

Effect of Precollege Drinking Intentions on Women's College Drinking as Mediated Via Peer Social Influences*

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ABSTRACT. Objective: The study examined the impact of precollege drinking intentions on college heavy episodic drinking (HED) in a sample of women making the transition from high school to college. We hypothesized that the effects of drinking intentions on college first and second semester HED would be mediated by first semester social norms and drinking pressure. **Method:** High school seniors ($n = 416$) recruited from the community were assessed at the time of high school graduation and at the end of the first and second semesters of college. **Results:** The hypothesized model was supported. After controlling for

high school HED, precollege drinking intentions predicted first semester descriptive and injunctive social norms and social pressure to drink. Social influence variables were associated with higher frequency HED in the first semester, which in turn predicted higher frequency HED in the second semester. **Conclusions:** Results suggest that precollege drinking intentions, independent of high school HED, may influence selection of college social environments and play a significant role in actual college HED. Assessment and targeting of these intentions may aid in prevention of college HED. (*J. Stud. Alcohol Drugs* 70: 575-582, 2009)

HEAVY EPISODIC DRINKING (HED) is recognized as a prevalent and significant problem among college students (Knight et al., 2002; Wechsler et al., 1998). HED, typically defined as consuming four or more drinks for women (five or more for men) on a single occasion, is associated with a range of negative consequences, including injury, school failure, and unprotected sex (Wechsler et al., 1998). There is substantial evidence that the college environment contributes to the increases in drinking that typically occur during this developmental period. For example, young people who go to college evidence a greater increase in drinking over the same period as those who do not go on to college (Slutske et al., 2004; White et al., 2005). These effects appear to be greatest for those who move away from home (White et al., 2006).

Research examining the risk factors for college HED has identified peer social influences as a major contributor. College HED is influenced by both perceived social norms around drinking and by direct social influences (see Borsari and Carey, 2001, for a review). For example, students who report that their peers drink more heavily (descriptive norms) and that their peers approve of drinking (injunctive norms) drink more themselves, both cross-sectionally and longitudinally (Larimer et al., 2004; Neighbors et al., 2007; Read et

al., 2003; Wood et al., 2001). More direct social influences (e.g., offers to drink or others providing drinks) are also positively associated with heavier drinking (Turrisi et al., 2008; Wood et al., 2001).

Individuals are not merely passive recipients of social influences from others; rather, they choose the social environments and peer groups that subsequently influence their drinking. Longitudinal studies support the notion of reciprocal social influences with respect to drinking behaviors (e.g., Kahler et al., 2003; Read et al., 2005). For example, specific to fraternity/sorority membership, several studies indicate that not only does fraternity/sorority affiliation contribute to increases in drinking in college but also that those who elect to join fraternity/sorority organizations reported heavier drinking in high school (Capone et al., 2007; McCabe et al., 2005; Park et al., 2008).

Other studies reveal that precollege intentions, expectations, or motivations to drink are also robust predictors of future drinking in college students (McMillan and Conner, 2003; Shim and Maggs, 2005). For example, Sher and Rutledge (2007) found that, after accounting for the effects of actual high school drinking, students reporting a greater importance of college parties, fraternities/sororities, and having fun subsequently reported higher drinking in college. Although not investigated directly in their study, Sher and Rutledge suggested that these precollege motivations contributed to peer selection effects as students enter the college environment and affiliate with new peer groups within the first weeks of college. Networks comprised of heavier drinking peers are likely to sustain and encourage alcohol use.

The current study was designed to extend prior research by examining the indirect effects of precollege drinking

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intentions on college HED in a sample of women making the transition from high school to college. It is plausible that these drinking intentions or motivations contribute to social affiliations and activities in college, which in turn contribute to college drinking. Thus, we examined whether the effect of precollege drinking intentions on college drinking is mediated via first semester social influences: peer drinking, peer approval of drinking, and social pressure to drink. We considered the influence of college drinking intentions separate from the impact of actual high school drinking. Although high school drinking is a robust predictor of college drinking (e.g., Leibsohn, 1994; Sher and Rutledge, 2007), a substantial number of students who do not engage in HED in high school begin doing so in college (e.g., Lo and Globetti, 1993). Intentions to drink have been shown to predict initiation of HED in college among students not already engaging in HED in high school (Kruse and Barnett, 2008). In a study that examined predictors separately for those who engaged in HED versus those who did not engage in HED in high school, Reifman and Watson (2003) found that the predictors of college HED were largely the same for both groups and involved peer social influences and self-reported importance of parties. Thus, we predicted that precollege intentions to drink in college would predict actual college HED independent of high school HED.

