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# Prospective Protective Effect of Parents on Peer Influences and College Alcohol Involvement

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## Abstract

This prospective study used a conceptually-based risk and protective framework to investigate whether parental influences exert a protective effect on the robust association between peer influences and college alcohol involvement. Participants were incoming freshmen in the control condition of a randomized clinical trial, $N = 256$, 57.0% women, baseline age: $M = 18.36$ years ($SD = 0.41$). Participants completed telephone surveys in the summer before matriculation (baseline) and in the spring of the freshman (10-month) and sophomore years (22-month) with 85.6% retention at 22-months. Latent growth models were estimated for heavy episodic drinking and alcohol-related consequences. Descriptive norms and social modeling among peers were positively associated with initial heavy drinking and consequences; parental drinking permissiveness was positively associated with initial heavy drinking. Greater social modeling among peers was associated with less growth in consequences. Parental monitoring was not significantly associated with alcohol involvement. Pre-matriculation social modeling exhibited a weaker positive association with initial heavy drinking and consequences at low pre-matriculation parental drinking permissiveness compared to high. Similarly, pre-matriculation descriptive norms exhibited a weaker positive association with initial heavy drinking at low pre-matriculation parental drinking permissiveness compared to high. Pre-matriculation descriptive norms were not significantly associated with growth in heavy drinking at low parental drinking permissiveness; in contrast, higher pre-matriculation descriptive norms were associated with less growth in heavy drinking at high parental drinking permissiveness. Findings provide support for a protective parental influence on peer-alcohol relations extending into college. Parental drinking permissiveness may be an important target for parent-based interventions.

### Keywords

alcohol; college students; parents; peers; protective

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Young adulthood is an important developmental period during which many individuals attend college and are presented with a multitude of opportunities for identity exploration and socialization (Arnett, 2005; Brown et al., 2008). The transition to college has been consistently associated with increased alcohol involvement (Sher & Rutledge, 2007; White et al., 2006). Approximately 40% of college students report engaging in heavy episodic drinking at least once in the past two weeks (O'Malley & Johnston, 2002). An estimated 1,825 college students die annually in the United States as a result of alcohol-related unintentional injuries, most often in motor vehicle accidents, and alcohol is implicated in more than 796,000 violent and sexual assaults (Hingson, Zha, & Weitzman, 2009). Given the severity and scope of the negative consequences associated with heavy alcohol use (Wechsler, Lee, Kuo, & Lee, 2000), further elucidation of the etiologic factors that may contribute to the initiation and escalation of alcohol use and misuse is critical. An important next step is to extend the small body of research suggesting that parenting practices may offset the robust influence of peers in college. Accordingly, the current study investigated whether parental influences may qualify the robust, effects of peer influences on college student alcohol use and consequences. These findings can inform needed refinement of parent-based interventions for college students by more effectively targeting the parental influences demonstrating both promotive and protective effects (Brook, Brook, Gordon, Whiteman, & Cohen, 1990; Zucker, Donovan, Masten, Mattson, & Moss, 2008).

## Framework for Risk, Promotive, and Protective Factors

The strong influence that peers have on the development of young adult alcohol use has been well-established for the general college population and fraternity and sorority members (Borsari & Carey, 2001; Capone, Wood, Borsari, & Laird, 2007; McCabe et al., 2005; Sher & Rutledge, 2007). Parents are commonly viewed as less important; yet, college students report parents as an important source of health information (American College Health Association, 2007). Parental factors have increasingly been shown to be directly and indirectly associated with decreased alcohol use and consequences during the college years in both cross-sectional (Patock-Peckham & Morgan-Lopez, 2006, 2010; see also Cail & LaBrie, 2010) and longitudinal research (Abar & Turrisi, 2008; Walls, Fairlie, & Wood, 2009; Wetherill & Fromme, 2007).

Peer and parental influences have long been characterized in the context of risk and protective factors (Hawkins, Catalano, & Miller, 1992; Jessor, 1991; Rutter, 1985). *Risk factors*, such as affiliations with substance-using peers (Brown et al., 2008), are associated with an increased risk of alcohol use. *Promotive factors*, defined by Sameroff (2000) as reflecting the more advantageous end of a risk factor (e.g., high parental attachment), are associated with a decreased risk of alcohol use. Protective factors are distinguishable from promotive factors, since *protective factors* are those that mitigate the effect of a risk factor (see Brook et al., 1990; Hawkins et al., 1992; Zucker et al., 2008). For example, parental monitoring may be considered protective if the association between a risk factor (e.g., peer influences) and alcohol involvement is weaker at high, as compared to low, levels of monitoring. Additive models testing risk factors and promotive effects are often tested, but the interaction terms needed to test protective factors are less often incorporated.

## Protective Effects of Parental Influences

The majority of the research evaluating the protective effects of parents in reducing peer influences on substance use or delinquency, has been conducted on younger adolescents (Crawford & Novak, 2002; Kemp, de Scholte, Overbeek, & Engels, 2006; Laird, Criss, Pettit, Dodge, & Bates, 2008; Marshall & Chassin, 2000; Mrug & Windle, 2009; Vitaro, Brendgen, & Tremblay, 2000). Several studies on young adolescents have examined

whether parents exert protective effects that dampen the positive association between friends' delinquency and adolescents' self-reported delinquency. However, evidence of protective effects has been limited (Kemp et al., 2006; Vitaro et al., 2000). In particular, findings on parental monitoring have been mixed with Laird and colleagues (2008) finding evidence of protective effects, while other studies have not (Kemp et al., 2006; Vitaro et al., 2000).

In the area of alcohol use, Crawford and Novak (2002) found that unstructured peer interactions among high school students were associated with a greater probability of transitioning to heavy drinking for students who reported low parental attachment compared to students reporting high parental attachment. Findings by Marshall and Chassin (2000) suggested that the presence of protective effects on peer-alcohol relations may be gender-specific among adolescents aged 10 to 15 years. The authors observed a three-way interaction among student sex, parenting, and peer affiliation. Among girls, associations between affiliation with drug-use promoting peers and alcohol use were weaker at high, as compared to low levels, of both parental support and consistency of discipline. However, among boys, higher parental support and consistency of discipline were associated with stronger relations between affiliation with drug-use promoting peers and alcohol use.

To our knowledge, only two studies have examined protective effects of parental influences on relations between peer influences and alcohol involvement among young adults or college populations (Jessor, Costa, Krueger, & Turbin, 2006; Wood, Read, Mitchell, & Brand, 2004). Jessor and colleagues (2006) used a risk and protective factors framework and assessed college students over a two-year period beginning shortly after college matriculation. Findings most relevant to the current study revealed that higher levels of perceived health-enhancing behaviors by the parents (e.g., parents' healthy diet) were associated with a weaker positive relation between perceived peer pressure to drink or smoke and adolescents' heavy episodic drinking. Wood and colleagues (2004) assessed college students during the summer prior to college matriculation. Cross-sectional findings revealed that low parental drinking permissiveness exhibited protective effects on the association between several peer influences (i.e., social modeling, alcohol offers, and descriptive norms) and alcohol involvement. Support for the protective effect of parental monitoring was limited to dampening the relation between alcohol offers by peers and alcohol-related consequences. No evidence was found for the protective effects of parental support or parental disapproval for heavy drinking. Given the diverse parental and peer influences examined in the literature, next we provide a brief description and rationale for the parental and peer influences that are the focus of the current study.

