



Published in final edited form as:

Addict Behav. 2011 March ; 36(3): 222–230. doi:10.1016/j.addbeh.2010.11.004.

Broad Social Motives, Alcohol Use, and Related Problems: Mechanisms of Risk From High School through College

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Abstract

Broad social motives (not specific to alcohol use) have been established as an important predictor of alcohol use and problems among college students, but we have little understanding of the mechanisms through which such motives operate. Thus, the current study examined broad social motives prior to college entry as a predictor of college drinking/problems and sought to identify potential mechanisms through which they are associated with increased risk. Participants comprised a sample of 2,245 incoming college students (59.9% women) transitioning from high school through the college years. The first web-based survey was completed during the summer prior to matriculation with participants reporting on their behavior during the spring of high school senior year. Additional surveys were administered each academic semester through the fall of the fourth year. High school social motives were examined as a predictor of changes in alcohol use/problems from high school through senior year, with changes in descriptive norms, personal drinking values, and alcohol expectancies from high school to sophomore year examined as possible mediators of these relations. Descriptive norms, personal drinking values, and alcohol expectancies were robust mediators of broad social motives for both alcohol use and problems. Although there were a few differences by race/ethnicity in the alcohol use model, the mechanisms through which broad social motives operated were largely invariant across groups. These findings shed light on important mechanisms that can be targeted in prevention programs, particularly those that target groups who are likely to be high in broad social motives (e.g., fraternity/sorority members).

Keywords

Social motives; alcohol use; college students; expectancies; descriptive norms; personal drinking values

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1. Introduction

The problem of college drinking has garnered increased attention over the past twenty years and prevention efforts have also increased dramatically (Wechsler et al., 2002). Despite increased attention to the problem, rates of heavy episodic drinking (HED; 4 or more drinks on a single occasion for women and 5 or more for men) have remained remarkably stable, and rates of frequent HED between 1993 and 2001 (3 or more times in a two week period) increased (Wechsler et al., 2002). Further, college represents a developmental period associated with the highest prevalence of alcohol use disorders (Grant et al., 2004), with one study finding that more than a third of college students met criteria for alcohol abuse or dependence (Knight et al., 2002). In addition to increasing risk for alcohol use disorders, HED places college students at risk for a host of negative consequences including high-risk sexual behavior, aggression, and other drug use (White & Jackson, 2004/2005).

Although the college environment clearly contributes to high-risk drinking (Borsari & Carey, 2006), those at greatest risk for long-term consequences tend to be those who are already engaging in HED prior to college matriculation (Grekin & Sher, 2006). Thus, it is critical to identify risk factors associated with heavy drinking among incoming college students. The current study examined broad social motives (not specific to alcohol use) prior to college entry as a predictor of college drinking and sought to identify potential mechanisms through which such motives are associated with increased risk.

The relation between the value placed on social activities and alcohol use has received some attention in the literature though a variety of terms have been used to describe the construct (e.g., motives, goals, strivings). Although related to personality traits, motives, goals, or strivings are generally considered to be distinct from these traits. There are a variety of models of the relation between personality traits and goals/motives (Cantor, 1990; Costa & McCrae, 2004; Hogan & Roberts, 2005), but they generally share the idea that personality traits are broader and more distal predictors of behavior that operate through more proximal constructs of which motives/goals are but one example. With respect to broad social motives as conceptualized in the current study, the personality trait of extraversion is likely to be of most relevance. Previous studies examining the relation between extraversion and broad motives similar to those assessed in the current study (Roberts, O'Donnell, & Robins, 2004; Roberts & Robins, 2000) have found correlation coefficients of moderate size (~.40). Thus, broad social motives, goals, or strivings and extraversion are related, but distinct constructs.

Regardless of the terminology used for broad social motives, prior research has demonstrated that placing greater value on social activities is associated with increased risk for heavy drinking (Simons, Christopher, Oliver, & Stanage, 2006; Rhoades & Maggs, 2006). A recent study using longitudinal data from high school to college found a similar pattern of results with respect to alcohol-related problems (Vaughan, Corbin, & Fromme, 2009), with broad social motives significantly predicting problems both in high school and in college, particularly for Caucasian and Latino students.