As suggested by previous research, intentions regarding college drinking are likely to influence college social activities and social networks, particularly around alcohol. The prevalence of alcohol use on most college campuses makes it likely that students who intend to drink more heavily will be able to identify many heavy drinking peers and support for their own drinking (see Borsari and Carey, 2001), if they desire. Thus, the first weeks of college provide a unique opportunity to affiliate with new social networks, particularly for students who move away from home (Hays and Oxley, 1986). Perceived drinking norms appear to be particularly important contributors to alcohol use among first-year students relative to upperclassmen (cf. Borsari et al., 2007). Moreover, some studies suggest that perceived social norms are relatively more influential for female versus male students (Lewis and Neighbors, 2004, 2007).

Figure 1 depicts a model in which the effect of precollege drinking intentions on college HED is mediated via first semester descriptive and injunctive social norms around drinking and via direct social influences, such as offers to drink. Such a model is consistent with both selection and socialization influences. That is, we hypothesize that students who intend to drink more in college affiliate in their first semester with heavier drinking peers who encourage and approve of college drinking. In turn, these peer norms and social approval around drinking are expected to predict a higher frequency of college HED in the first semester and, subsequently, in the second semester. We also hypothesize that the proposed social influence pathways will be stronger

among students who move away from home, compared with those who continue to live with parents. College students who move away from home have the opportunity to affiliate with completely new social networks and can choose those networks based on their college drinking intentions, if they so desire.

Method

Participants consisted of 416 female college freshmen who served as a control group for a randomized controlled trial (see Testa and Livingston, 2008). They were recruited by telephone, just before high school graduation, from households in Erie County, NY. At the time of recruitment, students were, on average (SD), 18.1 (0.33) years old. The majority was white (90.9%, compared with 82.2% white for the county), lived with both mother and father (87.1%), and came from households with a median income of \$75,000, which is close to the median income of \$74,000 for college freshmen nationally (Pryor et al., 2007). In the fall semester, students attended more than 100 different colleges; however, the majority of students attended colleges in western New York.

Potential participants were selected at random from yearbook photos from local city and suburban high school graduating classes of 2004, 2005, 2006, and 2007. Students and their mothers were offered the opportunity to participate in a longitudinal study of transition to college. To be eligible, the graduating senior had to be planning to enter a 2- or 4-year college in the fall and be living with her mother (or a mother figure, such as a grandmother), and both mother and daughter had to agree to participate and provide written informed consent. We identified 3,153 female students through yearbook photos and—using public telephone directories—were able to locate 1,354 of these.¹ Of these, 133 were ineligible (primarily because they were not planning to attend college in the fall) and 1068 (78.9%) agreed to participate. Baseline questionnaire booklets, sent in May or June of the senior year, were completed by 992 (92.9%) students. After completion of baseline measures, participants were randomly assigned to an intervention ($n = 523$) or control ($n = 469$) condition. The sample used in the primary analyses consists of control group participants who completed baseline (Time [T] 0), first semester (T1), and second semester (T2) measures ($n = 416$, 88.7%). Participants were paid \$30 for completing baseline questionnaires and \$50 for follow-ups.

¹Although we have no data with which to compare students who were not located with students who were recruited into the sample, we recognize that our sample contains a large proportion of intact and stable families and few blended families. Because of our reliance on public telephone directories, we were unable to recruit students without telephones and whose last names differed from their parents'.

Measures

Only measures used in the current analyses are described. Measures were also completed by mothers; however, mothers' data are not used in the current analyses.

Alcohol consumption. At baseline (T0), and at follow-ups at the end of the fall (T1) and spring semesters (T2) of the first year of college, participants reported on the frequency of HED over the past 90 days. Two measures were used: (1) the frequency of drinking four or more drinks on an occasion and (2) the frequency of drinking to intoxication. Responses were on a 6-point Likert scale, ranging from 0 (never) to 5 (5 or more days per week). Because items were highly correlated (.85 at baseline, .91 at follow-up), they were averaged to form a single measure of frequency of HED.