## Parental Influences Under Investigation

The current study investigates high parental monitoring and low parental drinking permissiveness as potential protective factors that may mitigate the relation between peer influences and alcohol use. Parental monitoring is characterized as the extent to which parents actively keep track of their children's whereabouts and social connections (Crouter & Head, 2002; Dishion & McMahon, 1998). However, assessments of parental monitoring have often been imprecise due to the inclusion of items that measure parental knowledge rather than monitoring activities (Kerr & Stattin, 2000; Stattin & Kerr, 2000). Parental knowledge likely reflects, the degree to which adolescents or young adults manage parents' access to personal information, parents' interest in knowing about their adolescents' lives, and the quality of the parent-child relationship (Frijns, Keijsers, Branje, & Meeus, 2010; Keijsers, Branje, VanderValk, & Meeus, 2010; Keijsers & Laird, 2010; Laird, Pettit, Dodge, & Bates, 2003). Unfortunately, “parental monitoring” has been measured with scales that assess monitoring and knowledge together (Walls et al., 2009; White et al., 2006; Wood et

al., 2004), knowledge only (Barnes, Reifman, Farrell, & Dintcheff, 2000; Laird et al., 2003), and monitoring and knowledge separately (Abar & Turrisi, 2008). Despite these ambiguities in measurement, cross-sectional and longitudinal studies have shown that parental monitoring/knowledge is a promotive factor, such that high parental monitoring/knowledge has been linked, either directly or indirectly, to less alcohol use in adolescent and college student samples (Abar & Turrisi, 2008; Barnes et al., 2000; Walls et al., 2009; White et al., 2006; Wood et al., 2004).

Parental drinking permissiveness reflects the degree to which parents are lenient regarding their teen's alcohol use. Parental drinking permissiveness may be operationalized as the students' perceptions of how much alcohol their parents would allow them to consume in a single setting (e.g., Wood et al., 2004). Alternatively, parental drinking permissiveness may be characterized by perceived level of parental approval for the child's drinking behavior (e.g., Hyatt & Collins, 2000). High levels of parental drinking permissiveness (e.g., high upper limit, high approval/acceptability) have been strongly associated with the onset of alcohol involvement and growth in alcohol involvement among younger adolescents (Hyatt & Collins, 2000; van der Vorst, Vermulst, Meeus, Deković, & Engels, 2009) and college students (Abar, Abar, & Turrisi, 2009; Walls et al., 2009; Wood et al., 2004). Therefore, etiological research suggests that parental monitoring and parental drinking permissiveness may influence college students' drinking behavior. Furthermore, as noted, Wood et al. (2004) found cross-sectional evidence that pre-matriculation parental monitoring/knowledge and low parental drinking permissiveness exerted protective effects among incoming college students.

## Peer Influences Under Investigation

Peer influences reflect both selection and socialization processes, such that adolescents select into alcohol-promoting environments, and involvement in alcohol-promoting environments also contributes to increased alcohol use and consequences (Borsari & Carey, 2001; Capone et al., 2007; Park, Sher, & Krull, 2008). The current study focuses on social modeling and descriptive norms. Social modeling comprises the degree to which peers in the students' environment model and imitate alcohol-related behaviors (Maisto, Carey, & Bradizza, 1999). Descriptive norms for alcohol use are defined as students' perceptions of how much alcohol their peers consume (Baer, Stacy, & Larimer, 1991; Perkins, Meilman, Leichliter, Cashin, & Presley, 1999). College students typically overestimate how much alcohol other students are drinking. Social modeling of alcohol use and high descriptive norms are well-established risk factors for alcohol use among young adults (Capone et al., 2007; Larimer, Turner, Mallett, & Geisner, 2004; Neighbors, Lee, Lewis, Fossos, & Larimer, 2007; Read, Wood, & Capone, 2005; Wood et al., 2004). The identification of parental factors that may attenuate these robust peer influences would have substantial implications for parent-based preventive interventions.

## The Current Study

The goal of the current study was to examine whether pre-matriculation parental factors served a protective effect on the association between pre-matriculation peer influences and heavy drinking and consequences. We aimed to replicate previous cross-sectional findings (i.e., Wood et al., 2004) using a different college student sample and extend previous findings longitudinally over a two year period. We hypothesized that descriptive norms, social modeling, and parental drinking permissiveness would be associated with greater pre-matriculation heavy drinking and consequences as well as greater growth in these outcomes over time. We also hypothesized that parental monitoring would be associated with less pre-matriculation heavy drinking and consequences and less growth in these outcomes. Further,

we hypothesized that parental factors would exhibit protective effects both concurrently and longitudinally, such that high parental monitoring and low parental drinking permissiveness would be associated with weaker positive associations between peer influences and heavy drinking and consequences.

## Method

### Participants

Incoming college freshmen at a mid-sized public northeastern university were recruited over two consecutive years for a randomized clinical trial ($N$ = 1,014, see Procedures for recruitment details), which examined the efficacy of a brief motivational intervention (BMI) and a parent-based intervention (PBI) targeting alcohol use and consequences (Fernandez, Laforge, Wood, & Black, in press; Wood et al., 2010). The current sample includes students randomized to the assessment-only control condition ($n$ = 256). The majority of participants in the current sample were women (57.0%), and the mean age of the sample at baseline was 18.36 years ($SD$ = 0.41). The majority of the participants (87.89%) identified as non-Hispanic White followed by Black or African American (3.91%) and Asian (2.34%). Approximately 4.30% of the sample identified their race as “other,” and 3.91% of the sample identified as Hispanic or Latino.

### Procedures

The target population was entering full- or part-time students ages 17 to 21. Incoming students were eligible to participate unless they were transfer students, married, not living with a parent/guardian, or reached the alcohol use cut-off criteria (≥40 drinks per week and two current symptoms of alcohol dependence). The sampling frame included all incoming freshmen demonstrating intent to matriculate, and students were randomly selected from the sampling frame. All incoming students received a pre-notification letter indicating potential study contact. Students also had the opportunity to refuse participation by mailing in a refusal form. Students were recruited by telephone through a survey research center. Parents were also contacted by telephone and recruited subsequent to student recruitment.

Across the two cohorts, study personnel had contact with 1,664 students (Fernandez et al., in press). Of these, 265 students were ineligible, and 127 students were ineligible because their parents did not complete the baseline survey. Of the remaining 1,272 students, 258 students refused to participate, and 1,014 student-parent pairs (79.72%) were successfully recruited and randomized. The full sample ($N$ = 1,014) did not differ from the population of incoming students with respect to gender and ethnicity, but did differ in terms of race, $X^2$ (3, $N$ = 4940) = 11.35, $p < .01$, with slightly less sample representation of African American (4.1% in sample vs. 5.3% in population) and Asian American (1.2% in sample vs. 2.9% in population) students.