Despite consistent evidence that broad social motives serve as a risk factor, little attention has been given to the mechanisms through which they contribute to drinking behavior. There are, however, a number of well-established social-cognitive influences that might mediate the influence of broad social motives. Examples include alcohol expectancies (beliefs about positive effects of alcohol), personal drinking values (personal beliefs about the acceptability of alcohol use), and descriptive norms (perceptions of normative drinking behavior in a relevant peer group). There is an extensive body of research on alcohol expectancies showing that beliefs about alcohol effects develop prior to drinking onset and prospectively predict both alcohol use and related problems (Greenbaum, Del Boca, Wang,

& Goldman, 2005; Jones, Corbin, & Fromme, 2001). Descriptive norms have also been shown to be a robust predictor of drinking behavior and efforts to correct misperceptions of peer drinking are now widespread on college campuses (DeJong et al., 2006; Perkins, 2002). Although less widely studied, personal drinking values regarding alcohol use have also been found to predict drinking behavior (Chawla, Neighbors, Lewis, Lee, & Larimer, 2007; Krohn, Lizotte, Thornberry, Smith, & McDowall, 1996). In fact, a recent study found that personal drinking values were a stronger prospective predictor of drinking during freshman year than were expectancies or descriptive norms (Corbin and Fromme, unpublished manuscript).

Although the association between social motives and expectancies, values, and norms has not previously been established, such relations are consistent with social-cognitive models of behavior (Bandura, 1986). If one strongly values broad engagement in social activities, the potential of drinking to ease or improve social interactions should be particularly appealing. Drinking experiences that are perceived as facilitating social interactions should serve to further strengthen beliefs about the social benefits of alcohol use (Borsari & Carey, 2006). Individuals with strong social motives might also be drawn to other individuals who are highly socially active. In the context of college, the social activities in which these peers engage are likely to involve alcohol. Thus, the individual with strong social motives should be more likely to affiliate with peers who are engaging in heavy drinking. These individuals may also be more susceptible to influence from heavy drinking peers, as they may receive social reinforcement for engaging in high-risk drinking behaviors. Thus, both selection and socialization processes may put individuals with broad social motives at risk for heavy drinking and related problems. Consistent with this idea, studies have found both selection and socialization effects on heavy drinking in college students in general (Read, Wood, & Capone, 2005; Stappenbeck, Quinn, Wetherill, & Fromme, in press), and among members of fraternities and sororities (Park, Sher, & Krull, 2009) and men (McCabe et al., 2005) in particular. Finally, strong beliefs about the positive effects of drinking and affiliation with heavier drinking peers, might also be accompanied by permissive values about drinking behavior. That is, it seems unlikely that a behavior in which one's friends engage and that has such positive consequences can be condemned.

Although we are not aware of any studies demonstrating that alcohol-related cognitions mediate the association between broad social motives and alcohol use, there is more general evidence that such cognitions mediate the influence of more distal and trait-like influences on alcohol use/problems. For example, alcohol expectancies serve as a mechanism through which personality influences (e.g., impulsivity, neurotic-extraversion) contribute to high-risk drinking and alcohol-related problems (Smith & Anderson, 2001), and a recent study suggests that other social cognitive constructs (e.g. perceptions of peer use) may also serve as mediators between personality traits and alcohol use (Barnow et al., 2007).

Based on the extant literature and theory regarding the relation between social motives and drinking behavior, we hypothesize that the development of more positive alcohol expectancies, more permissive drinking values, and perceptions of greater peer use during the transition from high school to college (sophomore year) will mediate the relation between high school senior year social motives and increases in alcohol use and problems from high school to senior year of college (Figure 1). Given racial group differences in the relations between broad social motives and drinking behavior (Vaughan et al., 2009) and evidence for gender differences in the relations among personality traits, expectancies, and drinking behavior (Fu, Ko, Wu, Cherng, & Cheng, 2007; McCarthy, Miller, Smith, & Smith, 2001), we also examined potential group differences in mechanisms of the influence of social motives on alcohol use and problems. Based on previous research we hypothesized

that broad social motives would have stronger indirect effect on the drinking outcomes of men (McCarthy et al., 2001) and Caucasian students (Vaughan et al., 2009).

2. Method

2.1 Participants

Participants included 2,245 incoming college freshmen who completed the first of twice-annual surveys (summer following senior year of high school through fall of the senior year of college) from the longitudinal study “The UT Experience!” which assessed alcohol use and other behavioral risks as well as attitudes and beliefs related to these behaviors. The majority of participants were women (59.9%), and the racial/ethnic distribution included 53.9% Caucasian, 18.0% Asian American, 15.2% Latino/Hispanic, 6.7% multi-ethnic, 4.1% African American, .4% Native Hawaiian, and .1% American Indian students. An additional 1.6% of participants did not report their race/ethnicity. The ethnic/racial distribution of the sample was similar to the 2003–2004 enrollment demographics for the university (Caucasian 60.6%, Asian American 17%, Hispanic/Latino 14%, and African American 3.6%).

