intervention outcomes. Among individuals receiving extended treatment for alcohol abuse, having family members or peers who use alcohol and/or who do not support reducing alcohol use are associated with decreased likelihood of attaining abstinence (Groh, Jason, & Keys, 2008; Zywiak, William H, Longabaugh, & Wirtz, 2002). For those who do achieve abstinence, peer drinking and peer disapproval of abstinence are associated with increased likelihood of relapse (Chung & Maisto, 2006; Groh et al., 2008; Zywiak, William H et al., 2002). On the other hand, family and peer support for abstinence predicts better post-treatment outcomes (Beattie & Longabaugh, 1999; Mccrady, 2004).

Examining factors that may moderate intervention efficacy can help to identify which individuals are likely to benefit from an intervention (Kraemer, Wilson, Fairburn, & Agras, 2002). Intuitively, riskier social networks might be expected to be associated with decreased intervention efficacy. However, greater intervention efficacy has been observed among college students with higher levels of baseline risk for alcohol use (Donohue, Allen, Maurer, Ozols, & Destefano, 2004; Dumas, Mckinley, & Book, 2009). For example, Donohue et al. (2004) observed that, relative to a computer-delivered intervention, a counselor-delivered intervention was most efficacious among college students with high levels of baseline alcohol consumption. To the extent that social network attributes tend to mirror personal level of drinking, social networks may similarly moderate intervention efficacy. That is,

counselor-delivered interventions may be particularly efficacious relative to computer-delivered interventions among individuals with riskier social networks. Efficacy of counselor- versus computer-delivered interventions varies as a function of individual differences at both short-term follow-ups (i.e., 1-3 months; Carey, Henson, Carey, & Maisto, 2009; Donohue et al., 2004; Mastroleo, Murphy, Colby, Monti, & Barnett, 2011) and longer-term follow-ups (i.e., beyond 3 months; Monahan et al., 2013). Social network attributes may therefore moderate intervention efficacy in the context of both initiation and maintenance of change.

In sum, research has examined the role of social networks both in naturalistic studies of young adult drinking and in relapse after extended alcohol treatment. These precedents raise the possibility that social networks may affect the process of behavior change among non-treatment seeking college students. The present study sought to examine the influence of social networks on initiation of behavior change and maintenance of intervention effects over time. To address this question, we conducted a secondary analysis, using data from a published trial (Carey, Carey, Henson, Maisto, & Demartini, 2010) that documented significant post-intervention reductions in alcohol use in two conditions—a brief motivational counselor-delivered intervention (BMI) and a brief computer-delivered intervention, Alcohol Edu for Sanctions (EDU). Individuals within one's social network were characterized by perceived level of both alcohol use and support for reducing alcohol use.

Using latent growth models, we examined two phases of intervention response. The initiation phase reflected reductions in alcohol use and consequences by 1 month following the intervention (model intercepts). The maintenance phase reflected the extent of growth in outcomes between 1 and 12 months following the intervention (model slopes). Our primary hypotheses focused on main effects of peers' attitudes and behaviors, as perceived by the participant. Overall, riskier social networks were expected to be associated with smaller initial changes in alcohol use and an accelerated increase in drinking over time, indicating faster return to baseline levels of drinking and decay of intervention efficacy. Our secondary hypotheses tested the moderating role of social networks. Because we expected the counselor-delivered BMI to be a more efficacious intervention than the computer-delivered EDU, EDU served as the control condition. We expected that, relative to EDU, BMI would be particularly successful in producing initial reductions in alcohol use and in maintaining reductions in alcohol use over time among individuals in riskier social networks.

Method

In the original intervention trial, students who had violated campus alcohol policies were randomly assigned to one of four conditions: (a) a counselor-delivered brief motivational intervention (BMI); (b) a computer-delivered intervention, Alcohol Edu for Sanctions (EDU); (c) a computer-delivered intervention, Alcohol 101 Plus; or (d) a delayed intervention control group. Participants completed a baseline assessment prior to intervention delivery and follow-up assessments 1, 6, and 12 months following intervention completion. The delayed control group received the intervention of their choosing after the 1-month follow-up and did not provide further follow-up data. We did not include the

delayed control in the present analyses because of our interest in trajectories over the follow-up period. Further, we did not include Alcohol 101 Plus in the present analyses because of our interest in investigating the role of social networks in empirically-supported interventions. Counselor-delivered brief interventions and EDU have demonstrated efficacy in producing at least initial reductions in drinking quantity but Alcohol 101 Plus has not (Campbell & Hester, 2012; Carey, Carey, et al., 2010; Carey et al., 2012).

Participants

Participants were college students who received either the BMI or EDU ($n = 331$), and who provided data on the two network variables, covariates, and the three drinking outcomes. Because 15 participants (5%) had missing data on an exogenous variable or at all follow-ups, the final analytic sample included 316 participants. All participants were students at a large private university in the Northeast who had violated campus alcohol policies and were mandated to participate in an alcohol risk reduction intervention. Inclusion in the study required that this was the participant's first alcohol violation on campus, that the offense was not severe enough to warrant referral to Judicial Affairs, and that the participant reported drinking alcohol in the month prior to receiving the sanction. Participants provided written informed consent prior to participation, and study procedures were conducted in compliance with the university's Institutional Review Board.

Interventions

BMI—Trained counselors used data from the baseline assessment coupled with motivational interviewing techniques to review a personalized feedback form with participants. Personalized feedback compared participants' baseline quantity and frequency of alcohol use and perceived descriptive norms with gender-consistent, university-specific norms for alcohol use. Personalized feedback was also given regarding the participant's typical and peak blood alcohol concentration (BAC) and consequences experienced as a result of drinking. Behavioral strategies for reducing alcohol-related risks were discussed and participants were invited to set goals for risk reduction. The BMI required approximately 1 hour for completion.