Baseline data were collected during the summer prior to college matriculation, and follow-up assessments occurred during the spring semesters of the freshman (10-month) and sophomore years (22-month). Each assessment lasted approximately 45-60 minutes. All assessment data were collected using computer-assisted telephone interviews administered by a local university-based survey center. Interviewers were not members of the research team, were blind to experimental condition, and were trained and monitored in standardized interviewing procedures. At 10-months, retention was significantly higher in the assessment-only group (94.5%) used in the current analyses relative to the combined BMI and PBI group (86.8%). However, there were no significant differences in attrition by experimental group at 22 months (85.6% retention for the assessment-only group). No baseline

differences were found on any outcome variables for those who did versus did not complete the study.

Graduated incentives were offered to students: $30 at baseline, $40 at 10-months, and $50 at 22-months. Participants who attended all appointments and completed follow-up procedures on time were eligible for $10 and $20 cash bonuses at the 10- and 22-month follow-ups, respectively. Three $200 cash prizes were awarded annually to randomly selected student participants. Consent forms were mailed prior to recruitment, and all participants provided verbal consent. Parents provided verbal consent for students under 18 years of age at the time of assessment. All procedures were approved by the university's Institutional Review Board.

## Measures

The measures analyzed in the current study were part of a larger assessment battery. Demographic information included sex, age, race, ethnicity, fraternity/sorority involvement, and residential status. Heavy episodic drinking and alcohol-related consequences were assessed at baseline, 10-months, and 22-months. Peer and parental influences were assessed at baseline.

**Heavy episodic drinking—**Gender-specific heavy episodic drinking was assessed by asking the number of times in the last month that students had consumed *five or more drinks* [*four or more for women*] in a row (Wechsler et al., 2000). One drink was defined as one shot of liquor, 12 ounces of beer, or a 4-ounce glass of wine. “In a row” was defined as on one occasion without any breaks of an hour or longer. An open-ended response format was used.

**Alcohol-related consequences—**For the larger study, to reduce item burden and capture the most prevalent consequences among college students (e.g., hangover, missed class, alcohol-impaired driving, unwanted or regretted sexual activity), seventeen items were selected from a 36-item version of the Young Adult Alcohol Problems Screening Test (Wood, Read, Palfai, & Stevenson, 2001). Students responded on a scale to assess the past 3-month frequency with responses ranging from 1 (*no, not in the past 3 months*) to 5 (*10 or more times*). In order to provide a more meaningful metric than the 1 to 5 scale to which students responded, responses were re-coded as an estimate of the number of occurrences, then a mean was calculated (α's = .76 - .82). For example, response option “4” (*6-9 times*) was re-coded to “7.5” occurrences, and response option “5” (*10 or more times*) was re-coded to “12.5” occurrences.

**Weekly drinking—**Alcohol use over the past 30 days was assessed using the Daily Drinking Questionnaire (Collins, Parks, & Marlatt, 1985). For descriptive purposes, a sum score was computed using the number of drinks consumed each day during a typical week.

**Descriptive norms—**Descriptive norms for weekly drinking were measured with two items adapted from the Drinking Norms Rating Form (Baer et al., 1991). Open-ended items assessed perceived quantity and frequency of alcohol use for the typical (target) university student of the participant's gender. The quantity and frequency items were multiplied to reflect students' perceptions of the typical number of drinks consumed per week.

**Social modeling—**Five items were averaged to assess peer and environmental influences for alcohol use (α = .88) (Capone et al., 2007; Wood et al., 2004). Two items assessed students' perceptions of the degree to which their close friends approved of drinking and getting drunk. Response options ranged from 1 (*strongly disapprove*) to 5 (*strongly*

*approve*). Three items assessed the students' perceptions of how many of their close friends drink alcohol, get drunk on a regular basis, and drink primarily to get drunk. Response options ranged from 1 (*none*) to 5 (*nearly all*).

**Parental monitoring—**Parental monitoring was measured with a modified version of the Strictness/Supervision scale whereby only items that appeared more relevant to older adolescents were selected (Abar & Turrisi, 2008; Wood et al., 2004). Four items asked students the degree to which their parents *try* to know about the students' engagement in four specific behaviors: where you go at night, (b) what you do with your free time, (c) where you are most afternoons after school, and (d) about your drinking. The item referring to the adolescent's drinking was added in the current study. Response options were: 1 (*don't try*), 2 (*try a little*), or 3 (*try a lot*). A mean score was calculated from the four items ($\alpha = .73$).

**Parental drinking permissiveness—**Parental drinking permissiveness was assessed by two questions with open-ended response options that asked students to indicate the number of drinks that their mother and father (asked separately) would consider to be an upper limit for them to consume on any given occasion during the senior year of high school (Wood et al., 2004). A mean score was calculated by averaging the student's responses for mother and father.

## Overview of Analyses

In order to obtain acceptable skewness and kurtosis (< 2 and 4, respectively), observations were adjusted inward if they fell outside of the threshold, which was defined as more than three interquartile ranges above the 75$^{th}$ percentile or below the 25$^{th}$ percentile. Observations were adjusted to be within 1.0 of the most extreme value that fell within the threshold. This definition resulted in adjustments to six or fewer observations for heavy episodic drinking, consequences, descriptive norms, and parental drinking permissiveness. Using Mplus Version 5 (Muthén & Muthén, 1998-2007), separate latent growth curve models were estimated for each of the two outcomes: heavy episodic drinking and alcohol-related consequences (Bollen & Curran, 2006; Singer & Willett, 2003). First, unconditional latent growth models were estimated using an intercept factor (coded to represent initial status) and a linear slope factor (coded to reflect the unequal spacing between assessments). Second, conditional latent growth models were estimated to test for the effects of sex, descriptive norms, social modeling among peers, parental drinking permissiveness, parental monitoring, and 4 two-way interaction terms.

The two-way interactions tested the primary hypotheses that parental factors would mitigate the influence of peers on alcohol involvement. The interactions were formed between descriptive norms and each of the two parental influences (parental drinking permissiveness and parental monitoring) and also between social modeling among peers and each of the two parental influences. Given that this set of variables was used to predict both the intercept factor (i.e., initial status) and the slope factor (i.e., change over time), the subsequent interpretations of the observed effects emphasize whether the predictor effects differed over time (i.e., does the effect increase or decrease over time) (Singer & Willett, 2003). In particular, a significant effect of a predictor on the intercept factor, but not on the slope factor, provides evidence that the effect of the predictor is consistent over time, that is an observed effect of a predictor on an outcome at baseline is generally consistent at each follow-up. In contrast, obtaining a significant effect of a predictor on the slope factor indicates that the effect of the predictor on the outcome varies over time. All continuous covariates were centered prior to creating interaction terms (Cohen, Cohen, West, & Aiken, 2003; Preacher, Curran, & Bauer, 2006). The latent growth models were estimated using all available data, and all parameters were estimated using maximum likelihood estimation. Fit

of the latent growth models was evaluated using chi-square ($\chi^2$), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR).