2.2 Measures

2.2.1 Alcohol use—Four indicators were used to measure alcohol use. Two items based on a revised version of the *Daily Drinking Questionnaire (DDQ)*; Collins, Parks, & Marlatt, 1985) were used to measure frequency and quantity of alcohol use. The revised DDQ was used given that it more closely approximates interview based measures of typical drinking like the Timeline Follow Back interview (Sobell & Sobell, 1992) by asking separate questions to better differentiate frequency and quantity of alcohol use (Kruse et al., 2005). For each day of the week, participants were asked to indicate the number of weeks (during the past 3 months) that they consumed alcohol, and to indicate the average number of drinks they consumed on the days that they consumed alcohol. The two other alcohol use items assessed past three month frequency of drinking to intoxication (Jackson, Sher, Gotham, & Woods, 2001), and heavy episodic drinking, defined as consuming five or more drinks in a setting for men, and four or more for women (Wechsler & Isaac, 1992). Response options for these two items ranged from 1 to 90.

2.2.2 Alcohol-related problems—Alcohol related problems during the past three months were assessed using the Rutgers Alcohol Problem Index (*RAPI*; White & Labouvie, 1989). The RAPI includes 23 items that measure the frequency of problems resulting from the individual’s alcohol consumption. The reliability estimates for the RAPI were $\alpha = .92$ during senior year of high school, and .91 for senior year of college.

2.2.3 Broad Social motives—The measure of broad social motives used the stem “How important is it for you...” and included six items such as, “to be popular,” “to have an active social life,” and “to date several people” (Maggs, 1997). In the summer prior to college entry, participants were asked to rate each item on a Likert scale that ranged from 1 = not at all important to me, to 5 = very important. The measure assessed broad social motives at the time the survey was completed as no time-specifier (during the past three months or during the spring semester of high school) was given. The internal consistency of the measures was adequate ($\alpha = .73$).

2.2.4 Personal drinking values—Participants were asked about their personal drinking values regarding alcohol use and intoxication (Perkins & Berkowitz, 1986). Four items were used as a composite of personal drinking values; for example: “it is okay if I get drunk frequently if that is what I want to do.” Internal consistency for the measure was adequate

during both senior year of high school and sophomore year of college ($\alpha = .71$ and $\alpha = .73$, respectively).

2.2.5 Descriptive norms—Descriptive norms for participants “social group” were assessed using a modified version of the Drinking Norms Rating Form (DNRF; Baer et al., 1991). Participants were asked to estimate the number of standard drinks that male and female members of their social group (i.e., “the principal group of friends with whom you interacted and spent time”) consumed on each day of a typical week during the past three months. The numbers of drinks for each day were summed to create measures of weekly drinking for male and female peers, and the mean of the two weekly sums was used as an overall index of perceived peer use.

2.2.6 Alcohol expectancies—Alcohol expectancies were measured using the 15-item Brief Comprehensive Effects of Alcohol questionnaire (Ham, Stewart, Norton, & Hope, 2005). Participants were asked to respond to each item on a four-point Likert scale with response options of “disagree”, “slightly disagree”, “slightly agree”, and “agree”. We focused on the four positive expectancy subscales including sociability, enhancement of sexual experiences, tension reduction, and liquid courage. The reliability estimates for the positive alcohol expectancy subscales were good at both waves 1 and 5 (.80–.91).

2.3 Recruitment and Data Collection Procedures

Potential participants were recruited during freshman orientation occurring during the summer prior to matriculation. In order to participate, students had to be between the ages of 17 and 19, unmarried and first-time college students. A total of 2,245 students completed the first survey in the summer prior to matriculation with participants retrospectively reporting on their behavior during the spring of their high school senior year. Relative to participants who consented but failed to complete the initial survey, those who completed the initial survey were more likely to be female and to be lighter drinkers, but there were no differences with respect to race/ethnicity (Corbin, Vaughan, & Fromme, 2008). In order to increase compliance and consistency of self-reports, participants were not required to complete the online survey in one sitting (Richman, Keisler, Weisband, & Drasgow, 1999). For further details on the recruitment procedures see Hatzenbuehler, Corbin, and Fromme (2008), and Corbin, Vaughan, and Fromme (2008). Finally all procedures were approved by the university Human Subjects Review Board.

2.4 Data Management and Data Analytic Plan

Prior to conducting analyses, distributions of the variables were inspected. Distributions that were non-normal (skewness values greater than 3) were log-transformed. Transformed variables included all indicators of alcohol consumption (high school and senior year of college), descriptive norms (high school and sophomore year of college), and alcohol-related problems (high school and senior year of college).

Structural equation modeling (SEM) was conducted using AMOS 16.0 (Arbuckle, 2007). Three waves of data were used in the models: spring of senior year in high school assessed in the summer prior to matriculation (wave 1), spring of sophomore year (wave 5) and fall of senior year (wave 8). We utilized only the spring surveys for the first two time-points as the fall surveys were briefer and did not include all of the measures of interest (e.g. expectancies). Missing data was handled by full-information maximum likelihood (FIML) estimation. FIML does not impute missing data, but rather uses all information from the data to calculate the parameter estimates and their standard errors (Enders, 2001). To assess the fit of the measurement and structural models, the comparative fit index (CFI), Tucker-Lewis fit index (TLI), and root mean square error of approximation (RMSEA) were utilized.