EDU—Alcohol Edu for Sanctions was delivered by computer and consisted of five chapters that provided personalized feedback on drinking and risk for consequences, in addition to content specific to the nature of drinking among mandated students (e.g., blacking out). Unlike the BMI, the program did not provide normative feedback. One month after completing the first four chapters of the program, participants were contacted via email to complete the final chapter of the program, in which alcohol use post-intervention was reviewed. In total, the program required approximately 2 hours for completion.

Measures

Demographics—Participants provided information regarding their gender, age, weight, ethnicity, and Greek involvement at baseline.

Alcohol use—Alcohol use was assessed at all time points; a standard drink was defined as one 12-ounce bottle of beer, one 5-ounce glass of wine, or 1.5 ounces of distilled spirits

(Dufour, 1999). At baseline, participants were asked to think about the week in which they consumed the most alcohol in the month before the event leading to the sanction. At all follow-ups, alcohol use in the last month was assessed. Drinking in the heaviest week in the past month was assessed with a 7-day grid, adapted from the Daily Drinking Questionnaire (Collins, R. L., Parks, & Marlatt, 1985). Responses were summed across the 7 days to reflect the total number of drinks consumed in the heaviest week. Participants also reported the maximum number of drinks consumed in a single day and the number of hours during which they consumed alcohol on this day. Peak BAC on the heaviest drinking day was calculated using a standard formula, accounting for participants' gender and weight (Matthews & Miller, 1979). We focused on heavy drinking outcomes for the present analysis because peers strongly influence heavy drinking episodes (Reifman & Watson, 2003). Based on the original intervention trial, we also expected larger intervention effects and greater variability in these outcomes.

Consequences—The Rutgers Alcohol Problems Index (White & Labouvie, 1989) was used to assess negative consequences experienced as a result of alcohol use in the previous 30 days. The scale consists of 23 items (e.g., hangover, missed school or work) rated on a 5-point scale from 0 (*never*) to 4 (*more than 10 times*). Items were averaged to form a scale score. Cronbach's alpha was .84.

Social network attributes—A modified version (i.e., for a young adult, non-treatment seeking population) of the Brief Important People Interview (BIPI; Clifford & Longabaugh, 1991; Zywiak, William H et al., 2002) was used to characterize social network attributes at baseline. The BIPI was derived from the Important People Interview (IPI; Clifford & Longabaugh, 1991), which was utilized in Projects MATCH (Project Match Research Group, 1997) and COMBINE (Anton, O'malley, Ciraulo, & Et Al., 2006) to assess perceptions of social network support for drinking. The BIPI retains the subset of components from the original interview that best predicted treatment outcomes in COMBINE. The IPI has good test-retest reliability among both treatment-seeking and college student samples (Hallgren, Ladd, & Greenfield, 2013; Longabaugh, Richard, Wirtz, Zweben, & Stout, 1998) and detects change in level of network support for drinking among individuals attending Alcoholics Anonymous (Kelly, Stout, Magill, & Tonigan, 2011), suggesting that it captures the objective reality of peer drinking.

Administration of the BIPI followed the manual (Zywiak, W.H. & Longabaugh, 2002). Participants listed up to 10 friends who were on-campus, with whom they had had regular face-to-face contact in the previous 6 months, and who had been the most significant in their lives. We focus on two items that have predicted treatment outcomes in previous research (Kelly et al., 2011; Longabaugh, R., Wirtz, Zywiak, & O'malley, 2010; Zywiak, William H et al., 2002) and capture the distinction between peer drinking and peer support for drinking. Participants described each friend's drinking status on a scale from 1 (*recovering alcoholic*) to 6 (*very heavy drinker*). The “very heavy drinker” category was added in the present study to facilitate greater use of the endpoint of the scale. The IPI includes the item, “How has this person reacted to your drinking?” rated from “encouraged” to “left, or made you leave when you were drinking.” To capture this sentiment for a college student who has not committed

to abstinence, participants rated how accepting each friend would be if the participant “decided to drink much less” than they were at present. Anchors were 1 (*not very accepting*) and 4 (*very accepting*). Scores for peer drinking status and peer acceptability of decreasing use were created by averaging ratings across all nominated friends.

Data Analysis

SPSS 20 was used to examine descriptive statistics for peer drinking status and peer acceptability of decreasing use and to conduct *t*-tests to compare men and women on these measures. The original study reported a composite measure of alcohol use that aggregated across a number of outcomes. In the present study, we conducted within subjects *t*-tests and regression analyses to examine within- and between-condition changes in outcomes.

Multiple group latent growth models were used to examine the influences of peer drinking status and peer acceptability of decreasing use on initiation (model intercepts) and maintenance (model slopes) of behavior change over time. Models were estimated in Mplus 7 (Muthén & Muthén, 1998-2012) with groups reflecting condition (BMI or EDU). Separate models were examined for each outcome. Participants with missing data on any exogenous variable or with missing data on all measures in the growth trajectory were excluded from analyses, resulting in final samples of 314 to 316 participants, depending on the outcome.

Models were estimated using full information maximum likelihood estimation. Model fit was evaluated using the chi-square (χ^2), comparative fit index (CFI), standardized root-mean-square residual (SRMR), and root-mean-square error of approximation (RMSEA). In path models, CFI values above .95, SRMR values below .08, and RMSEA values below .06 indicate good fit (Hu & Bentler, 1998). The intercept factor had loadings of 1 for all follow-ups; the slope factor was defined by assigning values of 0, 5, and 11 to the 1, 6, and 12 month follow-ups. The model intercept therefore reflects mean level of alcohol use and consequences at the 1 month follow-up, capturing the extent of initiation of behavior change; the slope reflects growth in alcohol use and consequences between the 1 and 12 month follow-ups, capturing the extent of maintenance of behavior change. Linear models were estimated with random intercepts for all outcomes¹. For consequences only, random slopes were included in the final model, and bootstrapping was employed to address skew (Enders, 2001). Gender and baseline status on the same outcome were included as covariates. Inclusion of baseline status allows for interpretations of 1) the intercepts and slopes as reflecting change from baseline drinking; and 2) the effects of the social network attributes above and beyond participants’ own behaviors.