## Results

### Descriptive Analyses and Correlations

Means, standard deviations, and correlations are presented in Table 1 for the measures of alcohol involvement, peer influences, and parental influences. At baseline, approximately half (51.6%) of the participants reported engaging in heavy episodic drinking in the last month, and almost half (45.3%) of the participants reported alcohol-related consequences in the past three months. Women reported drinking an average of 5.21 (*SD* = 7.38) drinks per week at baseline and 8.22 (*SD* = 9.56) and 7.89 (*SD* = 7.65) drinks per week at the 10-month and 22-month follow-ups, respectively. Women reported engaging in heavy episodic drinking an average of 1.89 times (*SD* = 3.13) in the last month at baseline and 2.81 times (*SD* = 3.57) and 2.93 times (*SD* = 3.36) at the 10-month and 22-month follow-ups, respectively. Men reported drinking an average of 7.25 (*SD* = 10.24) drinks per week at baseline and 11.48 (*SD* = 11.73) and 13.37 (*SD* = 10.75) drinks per week at the 10-month and 22-month follow-ups, respectively. Men reported engaging in heavy episodic drinking an average of 2.12 times (*SD* = 3.33) in the last month at baseline and 3.25 times (*SD* = 3.94) and 3.80 times (*SD* = 3.88) at the 10-month and 22-month follow-ups, respectively. At baseline, the most common alcohol-related consequences that students reported experiencing in the past three months were: being unable to remember the night before (66.41% of the sample), having a hangover (64.84% of the sample), saying things later regretted (60.55% of the sample), and feeling sick or throwing up (60.16% of the sample).

### Unconditional Latent Growth Models

Chi-square difference tests revealed that unconditional models with both the intercept and linear slope factors provided a significantly better fit than the models with the intercept-only for both heavy episodic drinking, $\Delta\chi^2$ (3, $N$ = 256) = 46.23, $p < .001$, and alcohol-related consequences, $\Delta\chi^2$ (3, $N$ = 256) = 31.17, $p < .001$. The unconditional latent growth models with the intercept and linear slope factors provided adequate fit to the data: heavy episodic drinking, $\chi^2$ (1, $N$ = 256) = 5.72, $p < .05$, CFI = .98, RMSEA = .14, SRMR = .04, and alcohol-related consequences, $\chi^2$ (1, $N$ = 256) = 0.81, $p$ = .37, CFI > .99, RMSEA < .001, SRMR = .01. The variances of the intercept factors were significant for heavy episodic drinking and consequences ($p$'s < .001), indicating significant individual variability on initial status of the alcohol outcomes pre-matriculation. The variance of the slope factor was significant for heavy episodic drinking ($p < .01$), indicating significant individual variability in the rate of change in heavy episodic drinking over time. The variance of the slope factor for alcohol-related consequences was not significant; however, this parameter was estimable and retained for subsequent analyses. The correlation between the intercept factor and linear slope factor was significant for heavy episodic drinking ($r$ = -.39, $p < .05$), but not alcohol-related consequences ($r$ = .14, $p > .05$). Individuals with higher initial levels of heavy episodic drinking experienced less growth in heavy episodic drinking over time.

### Conditional Latent Growth Models

The conditional latent growth models provided adequate fit to the data: heavy episodic drinking, $\chi^2$ (10, $N$ = 256) = 12.37, $p$ = .26, CFI = .99, RMSEA = .03, SRMR = .02, and alcohol-related consequences, $\chi^2$ (10, $N$ = 256) = 13.62, $p$ = .19, CFI = .99, RMSEA = .04, SRMR = .01. For heavy episodic drinking, the $R^2$ values for the intercept and slope factors were 0.74 and 0.24, respectively. For alcohol-related consequences, the $R^2$ values for the intercept and slope factors were 0.62 and 0.12, respectively.

Sex and parental monitoring were not significant predictors of the intercept factors for heavy episodic drinking (Table 2) or alcohol-related consequences (Table 3). Higher levels of descriptive norms, social modeling among peers, and parental drinking permissiveness were each significantly associated with higher initial levels of heavy episodic drinking. Higher levels of descriptive norms and social modeling, but not parental drinking permissiveness, were significantly associated with higher initial levels of alcohol-related consequences.

Men exhibited greater growth than women in heavy episodic drinking, but not alcohol-related consequences, over the 22-month period. Social modeling was significantly associated with the slope factor for alcohol-related consequences, but not heavy episodic drinking. Higher pre-matriculation social modeling was associated with less growth in consequences during the 22-month period. Figure 1 shows estimated means for consequences at different levels of social modeling (± 1 *SD* from the mean corresponding to high and low scores) in order to depict the significant positive effect of social modeling on the intercept and the significant negative effect of social modeling on the slope. At baseline, high scores on social modeling were associated with greater consequences than were low scores; however, over time high scores on social modeling were associated with less growth in consequences over time compared to low scores.

Descriptive norms, parental drinking permissiveness, and parental monitoring did not exhibit significant associations with the slope factors for heavy episodic drinking or alcohol-related consequences. Accordingly, the significant effects of the peer and parental influences on the alcohol outcomes, as indicated by the significant effects on the intercept factors, were consistent over the 22-month period. For instance, higher levels of pre-matriculation parental drinking permissiveness were consistently associated with higher levels of heavy episodic drinking over the 22-month period.

Four interaction effects were significant: two for Social Modeling × Parental Drinking Permissiveness and two for Descriptive Norms × Parental Drinking Permissiveness. The Social Modeling × Parental Drinking Permissiveness interaction term was significantly associated with the intercept factor for heavy episodic drinking (Table 2) and alcohol-related consequences (Table 3). Following Harlow (2005), the standardized estimates (β) for the significant interaction effects (as shown in Tables 2 and 3) were squared to obtain separate $R^2$ values for each of the significant interaction effects. The resulting $R^2$ values can be interpreted according to the guidelines of small (.01), medium (.06), and large (.13) effects. Accordingly, $R^2$ for the effect of Social Modeling × Parental Drinking Permissiveness on the intercept was .04 (between small and medium) for heavy episodic drinking and .02 (small) for consequences.

To probe the nature of the significant interactions, we examined the association between the predictor (i.e., peer influence) and the outcome at different levels of the moderator (i.e., mean on parental influence ± 1 *SD*; Cohen et al., 2003). Prior to college matriculation, social modeling exhibited a weaker positive association with heavy episodic drinking at low parental drinking permissiveness (β = 0.24, *SE* = .07, $p < .001$) compared to high parental drinking permissiveness (β = 0.62, *SE* = .10, $p < .001$). Similarly, social modeling exhibited a weaker positive association with alcohol-related consequences at low parental drinking permissiveness (β = 0.43, *SE* = .08, $p < .001$) compared to high parental drinking permissiveness (β = 0.73, *SE* = .11, $p < .001$). Students' perceptions of more stringent parental limits for alcohol use (i.e., low permissiveness) buffered the effect of social modeling on alcohol involvement. Figure 2 shows estimated means for heavy episodic drinking at different levels of both social modeling and parental drinking permissiveness (± 1 *SD* from the mean corresponding to high and low scores). In conjunction with either high or low social modeling, low permissiveness was associated with less heavy episodic

drinking than high permissiveness. Given the lack of significant Social Modeling × Parental Drinking Permissiveness interactions on the slope factors, the protective effect of low parental drinking permissiveness was sustained over the 22-month period (Figure 2).