Intentions to drink in college. At baseline (T0), four items were used to assess college drinking intentions: (1) expected frequency of drinking, (2) expected quantity of drinking per occasion, (3) expected frequency of drinking four or more drinks, and (4) expected frequency of drinking to intoxication. All used 6-point Likert scales, ranging from 0 (never) to 5 (5 or more days per week). Items were averaged ($\alpha = .93$).

Descriptive drinking norms. At T1, students estimated the percentage of their female friends who engaged in five

drinking behaviors, including "How many of your female friends sometimes get drunk or intoxicated?" Norms based on own-gender referents have been shown to be more relevant, less biased, and better predictors of one's own drinking than norms based on more general referents, particularly for women (Borsari and Carey, 2003; Lewis and Neighbors, 2004). Students responded on a scale ranging from 0 to 10, with 0 representing none of their friends, 5 representing half of their friends, and 10 representing all of their friends. These items were averaged into a single scale ($\alpha = .92$).

Injunctive norms for drinking. At T1, participants indicated perceived approval for a series of eight drinking behaviors, each following the stem "How would your close friends respond if they knew..." Items included those of Baer (1994; e.g., "you drank alcohol every weekend,") as well as four additional items, including "you had a drink to celebrate a special occasion." Items, rated on 7-point Likert scales ranging from 1 (strong disapproval) to 7 (strong approval), had good internal consistency ($\alpha = .92$) and were averaged.

College drinking pressure. A series of six items, administered at T1, assessed the frequency of experiencing active pressure to drink. These included four items used by Read et al. (2005) that asked how often they had experienced the following: (1) "been offered a drink," (2) "been given a drink