Multiple group latent growth models were estimated in which we first constrained all variances, residual variances, means, and path coefficients to be equal across conditions. In the second step, we examined whether the variances, residual variances, or intercept or slope means significantly differed between conditions. Each variance or mean was freed individually, providing a 1 degree of freedom, chi-square test of whether a significant difference existed between conditions. When significant, the variance or mean was freely estimated across conditions. Third, we accounted for effects of baseline status by condition

¹Quadratic models were explored, but were not significant for either condition on any of the outcomes (*ps* .47).

interactions on the intercepts and slopes, again by examining 1 df chi-square tests when the effects of baseline status on the intercepts and slopes were constrained versus freely estimated. Fourth, we tested interactions between each social network attribute and condition predicting the intercepts and slopes using the 1 df chi-square test. Significant interactions were probed at different levels of the social network attributes, by centering the attribute at the mean and 1 standard deviation above and below the mean (Aiken & West, 1991). When, for example, a significant social network by condition interaction emerged for a slope, models with the slope constrained versus unconstrained provided a test of the difference between conditions at low, mean, and high values of the social network attribute. Significant interactions were also probed within condition.

Results

Sample Description

Participants were predominantly male (63%), White (86%), and freshmen or sophomores (97%). In all, 12.4% were pledging or members of the Greek system; three participants lived off campus. On average, participants listed 7.45 friends in their social networks ($SD = 1.76$; range: 3-10). The average perceived peer drinking status fell between the categories of light and moderate drinker ($M = 3.77$, $SD = .52$); 21% of peers were classified as heavy or very heavy drinkers. On average, peers were perceived to be “somewhat accepting” to “very accepting” of participants decreasing their alcohol use ($M = 3.52$, $SD = .56$). Peer drinking status and acceptability of decreasing use were negatively correlated ($r = -.28$, $p = .001$); that is, the more a friend was perceived to drink, the less accepting he or she was perceived to be of the respondent decreasing their alcohol use. Correlations between baseline levels on the outcomes and the social network attributes were small to moderate ($rs = |.12-.26|$). Men and women did not differ in peer drinking status ($t = 1.22$, $p = .22$) but women's peers were perceived to be more accepting of decreasing alcohol use than were men's peers ($M_s 3.69$ vs. 3.42 , $t = -4.47$, $p = .001$).

Attrition

Of the 316 participants included in our analysis, 2% did not complete the 1 month follow-up, 41% did not complete the 6 month, and 26% did not complete the 12 month follow-up. Attrition was not related to baseline levels of drinking (all $ps > .08$) or demographics ($ps > .15$). Attrition differed by gender (females less than males) at the 12 month follow-up only ($p = .01$).

Intervention Efficacy and Model Fit

As reported in the original trial (Carey, Carey, et al., 2010) both intervention conditions reduced alcohol consumption and consequences at the 1 month follow-up ($ps < .05$), suggesting overall efficacy for producing initial changes in consumption and consequences. At 1 month, the BMI was associated with greater reductions in the consumption variables ($ps < .05$) but not consequences. With respect to growth between the 1 and 12 month follow-ups, participants in both conditions significantly increased in consumption and consequences over time ($ps < .01$). The rate of growth marginally differed between conditions only for drinks per heaviest week ($t = -1.78$, $p = .08$).

Final models indicated adequate to good fit to the data (see Table 1). There were significant baseline status by condition interactions for initiation and maintenance of reductions in both drinks per heaviest week and consequences and for initiation of reductions in peak BAC. Overall, effects of the BMI relative to EDU were stronger for those high in consumption and consequences, and baseline status was related to growth in outcomes among EDU but not BMI participants. The moderating role of baseline status was controlled for in subsequent analyses examining the social network attributes by allowing paths from baseline status to the intercepts and slopes to be freely estimated across conditions. This permits interpretation of results as the effects of social networks independent of moderation by baseline status.

Main Effects of Social Networks on Initiation and Maintenance

Initiation—We hypothesized main effects of peer drinking status and peer acceptability on the growth model intercepts, reflecting the extent to which participants initiated reductions in drinking and consequences at 1 month. Consistent with hypotheses, peer drinking status was positively associated with initiation of reductions in drinks per heaviest week ($B = 2.07$, $t = 1.94$, $p = .05$) and peak BAC ($B = .02$, $t = 3.40$, $p = .01$), suggesting that, across both conditions, participants who perceived their social networks as heavier drinking had smaller reductions in drinks per heaviest week and peak BAC at 1 month. Peer acceptability of decreasing use predicted initiation of reductions in consequences ($B = -1.22$, $t = -2.04$, $p = .04$). Mplus (Muthén & Muthén, 1998-2012) generates an effect size estimate that expresses the magnitude of change in Y, expressed in standard deviation units, for a 1 standard deviation change in X. Effect sizes for the influences of peer drinking status and peer acceptability on initiation were small (Cohen, 1992). A 1 standard deviation increase in peer drinking status was associated with a .13 standard deviation increase drinks per heaviest week and a .18 standard deviation increase in peak BAC. A 1 standard deviation decrease in peer acceptability was associated with a .19 standard deviation increase in consequences at 1 month. Contrary to hypotheses, peer drinking status was not associated with consequences and peer acceptability was unrelated to either consumption outcome 1 month following the interventions.