The interaction between Descriptive Norms × Parental Drinking Permissiveness was significantly associated with both the intercept and slope factors for heavy episodic drinking. The $R^2$ values for the effect of Descriptive Norms × Parental Drinking Permissiveness were .01 (small) for the intercept factor and 0.10 (between medium and large) for the slope factor. For the intercept factor, prior to college matriculation, descriptive norms exhibited a weaker positive association with heavy episodic drinking at low parental drinking permissiveness (β = 0.22, *SE* = .08, $p < .01$) compared to high parental drinking permissiveness (β = 0.47, *SE* = .09, $p < .001$). Consistent with the results for the two significant Social Modeling × Parental Drinking Permissiveness interactions, students' perceptions of more stringent parental limits for alcohol use buffered the positive relation between peer influences and initial alcohol involvement.

Probes of the significant Descriptive Norms × Parental Drinking Permissiveness interaction for the slope of heavy episodic drinking revealed a different pattern of results from that found for the intercept factor. At high parental drinking permissiveness, higher descriptive norms were associated with less growth in heavy episodic drinking (β = -0.45, *SE* = .18, $p < .01$). In contrast, at low parental drinking permissiveness, descriptive norms were not significantly associated with growth in heavy episodic drinking (β = 0.19, *SE* = .16, $p = .24$). For students reporting less stringent parental limits for alcohol use, higher descriptive norms were associated with less growth in heavy episodic drinking, but for students reporting more stringent parental limits descriptive norms did not relate to changes in heavy episodic drinking over time. Figure 3 shows estimated means for heavy episodic drinking at different levels of descriptive norms and parental drinking permissiveness (± 1 *SD* from the mean corresponding to high and low scores). For high descriptive norms, low permissiveness was associated with less heavy episodic drinking than high permissiveness. Similarly, for low descriptive norms, low permissiveness was associated with less heavy episodic drinking than high permissiveness. Moreover, the figure should be interpreted in the context of the significant Norms × Permissiveness effects on the intercept as well as the slope, suggesting that the protective effect observed at baseline (described above) is not consistent over time.

### Secondary Analyses

Two exploratory sub-sample analyses were conducted to determine whether the findings on protective effects were altered when including: 1) only students who were living away from their parents or guardians ($n = 213$), and 2) only students who were not affiliated with fraternities or sororities ($n = 183$). Sub-samples were determined using information from the 10-month follow-up given that all students lived at home at baseline and had not yet started college. Results revealed that the findings for the four significant interaction effects observed with the full sample ($n = 256$) were not appreciably altered for either of the two sub-samples.

## Discussion

The current study examined relations between pre-matriculation peer and parental influences and college student alcohol involvement assessed over a 22-month period. We evaluated cross-sectional and longitudinal associations between alcohol involvement and descriptive norms, social modeling among peers, parental drinking permissiveness, and parental monitoring. Our primary hypotheses evaluated whether high parental monitoring and low parental drinking permissiveness exhibited protective effects on the robust, positive associations between peer influences and college student alcohol use and consequences.

Consistent with the literature, the current study observed significant positive associations between pre-matriculation peer influences (i.e., descriptive norms, social modeling among peers) and pre-matriculation heavy episodic drinking and consequences (Neighbors et al., 2007; Wood et al., 2004). In addition, pre-matriculation parental drinking permissiveness was positively associated with pre-matriculation heavy episodic drinking, which contributes to the evidence that parents continue to influence alcohol involvement among young adults (Abar et al., 2009; Patock-Peckham & Morgan-Lopez, 2010; Walls et al., 2009). Observed peer and parental influences generally exhibited sustained effects on alcohol involvement over the 22-month period, suggesting that low parental drinking permissiveness at pre-matriculation sustained its promotive effect on heavy episodic drinking into the sophomore year of college.

The significant effect of social modeling among peers on changes in consequences over time indicated that higher social modeling of alcohol use among peers was associated with less growth in consequences. As shown in Figure 1, the negative association between social modeling and growth in consequences is likely due to a ceiling effect caused by students with high social modeling also reporting high levels of consequences prior to college, thus limiting the potential for growth over time. Post-matriculation changes in students' peer groups may have also affected reports of social modeling, which is another possible explanation for these findings. The lack of associations found between parental monitoring and alcohol involvement contradicts previous work. In particular, Abar and Turrisi (2008) used a nearly identical measure of parental monitoring and found that pre-matriculation parental monitoring, but not parental knowledge, was negatively associated with alcohol use during the first college semester. However, Abar and Turrisi used a measure of alcohol use that was largely reflective of typical weekend drinking, whereas the current study assessed heavy episodic drinking over the last month. Other research has found significant associations for parental monitoring in similarly-aged samples or college student samples using a combined measure for monitoring and knowledge (Walls et al., 2009; White et al., 2006; Wood et al., 2004). Given these inconsistent findings on parental monitoring, greater attention should be given to ensuring that the items reflect the parents' active engagement in monitoring activities.

## Protective Effects of Parental Influences

Consistent with previous cross-sectional analyses (Wood et al., 2004), protective effects were observed for low parental drinking permissiveness on: the associations between social modeling of alcohol use among peers and alcohol involvement (i.e., heavy episodic drinking and consequences), and the association between descriptive norms and heavy episodic drinking. Social modeling among peers and descriptive norms exhibited weaker positive associations with alcohol involvement at low levels of parental drinking permissiveness compared to high levels. Furthermore, the protective effect of low parental drinking permissiveness on the association between social modeling and alcohol involvement was sustained over the 22-month period. Recent findings have underscored the importance of low parental drinking permissiveness in etiological research (Abar et al., 2009; Walls et al., 2009) and as a potential target in parent-based interventions for college students (Wood et al., 2010).

The current finding that pre-matriculation descriptive norms were associated with less growth in heavy episodic drinking at high parental drinking permissiveness may seem counterintuitive. In the presence of less stringent parental limits and high descriptive norms, students may engage in more frequent heavy episodic drinking pre-matriculation, resulting in a ceiling effect for future growth in drinking during college. In contrast, at low parental drinking permissiveness, pre-matriculation descriptive norms were not significantly associated with changes in heavy episodic drinking. Accordingly, the observed protective

effect of low parental drinking permissiveness on social modeling did not generalize to descriptive norms. Future research should investigate how generalizable the protective effect of low parental drinking permissiveness may be across various constructs of peer influence (e.g., alcohol offers).