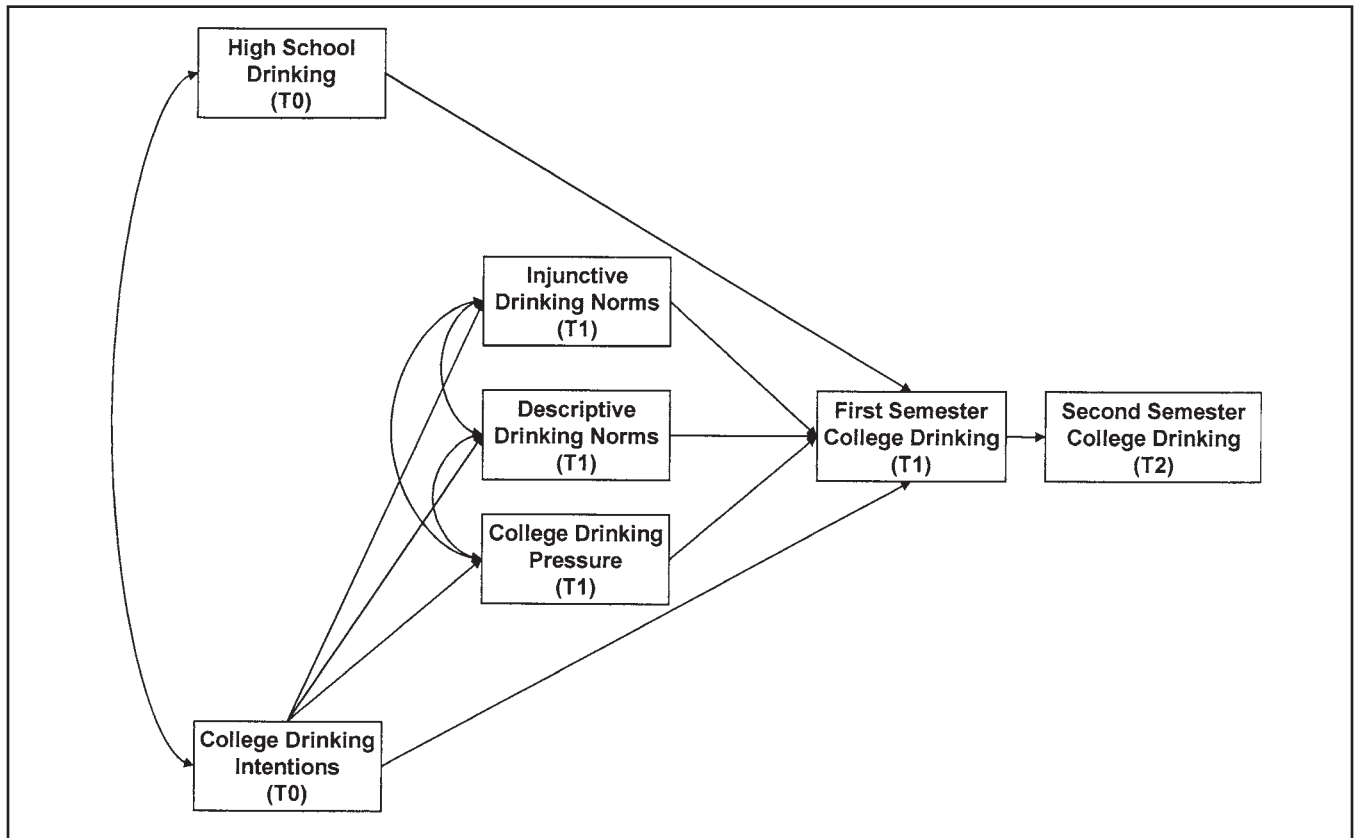


FIGURE 1. Conceptual model of mediated effects of precollege drinking intentions on college drinking; T = Time

without asking for it," (3) "someone filled up your drink without asking you if you wanted it filled," and (4) "someone bought you a drink without you asking for it." We added two more items: (1) "drank more than you intended because other people encouraged or pressured you to drink" and (2) "felt pressured to drink at a party or other situation where others were drinking." Responses were made on a 7-point scale, ranging from 1 (never) to 7 (all the time). The six items had good internal consistency ($\alpha = .87$) and were averaged.

College information

At the end of the first semester, respondents were asked what type of college they attended (2-year or 4-year college), location of the college, and where they lived during the school year (parents' home vs dormitory or college apartment).

Results

Overview of analyses

A series of models were evaluated and compared using structural equation modeling (SEM) analyses. The first structural model was designed to test the hypothesis that intentions about future college drinking would demonstrate a significant, positive association with actual college drinking. Our second structural model tested the hypothesis that social influences would mediate the relationship between college drinking intentions and college drinking. Finally, multiple-group structural equation models were estimated to determine whether the identified mediators had comparable effects for students living away from home versus living at home with their parents.

Model parameters were estimated using the maximum likelihood procedure of the AMOS structural equation modeling program (Arbuckle, 1997). The chi-square statistic was used to evaluate the overall fit of the models. A nonsignificant chi-square value indicates good fit. However, because trivial differences between predicted and observed matrices may result in a significant chi-square when large samples are used, three other goodness-of-fit indices were used that are less dependent on sample size: (1) the comparative fit index (CFI), (2) the root mean square error of approximation (RMSEA), and (3) the Tucker-Lewis index (TLI). Values close to .95 for CFI and TLI indices and values of .06 or less on the RMSEA are considered to indicate an acceptable fitting model (Byrne, 2001). Nested models were compared with the chi-square difference test.

Testing the mediated model

Before examining the mediational effect of active and passive social influence on the relationship between college

drinking intentions and actual college drinking, it was necessary to show that intentions regarding future college drinking had a direct effect on actual college drinking. The direct path from college drinking intentions to first semester (T1) college drinking was estimated with high school (T0) HED included as a covariate. As predicted, intentions regarding future college drinking positively predicted actual first semester (T1) HED ($\beta = .51, p < .001$), even after controlling for high school (T0) HED. Higher frequency of high school HED also predicted a higher frequency of first semester (T1) HED ($\beta = .23, p < .001$). As expected, first semester (T1) HED strongly predicted second semester (T2) HED ($\beta = .76, p < .001$).