Maintenance—We also hypothesized main effects of peer drinking status and peer acceptability on the model slopes for growth in alcohol use and consequences over the follow-up, reflecting lack of maintenance of intervention effects. In contrast to expectations, there were no main effects of either peer drinking status or peer acceptability of decreasing use on maintenance (all $ps > .19$).

Social Network by Condition Interactions

Initiation—We hypothesized interactions between condition and the social network attributes predicting both initiation of reduced drinking at 1 month (model intercepts) and maintenance of reduced drinking over time (model slopes). The BMI was expected to be most efficacious in reducing and maintaining lower levels of outcomes among individuals in the riskiest networks. Contrary to hypotheses, neither social network attribute significantly interacted with condition in predicting initiation of reductions in drinking or consequences.

Maintenance—Peer drinking status did not interact with condition to predict growth in any of the outcomes (all p 's > .11). However, consistent with our hypotheses for interactions, peer acceptability of decreasing use interacted with condition to predict growth in the outcomes. The interaction was marginal for growth in drinks per heaviest week ($\chi^2(1) = 2.98, p = .08$) but was significant for growth in peak BAC ($\chi^2(1) = 4.32, p = .04$) and growth in consequences ($\chi^2(1) = 5.32, p = .02$). We probed the marginal interaction for drinks per heaviest week to demonstrate consistency of the effects.

Table 2 displays the tests of whether the BMI and EDU slopes were significantly different from one another and the within-condition slopes at low, mean, and high values of peer acceptability. For drinks per heaviest week, BMI and EDU participants did not differ in rate of growth when they were in low risk networks, that is, peers who were perceived to be accepting of decreasing use. However, in networks at the mean or low in peer acceptability, BMI and EDU participants significantly differed in rate of growth in drinks per heaviest week ($ps < .05$). Similarly, rates of growth in peak BAC did not differ at high or mean levels of peer acceptability but were marginally different when networks were low in peer acceptability ($p = .10$; see Figure 1). The interaction yielded a similar pattern of results for consequences. BMI and EDU participants significantly differed in rate of growth in consequences only when they were in networks that were perceived as low in peer acceptability ($p = .02$). Taken together, EDU participants in networks that were perceived as low in peer acceptability generally exhibited the fastest rate of decay of intervention effects, increasing in drinks per heaviest week by .89 drinks per month, peak BAC by .003 units per month, and consequences by .19 per month. In contrast, BMI participants in networks that were perceived as low in peer acceptability increased at more moderate rates. They increased in drinks per heaviest week by .37 drinks per month, peak BAC by .002 units per month, and did not significantly increase in consequences over time (.01 consequences per month).

We also probed the peer acceptability by condition interactions within condition. Peer acceptability was consistently unrelated to growth in alcohol use and consequences among BMI participants (drinks per heaviest week: $B = -0.02, t = -0.12, p = .90$; peak BAC: $B = 0.000, t = 0.31, p = .78$; consequences: $B = 0.15, t = 1.56, p = .12$). However, among EDU participants, being in a social network that was perceived to be less accepting of reducing drinking predicted steeper growth in alcohol use but not consequences over time (drinks per heaviest week: $B = -0.39, t = -2.26, p = .02$; peak BAC: $B = -0.002, t = -2.33, p = .02$; consequences: $B = -0.08, t = -0.91, p = .37$). The clustering of slopes at different levels of peer acceptability among BMI participants versus differentiation of slopes in EDU can be seen in Figure 1.²

Effect sizes reflected the differential relationships of the social network attributes to outcomes among EDU and BMI participants. Among EDU participants, a 1 standard deviation decrease in peer acceptability of decreasing use was associated with a .44 standard deviation increase in the rate of growth in drinks per heaviest week, a .90 standard deviation increase in the rate of growth in peak BAC, and a .18 standard deviation increase in the rate

²Results generally reflected the same pattern of effects for typical drinks per week and typical BAC.

of growth in consequences. Among BMI recipients, the effects were non-significant across all outcomes and in the opposite direction for peak BAC and consequences: a 1 standard deviation decrease in peer acceptability was associated with a .04 standard deviation increase in growth in drinks per heaviest week, a .37 standard deviation decrease in growth in peak BAC, and a .41 standard deviation decrease in growth in consequences. These effect sizes suggest small to moderate effects of perceived peer acceptability among BMI participants but larger effects among EDU participants, particularly for the consumption outcomes.

Discussion

Alcohol risk reduction interventions for college students typically show initial, short-term reductions in drinking that decay with time. The present research aimed to contribute to this literature by examining the role of college students' social networks in facilitating or hindering behavior change following two brief interventions. Notably, influences of peer social networks, as perceived by the participant, emerged over and above not only main effects of baseline level of drinking, but also baseline drinking by condition interactions. Main effects of students' social networks on initiation of behavior change were observed in three out of six tests. Peer drinking status had small effects on initial reductions in both consumption variables, while peer acceptability predicted initial reductions in consequences. When considering maintenance of behavior change over time, interactions between intervention condition and peer acceptability were significant for peak BAC and consequences and marginal for drinks per heaviest week. The BMI was particularly effective in maintaining reductions, relative to EDU, when participants were in riskier networks. Although there were no main effects of social networks on maintenance, riskier social networks were strongly associated with steeper growth in the consumption outcomes over time (i.e., faster return to baseline drinking levels) among EDU participants, but were unrelated to growth among BMI participants. Overall, results suggest that individuals in riskier social networks may be less likely to initiate reductions in drinking, regardless of the type of intervention they receive. However, how well students maintain changes over time reflects the interplay of their social networks with the content and type of intervention received.