In contrast to the current study, Wood and colleagues (2004) found evidence of a protective effect for parental monitoring, specifically on the association between alcohol offers and alcohol-related consequences. Results from studies on young adolescents have been mixed regarding the protective role of parental monitoring on the association between peer influences and delinquency (Kemp et al., 2006; Laird et al., 2008; Vitaro et al., 2000). These inconsistent findings on parental monitoring may be reflective of the inconsistencies in operationalizing parental monitoring as distinct from parental knowledge or differences in the scope of the items. For instance, the current study measured parental monitoring specifically, while Wood and colleagues used a combined measure of monitoring and knowledge. Laird and colleagues assessed parental knowledge with five items, while Vitaro and colleagues assessed parental knowledge with two items. With greater attention to the operationalization of parental monitoring, findings on moderation effects (or the lack thereof) may be more consistent across studies on substance use and delinquency (Laird, Marrero, & Sentse, 2010).

Other potential explanations for the lack of evidence for the protective effect of parental monitoring should be noted. First, protective effects may be more pronounced among students who are low in sensation-seeking or impulsivity, given the positive association between sensation-seeking and alcohol use (Dick et al., 2010; Laird et al., 2010). Second, any potential protective effects of parental monitoring may be counteracted by the stronger alcohol-related peer influences among those affiliated with the fraternity and sorority system. Secondary analyses reported here suggested that protective effects on peer-alcohol relations were not more pronounced among college students who do not affiliate with fraternities or sororities. However, the current sample is not well-suited to test this hypothesis given that only 25% of the students reported affiliating with fraternities or sororities. Third, evidence for protective effects may be influenced by the inclusion of students living with their parents or guardians, given the potential for differences in monitoring activities when students reside at home. Secondary analyses presented here suggested that removing students who lived at home did not alter the conclusions. However, a study designed to thoroughly test this hypothesis would be more definitive, given that only 12% of the students sampled lived at home while attending college.

## Strengths and Limitations

The most notable strength of the current study is the investigation of the understudied area of the potential protective effects of pre-matriculation parental influences on prospective associations between peer influences and college alcohol use. In addition, the sample was drawn randomly from the pool of incoming freshmen, and students were randomly assigned to the control group in the randomized controlled trial. By randomly selecting from the population, the potential for self-selection bias is minimized. The use of a longitudinal design, beginning prior to college matriculation, also provided a much-needed examination of whether pre-matriculation levels of parental factors may continue to exert protective effects over the first 2 years of college.

Several limitations should also be noted. The study was conducted on a single campus, and the vast majority of the students identified as non-Hispanic White. Prior research suggests parenting and socialization processes operate differently in other cultures or among individuals from other racial backgrounds (Barnes, Farrell, & Banerjee, 1994; Gershoff et al., 2010). Given that participants who completed versus did not complete the study did not

differ at baseline on the alcohol outcomes, the evidence of attrition-related bias associated with alcohol is minimized. The current study examined two parental influences that have been shown to exhibit protective effects in a different sample of college students (Wood et al., 2004). However, it is possible that parental influences that were not examined in the present investigation (e.g., parental values toward alcohol use) may exhibit protective effects. Moreover, it may be the case that protective effects differ according to student and parent sex (same-sex or opposite-sex) (Marshall & Chassin, 2000; Patock-Peckham & Morgan-Lopez, 2006). Lastly, data reported here were collected from students only, and careful interpretations using data from multiple informants may provide additional insight (Laird & Weems, in press). Parents tend to underreport the health risk behaviors experienced by college students (Bylund, Imes, & Baxter, 2005). However, student- and parent-reports of parental influences may provide valuable information about the parent-teen relationship, parental knowledge, and students' self-disclosure. For instance, parents may be more knowledgeable about their child's activities in the context of a trusting relationship.

### Future Directions and Conclusions

In the college years, the focus of parent-based interventions is to reduce excessive alcohol use and its harmful consequences, recognizing that alcohol consumption for most youth has already begun during adolescence. A growing body of literature has investigated the efficacy of parent-based interventions at reducing college student alcohol use and misuse with either modest or null results (Ichiyama et al., 2009; Turrisi, Jaccard, Taki, Dunnam, & Grimes, 2001; Turrisi et al., 2009; Wood et al., 2010). The current findings suggest that parent-based interventions for college students should address how parents may directly and indirectly convey attitudes for appropriate alcohol consumption during the college years.

Future research should continue to investigate a range of parental influences that may exert protective effects against peer influences in order to determine which constructs are most central to the socialization process among college students. Researchers should consider parental influences that may be specific to the college environment (e.g., parents' knowledge of how often the student attends parties). As suggested previously, future work may also consider whether gender-specific effects exist and how place of residence may affect the socialization process. The extant literature would greatly benefit from longitudinal work to investigate changes in parental influences during the college years. For example, it would be beneficial to determine which factors may predict whether a parent will become less stringent in their parental alcohol limits once the child has entered college. The current findings on the protective effects of low parental drinking permissiveness on peer-alcohol relations among college students are promising, particularly in the context of the long-standing recognition that peer influences are dominant in the college years, and attest to the importance of future work in this area.

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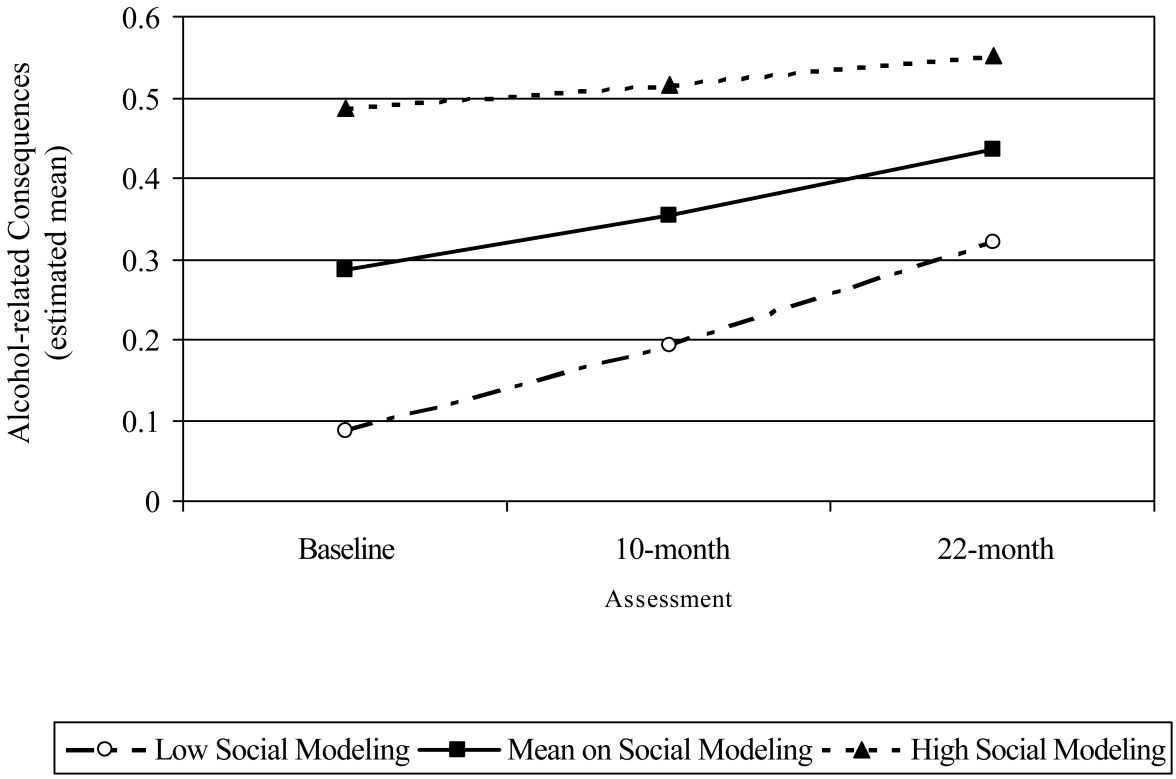