Comparative fit index, TLI values greater than .95 and RMSEA values less than .05 indicate near model-to-data fit (Quintana and Maxwell, 1999).

For both alcohol use and related problems, we first assessed the fit of the measurement model with correlations among all latent variables freely estimated. Both measurement and structural models in the full sample controlled for the demographic variables of gender and race/ethnicity. Ethnic/racial group status consisted of four dummy coded variables contrasting African American, Asian American, and Latino students to Caucasian students. After demonstrating adequate fit of the measurement model, we conducted tests of measurement invariance using Byrne's (2001) procedures to establish that the factor loadings and intercepts were similar across gender and racial/ethnic groups. The grouping variable in each model was removed as a covariate (i.e. gender was removed as a covariate when evaluating measurement invariance by gender). First, an unconstrained model was compared to a model in which the factor loadings were constrained (from latent variables to the variables that comprise them). Next, the model with constrained factor loadings was compared to a model with additional constraints on the intercepts (means of the indicators of the latent variables). A decrement in model fit for either contrast indicates group differences in the fit of the measurement model. Given the very large sample size, we used the cutoff criteria outlined by Chen (2007) to make determinations about invariance of the factor loadings ($\Delta CFI \geq -.01$ and $\Delta RMSEA \geq .015$ or $\Delta SRMR \geq .030$) and intercepts ($\Delta CFI \geq -.01$ and $\Delta RMSEA \geq .015$ or $\Delta SRMR \geq .010$).

After establishing measurement invariance, we proceeded to testing structural models in the full sample. These models incorporated both autoregressive and cross-lagged paths, and exogenous variables and error disturbances for the mediating variables at wave 5 were allowed to freely covary. The autoregressive paths signified the stability of the constructs over time, whereas the cross-lagged paths allowed us to examine longitudinal relations among the different constructs across the three time-points. Cross-lagged paths also provide the opportunity to examine indirect (or mediated) effects. We tested the indirect effects of social motives (senior year of high school) on changes in alcohol use and alcohol-related problems (from high school to senior year of college) through changes in personal drinking values, descriptive norms and alcohol expectancies (from high school to sophomore year of college). The program PRODCLIN2 (MacKinnon, Fritz, Williams, & Lockwood, 2007) was used to test for indirect effects using asymmetric 95% confidence intervals, which result in more accurate Type I error rates. When the resulting confidence limits do not include the value of zero, a significant indirect effect has been demonstrated.

After examining the structural models in the full sample, the structural weights (the autoregressive and cross-lagged paths) were constrained by group (gender or race/ethnicity). When the models were found to differ by group, individual paths that were significantly different by group were identified using critical ratios. The multigroup analyses comparing various ethnic/racial groups were restricted to three groups (Caucasian, Asian American, and Latino), given the limited samples sizes of the other groups.

3. Results

3.1 Attrition Analyses

Of the 2245 participants who completed the high school survey (wave 1), a total of 1790 (79.7%) completed the sophomore survey (wave 5), and a total of 1539 (68.5%) completed the survey in the fall of senior year of college (wave 8). A total of 1434 (63.9%) completed all three of the surveys used in the analyses. Comparisons of those who completed wave 8 and those who dropped out prior to this assessment showed significant gender and racial/ethnic group differences, $\chi^2 (4 \text{ df}) = 14.65, p = .005$. Women (72.8%) were more likely than

men (62.0%) to have completed wave 8 and relative to other racial/ethnic groups, Asian American (75.7%) and Hispanic/Latino (63.5%) students were more and less likely, respectively, to have completed wave 8. Analyses of Variance (ANOVAs) also indicated that those who dropped out prior to wave 8 tended to be at higher overall risk, as evidenced by heavier alcohol use (all four measures), and alcohol-related problems (all p values < .001). Non-completers also reported more permissive personal drinking values and perceptions of greater peer alcohol use relative to completers (p values < .001). Finally, one of the four expectancy subscales differed significantly with stronger expectations of tension reduction among non-completers ($p = .01$).

Given evidence for differential attrition, Little's test of MCAR (1988) was used to determine if the data were missing completely at random. The results indicated that the assumption of MCAR was not tenable ($p < .001$). Although data that meet the assumptions of MCAR are preferable, full information maximum likelihood (FIML) estimation requires only that the data be missing at random (MAR), a less restrictive assumption than MCAR. Unfortunately, approaches for determining if data are missing at random (MAR) are not well established. Further, even when the data are not missing at random (NMAR), FIML estimation typically provides less biased estimates than does listwise deletion (Schafer and Graham, 2002; West, 2001). For these reasons, we proceeded with FIML estimation, though results from models using listwise deletion yielded virtually identical results, with all statistically significant paths in the FIML models remaining significant in the listwise deletion models.