The observed influence of social networks on initiation and on growth in alcohol use over the follow-up period is consistent with both theoretical models suggesting an influence of peers on health behaviors (e.g., Bandura, 1998; Bronfenbrenner, 1979) and with models of intervention efficacy that view networks as resources that can facilitate or hinder behavior change (Johnson et al., 2010). Previous research has examined individual-level predictors and moderators of drinking outcomes following brief interventions, including the pros and cons of drinking, self-regulation, and the relative reinforcing value of alcohol (Collins, S. E. & Carey, 2005; Curtin, Stephens, & Bonenberger, 2001; Murphy, Correia, Colby, & Vuchinich, 2005). To the extent that perceptions of peer behavior and attitudes reflect the real circumstances that college students must navigate while attempting risk reduction, results highlight the importance of understanding whether and how factors external to the individual affect post-intervention outcomes.

Our results, with social networks affecting maintenance of reductions in consumption in EDU but not BMI, corroborate recent meta-analytic research indicating that the effects of computer-delivered alcohol interventions decay rapidly (potentially as a result of social network effects in such contexts), while effects of counselor-delivered interventions are more enduring (Carey et al., 2012). Nonetheless, social networks might similarly affect counselor-delivered interventions that contain different active ingredients than the present BMI. The inclusion of normative feedback in the BMI but not EDU may account for stronger effects of social networks on maintenance in EDU. To the extent that individuals who receive a BMI change their perceptions of not only the campus drinking norms, but also their peer groups' norms (Carey, Henson, Carey, & Maisto, 2010), providing normative feedback may be sufficient for mitigating effects of peers on maintenance. On the other hand, BMIs have been shown to mitigate the influence of the tendency to compare oneself with others on alcohol use (Carey, Henson, Carey, & Maisto, 2007), and social comparison has been proposed as a mechanism of social network influence (Berkman, Glass, Brissette, & Seeman, 2000). The lesser influence of social networks in the BMI may reflect that BMIs decrease the tendency to engage in social comparison while drinking, which may be an outcome of challenging perceived norms.

Colleges and universities are required to provide interventions to students who violate campus alcohol policies. As limited resources (i.e., staff) often preclude providing counselor-delivered interventions to all mandated students, our results are consistent with previous research suggesting that counselor-delivered interventions should be targeted toward the riskiest students (Mun, White, & Morgan, 2009), for whom such interventions are likely to be most effective. An initial screener assessing students' perceptions of the level of risk associated with their social networks might assist in triaging students in low risk networks to a computer-delivered intervention, while reserving the more resource intensive, counselor-delivered interventions for students in riskier networks.

Students with peers perceived as heavier drinking reported smaller reductions in both drinks per heaviest week and peak BAC at 1 month follow-up. Conversely, peer acceptability related to initiation of reductions in consequences and predicted how well EDU participants maintained reductions in consumption over time. Previous research has demonstrated that descriptive norms (how most others behave) predict behavior assessed more proximally, while injunctive norms (what is approved of by most others) relate more strongly to distal outcomes (Larimer, Turner, Mallett, & Geisner, 2004). Taken together with the present findings, peer behavior and peer attitudes may exert influence at different points in the behavior change process. Results also suggest that targeting perceived peer attitudes in interventions may fruitfully enhance maintenance of behavior change. However, on average, participants already described their friends as somewhat to very accepting of reducing drinking, suggesting that peer acceptability may not be a strong target for normative feedback interventions for the typical student. Rather, active ingredients that provide students with skills for negotiating moderate drinking with less approving peers may successfully mitigate this influence on maintenance.

Our findings should be interpreted in light of the study limitations. First, results may not generalize to students who are not mandated to receive an intervention as a result of

violating campus alcohol policies. Second, data were collected at a university with few commuters and relatively little Greek involvement, limiting our ability to test these potential moderators. Influences of social networks on drinking may be weaker on campuses with more commuters and/or particularly strong among students involved in the Greek system. Third, our sample was comprised primarily of underclassmen. However, as upperclassmen are likely to have more stable social networks, we might expect stronger influences of pre-intervention social networks on their outcomes. Fourth, our measure of peer acceptability of decreasing use evidenced restriction of range, potentially reducing power. Finally, we utilized self-report measures of alcohol use and social network attributes. However, these correspond well with collateral and objective measurements of alcohol use (Borsari & Muellerleile, 2009; Carey & Hustad, 2002) and with friends' own reports (Valente, Fujimoto, Soto, Ritt-Olson, & Unger, 2013).

In sum, the alcohol treatment relapse and recovery literatures provide evidence for the influence of the social environment on initiation and maintenance of behavior change following interventions (Moos, 2007; Witkiewitz & Marlatt, 2004). This study represents an initial effort toward considering the role of social networks in initiation and maintenance of reductions in alcohol use following intervention among college students. Given the strong influences of perceived peer behavior and attitudes, particularly on maintenance of reductions in alcohol use among those who received the computer-delivered program, further understanding how and under what circumstances college students' social networks affect the behavior change process is a crucial step toward the development of more effective, longer lasting interventions.

Acknowledgments

This research was supported in part by NIAAA Grant R01-AA012518 to Kate B. Carey. The authors thank the Syracuse University SURE team for their contributions to this research.