**Figure 1.**
Estimated means for alcohol-related consequences at different levels of social modeling among peers. The lines plotted for “high” correspond to predictor scores that are plus one standard deviation from the mean, and the lines plotted for “low” correspond to predictor scores that are minus one standard deviation from the mean.

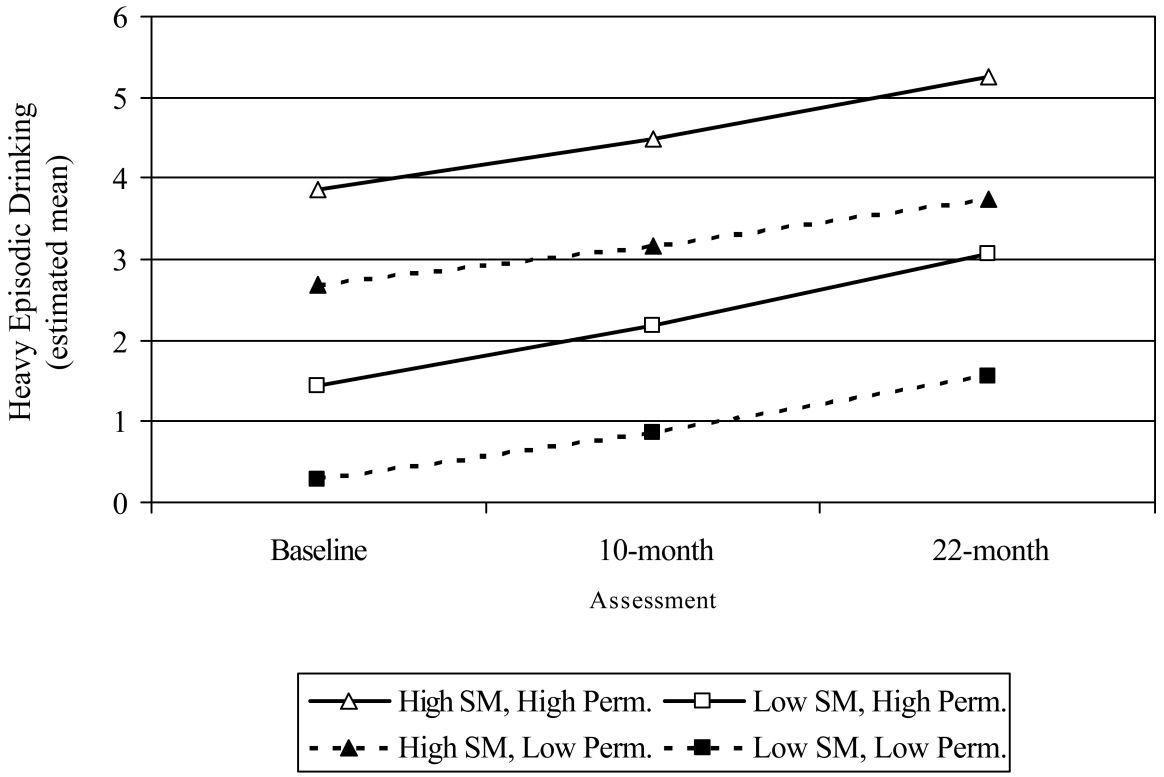


**Figure 2.**
Estimated means for heavy episodic drinking at different levels of social modeling and parental drinking permissiveness (Social Modeling × Permissiveness Interaction). The lines plotted for “high” correspond to predictor scores that are plus one standard deviation from the mean, and the lines plotted for “low” correspond to predictor scores that are minus one standard deviation from the mean. SM = social modeling. Perm. = parental drinking permissiveness.

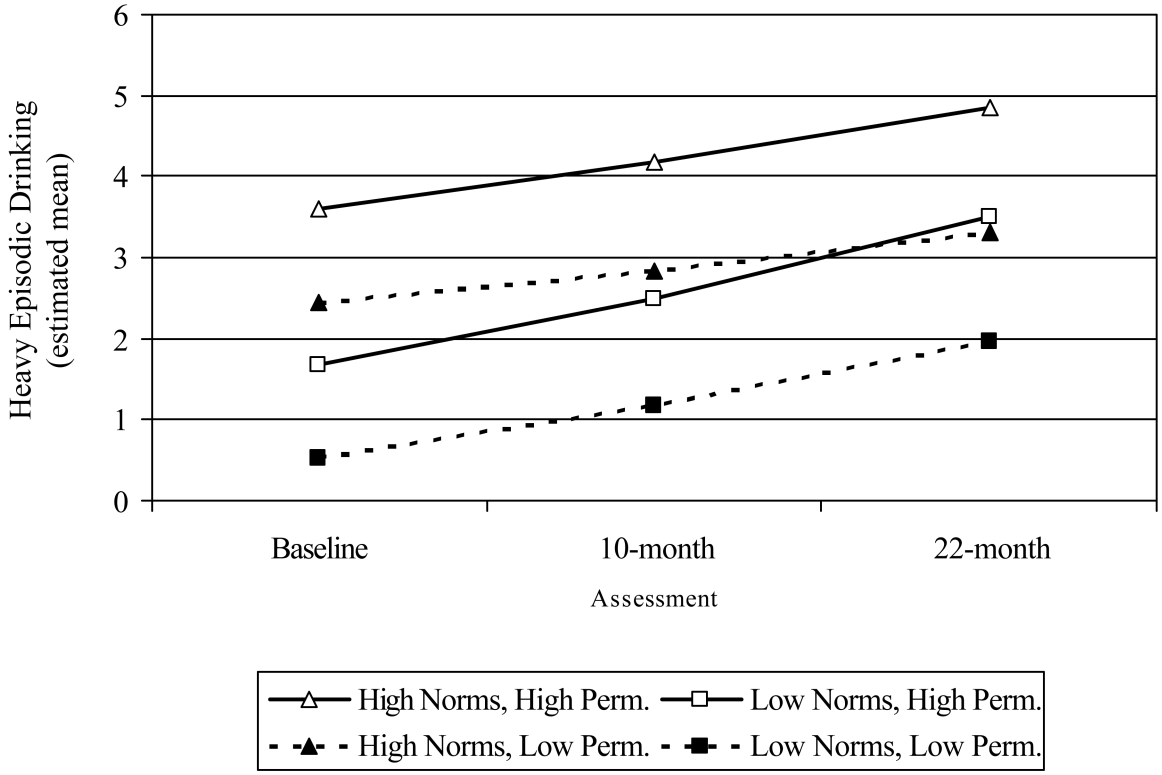


**Figure 3.**
Estimated means for heavy episodic drinking at different levels of descriptive norms and parental drinking permissiveness (Descriptive Norms × Permissiveness Interaction). The lines plotted for “high” correspond to predictor scores that are plus one standard deviation from the mean, and the lines plotted for “low” correspond to predictor scores that are minus one standard deviation from the mean. Perm. = parental drinking permissiveness.