3.2 Measurement Model for Alcohol Use

The latent constructs in the measurement model included alcohol use at the high school and senior year of college assessments, and social motives, personal drinking values and alcohol expectancies at the high school and sophomore year of college assessments (Figure 2). Although fit indices suggested adequate fit, $\chi^2(345) = 2,084.87$, $p < .001$, CFI = .94, TLI = .93, and RMSEA = .05, the factor loadings for one of the personal drinking values items (e.g., "It is okay for me to get drunk even if it sometimes interferes with my grades or responsibilities") were less than .30 at both time points. In addition, modification indices suggested that correlating the errors of binge drinking and the number of times drunk in the past three months within each time point (high school and senior year of college), would significantly improve model fit. The model without the low loading item and with the correlated errors provided an excellent fit to the data, $\chi^2(291) = 1,394.88$, $p < .001$, CFI = .96, TLI = .95, and RMSEA = .04.

Next, tests of measurement invariance were conducted to determine if the model operated similarly across gender and race. Using Chen's (2007) criteria, there was no significant decrement in model fit when constraining either the factor loadings, CFI (.963 vs. .962) and RMSEA (.03 vs. .029), or the intercepts, CFI (.962 vs. .956) and RMSEA (.029 vs. .031), for men and women, suggesting invariance of the measurement model by gender. Tests of measurement invariance by race/ethnicity also found no decrement in model fit when constraining either the factor loadings, CFI (.955 vs. .951) and RMSEA (.026 vs. .027), or the intercepts, CFI (.951 vs. .933) and RMSEA (.027 vs. .031).

3.3 Structural Model for Alcohol Use

The structural model for the alcohol use model fit the data well, $\chi^2(465) = 2,313.56$, $p < .001$, CFI = .95, TLI = .93, and RMSEA = .04. Figure 2 includes standardized coefficients for all structural paths and R-square values for all endogenous variables. The autoregressive paths were all significant, (ranging from .29 to .56), indicating that the latent constructs were moderately stable over time. In terms of the cross-lagged paths, broad social motives in high school were significantly predictive of changes in personal drinking values (standardized

coefficient = .14, $p < .001$), descriptive norms (.11, $p < .001$), and alcohol expectancies (.12, $p < .001$) from high school to sophomore year, and changes in alcohol use from high school to senior year in college (.07, $p < .01$). Sophomore year personal drinking values (.39, $p < .001$) were the most robust predictor of changes in alcohol use from high school to senior year in college, followed by descriptive norms (.22, $p < .001$). Tests of indirect effects indicated that high school social motives had indirect effects on senior year alcohol use through sophomore year descriptive norms (95% CI = .009 to .024, $p < .01$), and personal drinking values (95% CI = .022 to .053, $p < .05$). Thus, descriptive norms and personal drinking values partially mediated the relationship between broad social motives and alcohol use.

Multigroup analyses were conducted to test for differences in the structural paths by gender and race/ethnicity. Constraining the structural weights to equality resulted in no decrement in model fit for gender ($p = .37$), but constraining the structural weights to equality across racial/ethnic groups did produce a significant change in model fit χ^2 ($df = 78$) = 573.97, $p < .001$). Critical parameters tests revealed that there were statistically significant group differences in four of the structural parameter estimates, though two were autoregressive paths; descriptive norms were more stable for Caucasians (.48, $p < .001$) than for Latinos (.31, $p < .001$), whereas alcohol expectancies were more stable across time for Latinos (.51, $p < .001$) than for Caucasians (.39, $p < .001$). In addition, broad social motives were a stronger predictor of descriptive norms for Latinos (.20, $p < .001$) than for either Caucasians (.07, $p < .05$) or Asian Americans (.05, $p = .40$).

3.5 Measurement Model for Alcohol-Related Problems

The only difference between the measurement model for alcohol-related problems and the measurement model for alcohol use was the exclusion of the latent variable of senior year alcohol use. Alcohol-related problems was a measured variable rather than a latent variable, and the latent variable for high school alcohol use was retained to control for the effects of baseline drinking on later problems. Based on our previous analysis of the measurement model for alcohol use, we removed the one low loading item of the personal drinking values latent variable, and included correlated errors for binge drinking and number of times drunk in the past three months in high school. The measurement model provided strong fit to the data, χ^2 (207) = 1,174.21, $p < .001$, CFI = .96, TLI = .95, and RMSEA = .05. As with the model for alcohol use, tests of measurement invariance indicated that the measurement model operated similarly across gender and race. There was no significant decrement in model fit by gender or race/ethnicity when constraining the factor loadings and intercepts to equivalence across groups.