After establishing that there was a direct effect of college drinking intentions on actual first semester (T1) college drinking, a mediational model was then tested to examine whether drinking intentions influenced first semester (T1) college drinking via social norms and social influences. A structural equation model was specified by adding the descriptive norms, injunctive norms, and drinking pressure variables to the model (see Figure 2). This model provided acceptable fit to the data ($\chi^2 = 34.76, 8 \text{ df}, p < .001; n = 416; \text{CFI} = .98; \text{TLI} = .95; \text{RMSEA} = .09$). As predicted, women who intended to drink more in college reported having more female friends who drank ($\beta = .61, p < .001$), more peer social approval of drinking ($\beta = .53, p < .001$), and more social pressure to drink ($\beta = .51, p < .001$). In turn, having more friends who drank ($\beta = .17, p < .001$), perceiving greater peer social approval of drinking ($\beta = .08, p < .05$), and experiencing more pressure to drink ($\beta = .25, p < .001$) predicted women's first semester (T1) HED. All three indirect paths were significant using Sobel's (1982) method: the indirect effect from intentions to college drinking as mediated through peer descriptive norms ($z = 3.64, p < .001$), the indirect effect from intentions to college drinking as mediated through peer injunctive norms ($z = 1.96, p < .05$), and the indirect effect mediated through social pressure to drink ($z = 5.69, p < .001$).

Although the effect of college drinking intentions on actual first semester (T1) drinking was not eliminated when the mediators were included in the model (see Figure 2), the direct path was reduced substantially (change in standardized path coefficient = .22). To test for mediation, we compared the model proposed in Figure 2 with a model in which the direct path from drinking intentions to first semester (T1) HED was constrained to zero. Results of this analysis indicated that the model in which the direct path was constrained to zero provided a significantly worse fit to the data than did the model that allowed this path to be estimated ($\Delta\chi^2 = 25.64, 1 \text{ df}, p < .001$). Taken together with the significant indirect paths, results suggest that the effect of drinking intentions on first semester (T1) college drinking is partially mediated by the three proposed variables.