References

- Aiken, L.S.; West, S.G. Multiple regression: Testing and interpreting interactions. Sage; 1991.
- Ajzen I. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*. 1991; 50:179–211.
- Anton RF, O'malley SS, Ciraulo DA, et al. Combined pharmacotherapies and behavioral interventions for alcohol dependence: The combine study: a randomized controlled trial. *JAMA*. 2006; 295:2003–2017. doi: 10.1001/jama.295.17.2003. [PubMed: 16670409]
- Baer JS, Kivlahan DR, Blume AW, Mcknight P, Marlatt GA. Brief intervention for heavy-drinking college students: 4-year follow-up and natural history. *American Journal of Public Health*. 2001; 91:1310. [PubMed: 11499124]
- Bandura A. Health promotion from the perspective of social cognitive theory. *Psychology & Health*. 1998; 13:623–649. doi: 10.1080/08870449808407422.
- Beattie MC, Longabaugh R. General and alcohol-specific social support following treatment. *Addictive Behaviors*. 1999; 24:593–606. doi: [http://dx.doi.org/10.1016/S0306-4603\(98\)00120-8](http://dx.doi.org/10.1016/S0306-4603(98)00120-8). [PubMed: 10574299]
- Berkman LF, Glass T, Brissette I, Seeman TE. From social integration to health: Durkheim in the new millennium. *Social Science & Medicine*. 2000; 51:843–857. doi: [http://dx.doi.org/10.1016/S0277-9536\(00\)00065-4](http://dx.doi.org/10.1016/S0277-9536(00)00065-4). [PubMed: 10972429]
- Blanco C, Okuda M, Wright C, Hasin DS, Grant BF, Liu S-M, Olfson M. Mental health of college students and their non-college-attending peers: results from the National Epidemiologic Study on

- Alcohol and Related Conditions. *Archives of General Psychiatry*. 2008; 65:1429–1437. doi: 10.1001/archpsyc.65.12.1429. [PubMed: 19047530]
- Borsari B, Carey KB. Peer influences on college drinking: A review of the research. *Journal of Substance Abuse*. 2001; 13:391–424. doi: [http://dx.doi.org/10.1016/S0899-3289\(01\)00098-0](http://dx.doi.org/10.1016/S0899-3289(01)00098-0). [PubMed: 11775073]
- Borsari B, Muellerleile P. Collateral reports in the college setting: a meta-analytic integration. *Alcohol Clin Exp Res*. 2009; 33:826–838. doi: 10.1111/j.1530-0277.2009.00902.x. [PubMed: 19298324]
- Bronfenbrenner, U. *The ecology of human development: Experiments by nature and design*. Harvard University Press; Cambridge: 1979.
- Campbell, W.; Hester, RK. Computerized Interventions.. In: Correia, CJ.; Murphy, JG.; Barnett, NP., editors. *College Student Alcohol Abuse: A Guide to Assessment, Intervention, and Prevention*. John Wiley & Sons, Inc.; Hoboken, New Jersey: 2012. p. 246-267.
- Capaldi DM, Stoolmiller M, Kim HK, Yoerger K. Growth in alcohol use in at-risk adolescent boys: Two-part random effects prediction models. *Drug and Alcohol Dependence*. 2009; 105:109–117. doi: 10.1016/j.drugalcdep.2009.06.013. [PubMed: 19625141]
- Carey KB, Carey MP, Henson JM, Maisto SA, Demartini KS. Brief alcohol interventions for mandated college students: comparison of face-to-face counseling and computer-delivered interventions. *Addiction*. 2010 doi: 10.1111/j.1360-0443.2010.03193.x.
- Carey KB, Henson JM, Carey MP, Maisto SA. Which heavy drinking college students benefit from a brief motivational intervention? *Journal of Consulting and Clinical Psychology*. 2007; 75:663–669. doi: 10.1037/0022-006x.75.4.663. [PubMed: 17663621]
- Carey KB, Henson JM, Carey MP, Maisto SA. Computer versus in-person intervention for students violating campus alcohol policy. *Journal of Consulting and Clinical Psychology*. 2009; 77:74. doi: 10.1037/a0014281. [PubMed: 19170455]
- Carey KB, Henson JM, Carey MP, Maisto SA. Perceived norms mediate effects of a brief motivational intervention for sanctioned college drinkers. *Clinical Psychology: Science and Practice*. 2010; 17:58–71. [PubMed: 22238504]
- Carey KB, Hustad JT. Are retrospectively reconstructed blood alcohol concentrations accurate? Preliminary results from a field study. *Journal of Studies on Alcohol*. 2002; 63:762–766. [PubMed: 12529077]
- Carey KB, Scott-Sheldon LA, Carey MP, Demartini KS. Individual-level interventions to reduce college student drinking: a meta-analytic review. *Addictive Behaviors*. 2007; 32:2469–2494. doi: 10.1016/j.addbeh.2007.05.004. [PubMed: 17590277]
- Carey KB, Scott-Sheldon LA, Elliott JC, Garey L, Carey MP. Face-to-face versus computer-delivered alcohol interventions for college drinkers: A meta-analytic review, 1998 to 2010. *Clinical Psychology Review*. 2012; 32:690–703. doi: 10.1016/j.cpr.2012.08.001. [PubMed: 23022767]
- Carey KB, Scott Sheldon L. a. J. Elliott JC, Bolles JR, Carey MP. Computer-delivered interventions to reduce college student drinking: a meta analysis. *Addiction*. 2009; 104:1807–1819. doi: 10.1111/j.1360-0443.2009.02691.x. [PubMed: 19744139]
- Christiansen M, Vik PW, Jarchow A. College student heavy drinking in social contexts versus alone. *Addictive Behaviors*. 2002; 27:393–404. [PubMed: 12118627]
- Chung T, Maisto SA. Relapse to alcohol and other drug use in treated adolescents: Review and reconsideration of relapse as a change point in clinical course. *Clinical Psychology Review*. 2006; 26:149–161. doi: <http://dx.doi.org/10.1016/j.cpr.2005.11.004>. [PubMed: 16364524]
- Clifford, PR.; Longabaugh, R. *Project MATCH Manual of the Administration of the Important People and Activities Instrument*. Brown University; Providence, R.I.: 1991.
- Cohen J. A power primer. *Psychological Bulletin*. 1992; 112:155–159. doi: 10.1037/0033-2909.112.1.155. [PubMed: 19565683]
- Collins RL, Parks GA, Marlatt GA. 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*. 1985; 53:189–200. [PubMed: 3998247]
- Collins SE, Carey KB. Lack of effect for decisional balance as a brief motivational intervention for at-risk college drinkers. *Addictive Behaviors*. 2005; 30:1425–1430. doi: 10.1016/j.addbeh.2005.01.004. [PubMed: 16022936]