**Table 1**

**Correlations, Means, and Standard Deviations**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. HED Baseline | - | | | | | | | | | |
| 2. HED 10-mth | .63*** | - | | | | | | | | |
| 3. HED 22-mth | .50*** | .59*** | - | | | | | | | |
| 4. Consequences Baseline | .70*** | .59*** | .48*** | - | | | | | | |
| 5. Consequences 10-mth | .55*** | .70*** | .48*** | .65*** | - | | | | | |
| 6. Consequences 22-mth | .39*** | .45*** | .57*** | .51*** | .66*** | - | | | | |
| 7. Descriptive norms | .51*** | .48*** | .35*** | .37*** | .45*** | .28*** | - | | | |
| 8. Social modeling | .56*** | .53*** | .43*** | .59*** | .48*** | .37*** | .42*** | - | | |
| 9. Parental permissiveness | .52*** | .42*** | .38*** | .41*** | .35*** | .29*** | .30*** | .40*** | - | |
| 10. Parental monitoring | -.14* | -.08 | -.04 | -.14* | -.14* | -.10 | -.05 | -.09 | -.09 | - |
| *M* (*SD*) Men | 2.12 (3.33) | 3.25 (3.94) | 3.8 (3.88) | 0.32 (0.46) | 0.36 (0.44) | 0.49 (0.6) | 14.87 (9.56) | 3.1 (1.01) | 2.53 (2.56) | 2.45 (0.46) |
| *M* (*SD*) Women | 1.89 (3.13) | 2.81 (3.57) | 2.93 (3.36) | 0.28 (0.41) | 0.34 (0.44) | 0.43 (0.57) | 12.46 (6.71) | 3.09 (0.92) | 1.8 (1.69) | 2.54 (0.44) |

*Note.* Sample sizes for the correlation coefficients ranged from 213 to 256 due to attrition over time. Sample sizes for the means and standard deviations were 110 for men and 146 for women, with attrition over time. HED = heavy episodic drinking.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

**Table 2**

**Latent Growth Model for Heavy Episodic Drinking**

| | Intercept | | | | Slope | | | |
|---|---|---|---|---|---|---|---|---|
| | ***b*** | ***SE*** | **95% CI for *b*** | **β** | ***b*** | ***SE*** | **95% CI for *b*** | **β** |
| Growth factor mean | 1.96*** | 0.19 | [1.58, 2.33] | 0.70 | 0.58*** | 0.14 | [0.31, 0.86] | 0.59 |
| Male Gender | -0.47 | 0.28 | [-1.01, 0.07] | -0.08 | 0.43* | 0.20 | [0.04, 0.83] | 0.22 |
| Descriptive norms | 0.12*** | 0.02 | [0.08, 0.16] | 0.34 | -0.02 | 0.01 | [-0.04, 0.01] | -0.13 |
| Social modeling among peers | 1.26*** | 0.17 | [0.92, 1.59] | 0.43 | -0.05 | 0.13 | [-0.30, 0.20] | -0.05 |
| Parental drinking permissiveness | 0.27*** | 0.08 | [0.12, 0.43] | 0.21 | 0.04 | 0.06 | [-0.08, 0.15] | 0.08 |
| Parental monitoring | -0.44 | 0.30 | [-1.03, 0.15] | -0.07 | 0.24 | 0.22 | [-0.20, 0.67] | 0.11 |
| Descriptive norms × Parental permissiveness | 0.02* | 0.01 | [0.001, 0.04] | 0.12 | -0.02** | 0.01 | [-0.03, -0.01] | -0.32 |
| Social modeling × Parental permissiveness | 0.26** | 0.08 | [0.10, 0.43] | 0.19 | -0.07 | 0.06 | [-0.18, 0.05] | -0.14 |
| Descriptive norms × Parental monitoring | <0.001 | 0.04 | [-0.08, 0.08] | <0.01 | -0.01 | 0.03 | [-0.07, 0.04] | -0.05 |
| Social modeling × Parental monitoring | 0.12 | 0.37 | [-0.61, 0.85] | 0.02 | 0.28 | 0.27 | [-0.25, 0.81] | 0.12 |

* $p < .05$.

** $p < .01$.

*** $p < .001$.

**Table 3**

**Latent Growth Model for Alcohol-related Consequences**

| | Intercept | | | | Slope | | | |
|---|---|---|---|---|---|---|---|---|
| | ***b*** | ***SE*** | **95% CI for *b*** | **β** | ***b*** | ***SE*** | **95% CI for *b*** | **β** |
| Growth factor mean | 0.27*** | 0.03 | [0.22, 0.33] | 0.79 | 0.07*** | 0.02 | [0.03, 0.11] | 0.57 |
| Male Gender | -0.03 | 0.04 | [-0.11, 0.05] | -0.04 | 0.01 | 0.03 | [-0.05, 0.07] | 0.04 |
| Descriptive norms | 0.01** | 0.003 | [0.002, 0.01] | 0.18 | 0.003 | 0.002 | [-0.001, 0.01] | 0.21 |
| Social modeling among peers | 0.21*** | 0.03 | [0.16, 0.26] | 0.58 | -0.04* | 0.02 | [-0.08, -0.002] | -0.31 |
| Parental drinking permissiveness | 0.02 | 0.01 | [-0.003, 0.04] | 0.12 | 0.003 | 0.01 | [-0.02, 0.02] | 0.05 |
| Parental monitoring | -0.07 | 0.04 | [-0.16, 0.02] | -0.09 | -0.01 | 0.03 | [-0.08, 0.06] | -0.04 |
| Descriptive norms × Parental permissiveness | 0.001 | 0.001 | [-0.001, 0.004] | 0.07 | <0.001 | 0.001 | [-0.002, 0.002] | -0.04 |
| Social modeling × Parental permissiveness | 0.03* | 0.01 | [0.001, 0.05] | 0.15 | -0.01 | 0.01 | [-0.03, 0.01] | -0.13 |
| Descriptive norms × Parental monitoring | 0.002 | 0.006 | [-0.01, 0.01] | 0.03 | -0.003 | 0.01 | [-0.01, 0.01] | -0.10 |
| Social modeling × Parental monitoring | -0.02 | 0.06 | [-0.12, 0.09] | -0.02 | 0.06 | 0.04 | [-0.02, 0.14] | 0.20 |

* $p < .05$.

** $p < .01$.

*** $p < .001$.