3.6 Structural Model for Alcohol-Related Problems

The structural model for alcohol related problems fit the data well, χ^2 (395) = 2,014, $p < .001$, CFI = .95, TLI = .93, and RMSEA = .04. All of the autoregressive and cross-lagged paths were statistically significant except for the paths from social motives and alcohol use during high school to alcohol-related problems in senior year of college. The autoregressive effects were quite similar to the alcohol use model (Figure 3). Controlling for the effects of wave 1 alcohol-related problems (.24, $p < .001$) and alcohol use (−.03, $p = .49$), descriptive norms (.16, $p < .001$) were the most robust predictor of senior year alcohol related problems followed by personal drinking values (.15, $p < .001$) and alcohol expectancies (.14, $p < .001$). Broad social motives contributed to alcohol-related problems through each of the proposed mediators, including descriptive norms (95% CI = .0065 to .02, $p < .05$), alcohol expectancies (95% CI = .0054 to .020, $p < .05$), and personal drinking values (95% CI = .005 to .026, $p < .05$). Given the lack of significance of the path from high school social motives to senior year problems, descriptive norms, personal drinking values and alcohol

expectancies fully mediated the relationship between broad social motives and alcohol use. Constraining the structural paths to equality across groups failed to identify differences in model fit relative to the unconstrained models ($p = .81$, gender, $p = .22$, race/ethnicity). These findings suggest that the theoretical model operated similarly for all groups with respect to alcohol-related problems.

4. Discussion

The present study contributes to the literature by identifying multiple mechanisms through which broad social motives contribute to alcohol use and problems during the transition from high school through the college years. Descriptive norms and personal drinking values were consistent mediators of the influence of broad social motives on both alcohol use and alcohol-related problems, and alcohol expectancies served as an additional mediator with respect to alcohol-related problems. The fact that the study was conducted with a very diverse college student sample and that the results were largely invariant across groups suggests that the proposed model is applicable to a wide range of students.

Previous studies have identified a link between social motivation and both alcohol consumption and alcohol-related problems (LaBrie, Hummer, & Pederson, 2007; Simons et al., 2006), but have only speculated about the potential mechanisms through which social motivation may contribute to alcohol-related outcomes. The current results provide novel information about the ways in which social motivation may contribute to risk. Because individuals who are more socially motivated may drink to build social camaraderie (LaBrie et al., 2007), individuals with strong social motives during high school may self-select into peer groups that engage in heavier drinking when they transition into college. In addition, they may be more susceptible to passive peer pressure associated with membership in a high-risk group. In other words, they may be more likely to drink heavily in an effort to “fit in” with a heavy drinking peer group. The strong indirect effect of broad social motives operating through descriptive norms supports this possible mechanism of increased risk for heavy drinking. Given the social contexts in which most college drinking occurs, membership in heavy drinking social groups may also provide increased opportunities for experiencing negative consequences associated with alcohol use.

In addition to their direct impact on behavior, peers are an important source of information about the acceptability and potential benefits of engaging in different types of social behavior, including alcohol use. Thus, emerging adults with strong social motives may develop attitudes that are more favorable toward alcohol use as they affiliate with social groups in which the behavior is accepted and valued (LaBrie et al., 2007). The significant indirect effects on alcohol-related problems through expectancies and values are consistent with the idea that strong social motives contribute to the development of more positive alcohol-related cognitions, which serve as precursors to drinking problems.

Although the results were largely consistent across groups, there was evidence that the pathway from broad social motives to descriptive norms was stronger for Latinos compared to Caucasians and Asian Americans. This is interesting given that a previous study in this sample found that descriptive norms were a weaker predictor of drinking behavior for Latinos than for Caucasians (Corbin et al., 2008). It is possible that the stronger relation between social motives and descriptive norms and the weaker relation between descriptive norms and drinking behavior among Latino students reflects larger selection and smaller socialization effects. In other words, Latino students who have strong social motives may be particularly likely to select into peer groups that engage in social activities that include heavy drinking (Vaughan et al., 2009), but be little impacted by further socialization by their

heavy drink peers. Although this hypothesis is consistent with the pattern of results, it is speculative and requires replication in other samples.

In addition to the theoretical importance of the findings, there is great practical value in identifying a marker of increased risk for drinking problems in college that does not directly relate to the behavior of interest. Specifically, questions related to broad social motives may be perceived as less intrusive because admitting to strong social motives does not carry the same risks as admitting to engagement in alcohol use (particularly for those who are not of legal drinking age). Future studies are needed to replicate the current findings, but assessment of social motives as a means for identifying high-risk students who might be targeted by prevention efforts seems worth considering. For example, assessments of social motives among incoming freshman might identify students for whom engagement in lower risk social activities (e.g. clubs, recreational sports) might prevent engagement in social activities that encourage heavier drinking (e.g. fraternity membership). Such efforts to engage these students in constructive programs might serve as an effective prevention tool for this high-risk group.