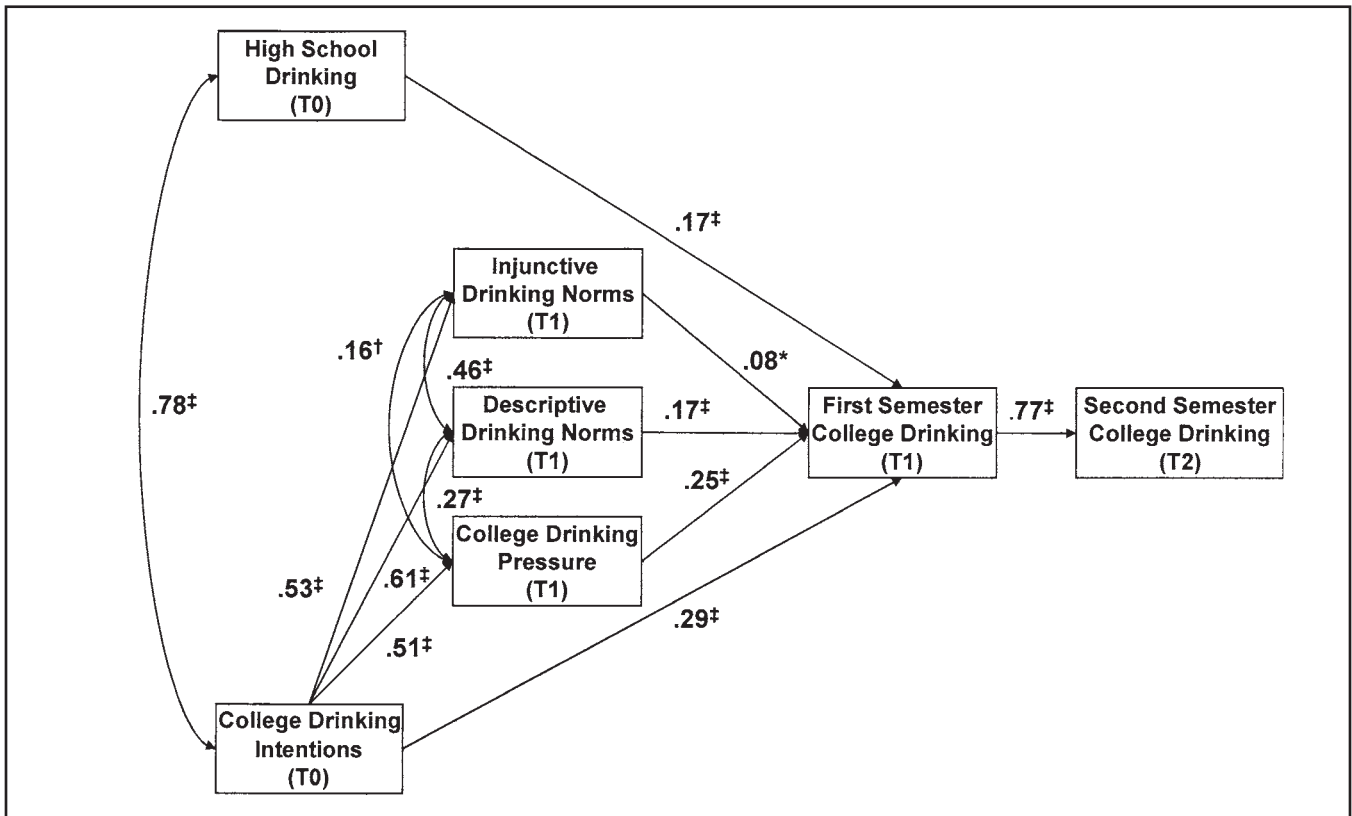


FIGURE 2. Mediated effects of precollege drinking intentions on first and second semester heavy episodic drinking; $n = 416$; T = Time
 * $p < .05$; † $p < .01$; ‡ $p < .001$.

Because of the substantial correlation between high school (T0) drinking and T0 intentions regarding college drinking ($r = .78$), we considered the possibility that high school drinking contributes to college (T1) social influences in addition to or instead of drinking intentions. To examine this possibility, we estimated a model that included the direct paths from high school drinking to the three mediators. Results of this analysis indicated that the paths from high school drinking to the mediator variables, in comparison with those from drinking intentions, were more modest (high school drinking \rightarrow descriptive norms: $\beta = .11$, NS; high school drinking \rightarrow injunctive norms: $\beta = .14$, $p < .05$; high school drinking \rightarrow social pressure: $\beta = .12$, NS). Moreover, none of the proposed mediators significantly mediated the relationship between high school drinking (T0) and first semester (T1) college drinking. Of importance, the effects of drinking intentions on the proposed mediators and on first semester (T1) college drinking remained, even after these additional paths were included in the model. Thus, despite the correlation between drinking intentions and high school drinking, the effect on college social influence variables appears specific to the former. Given that the impact of high school drinking on the proposed mediators was minimal, these paths were not included in subsequent analyses.

Testing whether mediation effects are moderated by college living status

We had hypothesized that the mediated effects of college drinking intentions via peer influences would be stronger for women living away from home, compared with those living with parents. To examine whether the identified mediators had comparable effects for the two groups, the sample was split by daughters' living status at college. Approximately 40% ($n = 167$) of daughters reported living in their parents' home, whereas 60% ($n = 247$) lived away from home. Two participants did not report living status and were dropped from the analysis.

A multiple group structural equation model was estimated to determine whether the identified mediators had comparable effects for the two groups. In the multiple-group procedure, a specified model is first estimated simultaneously in both groups. Constraints are then imposed to test whether constraining the two models to be equal significantly reduces the fit of the model. If the constrained model has a significantly worse fit, this suggests that the path coefficients for the two groups are not equal and that living status is a significant moderator of at least one of these effects.