- Cruz JE, Emery RE, Turkheimer E. Peer network drinking predicts increased alcohol use from adolescence to early adulthood after controlling for genetic and shared environmental selection. *Developmental Psychology*. 2012; 48:1390–1402. doi: 10.1037/A0027515. [PubMed: 22390657]
- Curtin L, Stephens RS, Bonenberger JL. Goal setting and feedback in the reduction of heavy drinking in female college students. *Journal of College Student Psychotherapy*. 2001; 15:17–37.
- Donohue B, Allen DN, Maurer A, Ozols J, Destefano G. A Controlled Evaluation of Two Prevention Programs in Reducing Alcohol Use Among College Students at Low and High Risk for Alcohol Related Problems. *Journal of Alcohol & Drug Education*. 2004; 48:13–33. doi: 10.1056/NEJM196001072620104.
- Doumas DM, Mckinley LL, Book P. Evaluation of two Web-based alcohol interventions for mandated college students. *Journal of Substance Abuse Treatment*. 2009; 36:65–74. doi: 10.1016/j.jsat.2008.05.009. [PubMed: 18657941]
- Dufour MC. What is moderate drinking. *Alcohol Research & Health*. 1999; 23:5–14. [PubMed: 10890793]
- Enders CK. The impact of nonnormality on full information maximum-likelihood estimation for structural equation models with missing data. *Psychological Methods*. 2001; 6:352–370. doi: 10.1037/1082-989x.6.4.352. [PubMed: 11778677]
- Groh DR, Jason LA, Keys CB. Social network variables in alcoholics anonymous: a literature review. *Clinical Psychology Review*. 2008; 28:430–450. doi: 10.1016/j.cpr.2007.07.014. [PubMed: 17719158]
- Hallgren KA, Ladd BO, Greenfield BL. Psychometric properties of the Important People Instrument with college student drinkers. *Psychology of Addictive Behaviors*. 2013; 27:819–825. doi: 10.1037/a0032346. [PubMed: 23586450]
- Hingson RW, Zha W, Weitzman ER, Hingson R, Weitzman E. 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*. 2009; (Supplement 16):12–20. Supplement. [PubMed: 19538908]
- Hu L-T, Bentler PM. Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods*. 1998; 3:424–453. doi: 10.1037/1082-989x.3.4.424.
- Johnson BT, Redding CA, Diclemente RJ, Mustanski BS, Dodge B, Sheeran P, Fishbein M. A network-individual-resource model for HIV prevention. *AIDS & Behavior*. 2010; 14:204–221. doi: 10.1007/s10461-010-9803-z. [PubMed: 20862606]
- Johnston, LD.; O'malley, PM.; Bachman, JG.; Schulenberg, JE. Monitoring the future national survey results on drug use, 1975–2007. Vol. 744. Institute for Social Research, The University of Michigan; Ann Arbor: 2011.
- Kelly JF, Stout RL, Magill M, Tonigan JS. The role of Alcoholics Anonymous in mobilizing adaptive social network changes: A prospective lagged mediational analysis. *Drug and Alcohol Dependence*. 2011; 114:119–126. [PubMed: 21035276]
- Kraemer HC, Wilson GT, Fairburn CG, Agras WS. Mediators and moderators of treatment effects in randomized clinical trials. *Archives of General Psychiatry*. 2002; 59:877. [PubMed: 12365874]
- Larimer ME, Turner AP, Mallett KA, Geisner IM. Predicting Drinking Behavior and Alcohol-Related Problems Among Fraternity and Sorority Members: Examining the Role of Descriptive and Injunctive Norms. *Psychology of Addictive Behaviors*. 2004; 18:203–212. doi: 10.1037/0893-164x.18.3.203. [PubMed: 15482075]
- Lau-Barraco C, Braitman AL, Leonard KE, Padilla M. Drinking buddies and their prospective influence on alcohol outcomes: Alcohol expectancies as a mediator. *Psychology of Addictive Behaviors*. 2012; 26:747–758. doi: 10.1037/A0028909. [PubMed: 22732054]
- Longabaugh R, Wirtz PW, Zweben A, Stout RL. Network support for drinking, Alcoholics Anonymous and long-term matching effects. *Addiction*. 1998; 93:1313–1333. doi: 10.1046/j.1360-0443.1998.93913133.x. [PubMed: 9926538]
- Longabaugh R, Wirtz PW, Zywiak WH, O'malley SS. Network support as a prognostic indicator of drinking outcomes: The COMBINE study. *Journal of Studies on Alcohol and Drugs*. 2010; 71:837. [PubMed: 20946740]