In addition to being a marker for increased risk, the current results identify potential mechanisms through which broad social motives contribute to high risk drinking behavior. These findings shed light on important mechanisms that can be targeted in prevention programs, particularly among individuals with strong social motives. Measures of social motives might be used to screen for high-risk individuals who are likely to be most responsive to interventions targeting social-cognitive mechanisms. For example, individualized feedback about true drinking norms on campus might be particularly effective for those high in social motives, as they may be more likely to perceive that others are drinking heavily and/or to select into groups comprising high-risk drinkers. As an alternative to screening for high social motives, these programs might also be used to target high-risk groups (fraternity/sorority members, athletic team members) that collectively are likely to be more susceptible to social influences (Capone, Wood, Borsari, & Laird, 2007; Ford, 2007).

Prevention programs that attempt to provide alternative ways to fulfill socialization needs (e.g. alcohol free social activities) might have particular utility. Efforts to provide more constructive outlets for meeting social needs might be coupled with programs targeting descriptive norms and expectancies for freshmen entering college. Programs designed to counter misperceptions of peer drinking behavior and to reduce beliefs about positive effects of alcohol have been shown to be effective in achieving these outcomes (Neighbors, Larimer, & Lewis, 2004), though effects have typically been quite small (Carey et al., 2007). Combining these approaches with efforts to change the social environment, and targeting these approaches during a period when they are known to increase (freshman year) and among individuals known to be at increased risk for developing these beliefs (those high in social motivation) may lead to stronger effects. It is important to recognize that such interventions might be most effective for Caucasian and Latino students, and that these approaches may need to be adapted in important ways to serve the needs of Asian Americans.

The results of the current study should be considered in light of several important limitations. First, this study relied exclusively on self-report measures which are prone to socially desirable responses. Further, those with strong social motivations might be particularly vulnerable to socially desirable responding. It is important to note, however, that research has found self-reports of drinking behavior to be quite accurate (Grant et al., 2002) when confidentiality is assured. Other research has found that the addition of collateral reporters of drinking behavior provides limited incremental value beyond the information obtained by self-report (LaForge, Borsari, & Baer, 2005).

Although the data in the current study were longitudinal in the sense that each successive wave of data was collected at a later time-point, within each wave of data collection, participants were asked to retrospectively report on their behavior during the prior three-month period. Further, the “high-school” assessment was based on data collected during the summer prior to college matriculation (retrospectively reporting on behavior in the final semester of high-school). This data collection approach leaves open the possibility of biases related to recall though research has demonstrated that individuals can accurately recall their alcohol consumption over periods of at least 90 days (Sobell & Sobell, 1995). It is also important to note that the data were correlational and can therefore not be used to make definitive statements about causation.

This study also did not assess personality traits likely to be associated with broad social motives (e.g. extraversion) or more specific motives (e.g. social drinking motives). Although the lack of a measure of extraversion is a clear limitation, prior research on personality traits has found that extraversion is less consistently associated with important alcohol-related outcomes, including alcohol use disorders, than are other personality traits (e.g. impulsivity) that are more distinct from broad social motives (Sher & Trull, 1994). Our inability to examine the association between broad social motives and social motives for drinking leaves unanswered questions that will be important to address in future research. Drinking motives are conceptualized as a final common pathway through which more distal and trait-like factors may operate (Cooper, 1994). Thus, it seems likely that social drinking motives would mediate the influence of broad social motives on drinking behavior and related problems. This possibility does not argue against the importance of broad social motives, which may serve as an early marker for risk that predates the development of more specific motives for drinking.

Despite these limitations, the results of the current study have important implications and add valuable information to our current understanding of drinking behavior among college students. Our study is one of the few studies investigating patterns of alcohol use and problems across the college years among a large ethnically diverse sample. The cross-lagged, autoregressive models permitted us to examine changes in the proposed mediators and outcomes over time, allowing for stronger inferences about the temporal relationships among the constructs as well as the processes through which broad social motives may contribute to drinking behavior and associated problems. This study also highlights differences in the magnitude of various pathways among ethnic minority college students. Finally, the findings are practically relevant as they provide a basis for the development of strategies that target specific mechanisms in at-risk populations during the riskiest time periods.

Acknowledgments

This study was supported by the National Institute on Alcohol Abuse and Alcoholism [RO-1-AA013967-02] and the National Institute on Drug Abuse [5T32 DA-019426-04].