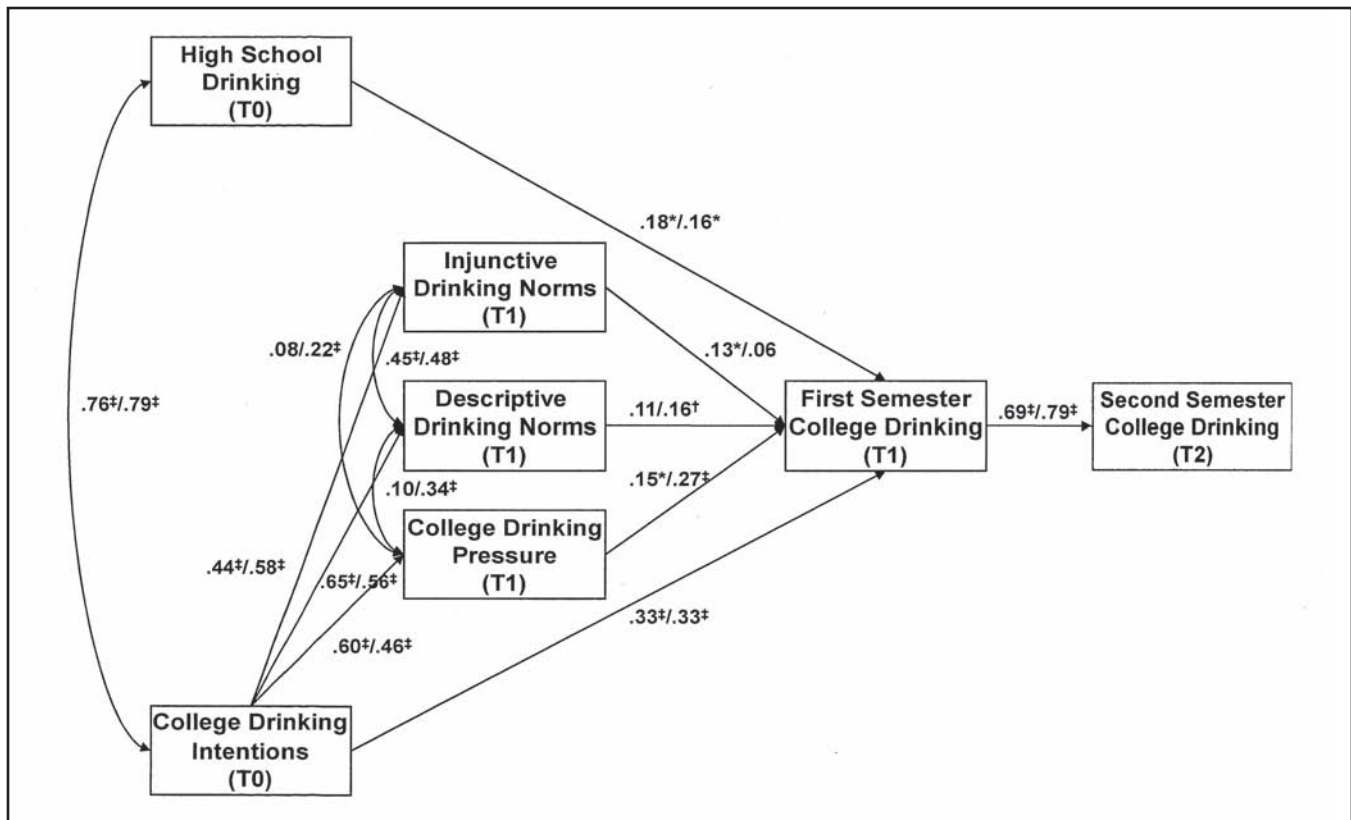


FIGURE 3. Moderated effects of precollege drinking intentions on first and second semester heavy episodic drinking; $n = 414$; T = Time
 $^*p < .05$; $^\dagger p < .01$; $^\ddagger p < .001$.

Results indicated that the unconstrained model ($\chi^2 = 46.30$, 16 df, $p = .001$; $n = 414$; CFI = .98, TLI = .94, RMSEA = .07) provided an acceptable fit to the data. Figure 3 displays the parameter estimates for the two groups. Next, a multiple-group SEM model was tested that constrained all of the path coefficients to be equal across the two groups. A chi-squared difference test ($\Delta\chi^2 = 21.57$, 9 df, $p < .05$) revealed that the unconstrained model provided a significantly better fit to the data than did the model that constrained the path coefficients to be equal ($\chi^2 = 67.87$, 25 df, $p < .001$; $n = 414$; CFI = .97, TLI = .94, RMSEA = .07), indicating that some relationships among the variables differed across the groups.

To determine which specific path coefficients significantly differed across the two groups, a series of nested models were examined. Each of these nested models allowed a single parameter to be freely estimated across the two groups. If releasing the constraint did not result in a significantly better fit over the constrained model, the parameter was considered to be equal for the two groups. The results of these analyses indicated that six paths differed across college living status; however, differences were modest in magnitude (see Figure 3).