- Mastroleo NR, Murphy JG, Colby SM, Monti PM, Barnett NP. Incident-specific and individual-level moderators of brief intervention effects with mandated college students. *Psychology of Addictive Behaviors*. 2011; 25:616–624. [PubMed: 21766975]
- Matthews DB, Miller WR. Estimating blood alcohol concentration: Two computer programs and their applications in therapy and research. *Addictive Behaviors*. 1979; 4:55–60. [PubMed: 420046]
- Mccrady BS. To have but one true friend: Implications for practice of research on alcohol use disorders and social network. *Psychology of Addictive Behaviors*. 2004; 18:113–121. [PubMed: 15238053]
- Monahan CJ, Mcdevitt-Murphy ME, Dennhardt AA, Skidmore JR, Martens MP, Murphy JG. The impact of elevated posttraumatic stress on the efficacy of brief alcohol interventions for heavy drinking college students. *Addictive Behaviors*. 2013; 38:1719–1725. doi: <http://dx.doi.org/10.1016/j.addbeh.2012.09.004>. [PubMed: 23261489]
- Moos RH. Theory-based processes that promote the remission of substance use disorders. *Clinical Psychology Review*. 2007; 27:537–551. doi: <http://dx.doi.org/10.1016/j.cpr.2006.12.006>. [PubMed: 17254686]
- Mun EY, White HR, Morgan TJ. Individual and situational factors that influence the efficacy of personalized feedback substance use interventions for mandated college students. *Journal of Consulting and Clinical Psychology*. 2009; 77:88–102. [PubMed: 19170456]
- Murphy JG, Correia CJ, Colby SM, Vuchinich RE. Using behavioral theories of choice to predict drinking outcomes following a brief intervention. *Experimental and Clinical Psychopharmacology*. 2005; 13:93–101. doi: 10.1037/1064-1297.13.2.93. [PubMed: 15943542]
- Muthén, L.; Muthén, B. Mplus user's guide. 7th ed.. Muthen & Muthen; Los Angeles: 1998-2012.
- Reifman A, Watson WK. Binge drinking during the first semester of college: Continuation and desistance from high school patterns. *Journal of American College Health*. 2003; 52:73–81. [PubMed: 14765761]
- Reifman A, Watson WK, Mccourt A. Social networks and college drinking: Probing processes of social influence and selection. *Personality and Social Psychology Bulletin*. 2006; 32:820–832. doi: 10.1177/0146167206286219. [PubMed: 16648206]
- Rosenquist JN, Murabito J, Fowler JH, Christakis NA. The spread of alcohol consumption behavior in a large social network. *Annals of Internal Medicine*. 2010; 152:426. doi: 10.1059/0003-4819-152-7-201004060-00007. [PubMed: 20368648]
- Sher KJ, Rutledge PC. Heavy drinking across the transition to college: Predicting first-semester heavy drinking from precollege variables. *Addictive Behaviors*. 2007; 32:819–835. doi: 10.1016/j.addbeh.2006.06.024. [PubMed: 16860940]
- Slutske WS. Alcohol use disorders among US college students and their non-college-attending peers. *Archives of General Psychiatry*. 2005; 62:321–327. doi: 10.1001/archpsyc.62.3.321. [PubMed: 15753245]
- Valente TW, Fujimoto K, Soto D, Ritt-Olson A, Unger JB. A comparison of peer influence measures as predictors of smoking among predominately hispanic/latino high school adolescents. *The Journal of Adolescent Health*. 2013; 52:358–364. doi: 10.1016/j.jadohealth.2012.06.014. [PubMed: 23299016]
- White HR, Labouvie EW. Towards the assessment of adolescent problem drinking. *Journal of Studies on Alcohol and Drugs*. 1989; 50:30–37.
- Witkiewitz K, Marlatt GA. Relapse prevention for alcohol and drug problems: That was Zen, this is Tao. *American Psychologist*. 2004; 59:224–235. doi: 10.1037/0003-066x.59.4.224. [PubMed: 15149263]
- Zywiak, WH.; Longabaugh, R. Center for Alcohol and Addiction Studies; Providence, RI: 2002. The Brief Important People Interview Manual..
- Zywiak WH, Longabaugh R, Wirtz PW. Decomposing the relationships between pretreatment social network characteristics and alcohol treatment outcome. *Journal of Studies on Alcohol and Drugs*. 2002; 63:114–121.

Figure 1.

Simple slopes for condition by peer acceptability of reducing use interaction predicting peak BAC. Simple slopes were probed at the mean and at 1 standard deviation above (high) and below the mean (low) of peer acceptability.

Table 1

Fit statistics for final models.

Outcome	Chi-square	CFI	SRMR	RMSEA
Drinks per heaviest week	$\chi^2(19) = 29.60, p = .06$	.98	.04	0.06 (CI= 0.00-0.10)
Peak BAC	$\chi^2(26) = 25.03, p = .52$	1.00	.06	0.00 (CI= 0.00-0.06)
Consequences	$\chi^2(25) = 41.79, p = .02$	.94	.05	0.07 (CI= 0.03-0.10)

Note. CFI= comparative fit index; SRMR= standardized root-mean-square residual; RMSEA= root-mean-square error of approximation

Table 2

Simple slopes for peer acceptability by condition interactions.

Outcome	Level of Peer Acceptability	Test of difference between BMI and EDU slopes	Unstandardized Slope in BMI	Unstandardized Slope in EDU
Drinks per heaviest week	Low	$\chi^2 = 7.72, p = .01$	0.37	0.87
	Mean	$\chi^2 = 4.97, p = .03$	0.37	0.67
	High	$\chi^2 = 0.26, p = .66$	0.38	0.46
Peak BAC	Low	$\chi^2 = 2.66, p = .10$	0.002	0.003
	Mean	$\chi^2 = 0.11, p = .74$	0.002	0.002
	High	$\chi^2 = 1.34, p = .25$	0.002	0.001 ^a
Consequences	Low	$\chi^2 = 5.13, p = .02$	0.01 ^a	0.19
	Mean	$\chi^2 = 1.12, p = .29$	0.09	0.14
	High	$\chi^2 = 1.18, p = .28$	0.18	0.09 ^a

Note.

^a denotes non-significant slope; all other slopes significantly different from zero. Simple slopes at mean, low, and high levels of peer acceptability were probed at the mean and at 1 standard deviation below and above the mean, respectively.