Consistent with the hypothesis that mediated effects would be stronger for women living away from home, peer

drinking (descriptive norms) was a significant mediator for women living away from home ($z = 1.32$, $p < .01$) but not for those living with their parents. Moreover, whereas pressure to drink was a significant mediator both for women living away from home ($z = 4.60$, $p < .001$) and those living with parents ($z = 2.16$, $p < .05$), the indirect effect was stronger for women living away from home. However, the hypothesis was not supported with respect to perceived social approval of drinking, which was a significant mediator for women living with their parents ($z = 2.00$, $p < .05$) but not for those living away from home. In brief, the hypothesis that the mediated social influences would be stronger for women living away from home received only weak support.

Discussion

Consistent with hypotheses, the effect of college drinking intentions on actual college HED was mediated via social influences: heavier drinking peers, greater perceived peer approval for drinking, and more actual social pressure to drink. Findings are consistent with the notion that precollege drinking intentions lead new college students to affiliate with heavier drinking social networks or at least to perceive that their social networks involve more drinking and greater approval of drinking. In turn, these peer social influences are

associated with more frequent HED in the first semester and subsequently in the second semester of college.

Our data are consistent with prior research showing that precollege drinking is a robust predictor of college drinking (e.g., Borsari et al., 2007). However, intentions to drink in college, reported at the time of high school graduation, were a better predictor of actual college HED than high school drinking, with larger direct and indirect effects. Although high school drinking and college drinking intentions were strongly correlated, our findings suggest that these components are distinct. Specifically, drinking intentions play a stronger role than high school drinking in driving the peer social influences that support and contribute to college HED. Thus, college drinking is not merely a continuation of a pattern of behavior begun in high school but, rather, reflects intentionality. That is, those who intend to drink more affiliate with peer networks and environments that encourage drinking and subsequently engage in more frequent HED.

We had hypothesized that the mediated paths from intentions through social influences would be stronger for female college students who move away from home, because they are better able to choose new social influences and alter their existing peer networks relative to students who remain at home. We found little support for this hypothesis, however. Although there were subtle differences in the strength of the path coefficients, findings suggest that the model is applicable to both students living away from home, as well as those living with their parents. Students who remain in their parents' homes, like those who move away, may be affiliating with new social groups whose drinking is consistent with their college drinking expectations. However, it is also likely that the social networks of commuter students are comprised primarily of prior friends (see Hays and Oxley, 1986) whose social norms coincide with the students' precollege drinking intentions.

The longitudinal design is an important strength of the study, as is the high retention rate. Nonetheless, there are limitations. First, we relied on self-reports of drinking and peer drinking norms. Social norms are admittedly difficult to assess accurately, because they are filtered through one's own perception and include known biases, such as a tendency to overestimate others' drinking (Borsari and Carey, 2001). Nonetheless, perceptions reflect reality to some extent; for example, those in heavier drinking fraternities perceive higher norms for drinking than do those in lighter drinking fraternities (Larimer et al., 1997). To reduce the tendency to overreport and to better estimate actual social influences in this study, we assessed perceived descriptive and injunctive norms of close female friends, whose behavior is observable, rather than of the average college student. Moreover, we used a measure of social pressure to drink that included specific behaviors directed toward oneself (e.g., offers to drink or people buying drinks). Thus, we believe that our measures

are reasonably accurate assessments of actual peer social norms and influences.

Although we believe that the model applies to male college students as well, findings were based on an all-female sample and should be tested with men before generalizing. In addition, generalizability may be limited because the sample was recruited, and, for the most part, students attended college in one area of the country. We note, however, that the sample was more heterogeneous than many college samples in that students attended a variety of 4- and 2-year colleges and included students living in dorms and with parents.

Interventions targeting incoming college students would do well to assess and address precollege drinking intentions, because these have clear implications for college socialization, which is, in turn, a major determinant of actual drinking. Understanding how intentions to drink in college are formed (e.g., from peers, older siblings, or parents) may also help to guide prevention efforts. Findings also support the importance of intervention before initiation of college (e.g., Turrisi et al., 2001), because peer selection effects occur quickly, and drinking behaviors are established within a short time after the start of college. Findings are consistent with the notion that students who intend to drink more in college seek out heavier drinking peer groups, but also with the opposite: that those who do not intend to drink heavily in college remain lighter drinkers via their affiliation with like-minded peers. Because college students are not passive recipients of social pressure to drink but rather make choices regarding social affiliations, emphasizing and encouraging social alternatives to drinking may be a promising prevention approach.

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