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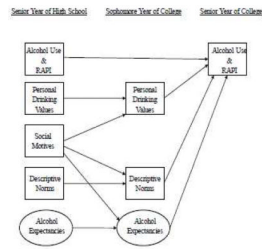


Figure 1. Conceptual model of factors associated with alcohol use/problems. Note: RAPI = Rutgers Alcohol Problems Index.

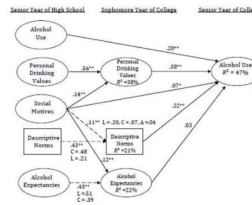


Figure 2. Structural equation model of factors associated with alcohol use. Note: * $p < .05$, ** $p < .001$. Rectangular boxes = observed variables. Ovals = latent factors. Covariates (gender and race/ethnicity) were included in the overall structural model, and the endogenous variables assessed in sophomore year were allowed to freely covary. These paths are not shown in the figure for clarity of presentation. Dashed lines indicate statistically significant group differences in the parameter estimates. C = Caucasians, A = Asian American, L = Latino Americans. Coefficients without a corresponding letter are for the full-sample.

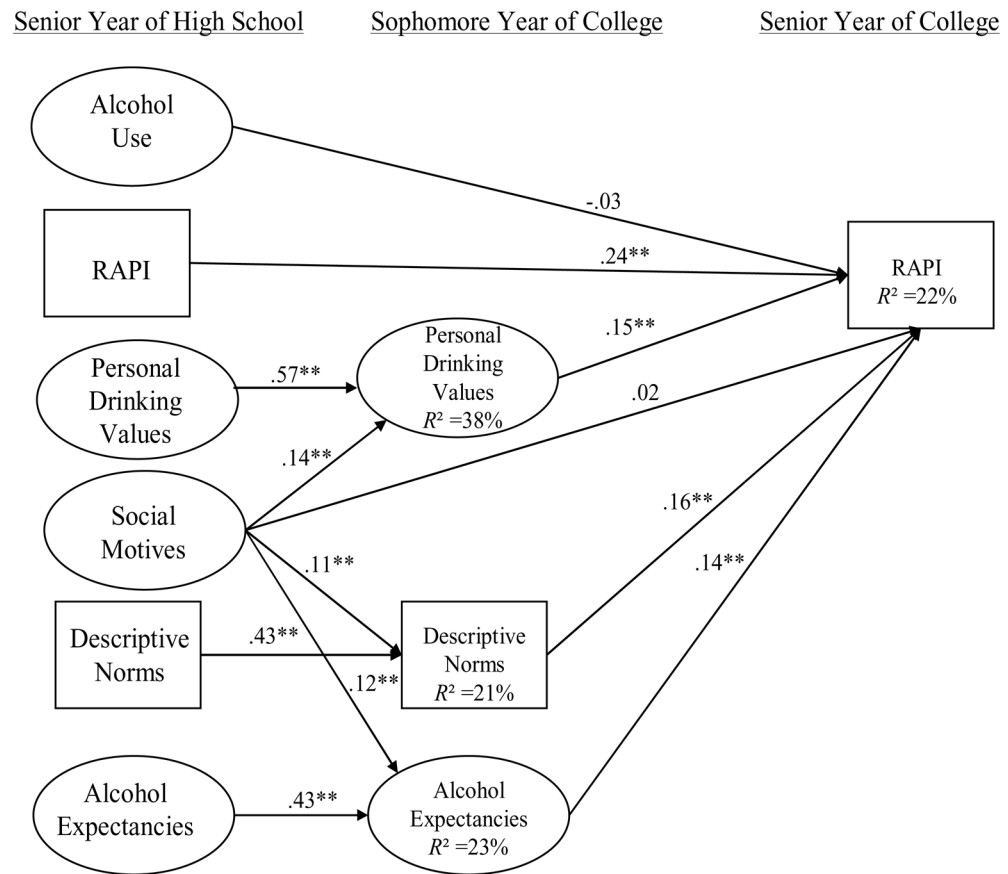


Figure 3.

Structural equation model of factors associated with alcohol problems.

Note: $*p < .05$, $**p < .001$. Rectangular boxes = observed variables. Ovals = latent factors.

Covariates (gender and race/ethnicity) were included in the overall structural model, and the endogenous variables assessed in sophomore year were allowed to freely covary. These paths and not shown in the figure for clarity of presentation.

Table 1

Correlations	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1. Gender	---	.02	-.02	-.06**	.03	.00	-.01	.00	.01	-.03	.04*	.03	-.12**	-.07**	.06**	-.04	-.02	-.01	.05	.04	.03	.02
2. Asian	---	---	-.20**	-.10**	-.13**	-.20**	-.21**	-.21**	-.20**	-.13**	-.06*	-.13**	-.18**	-.09**	-.12**	-.20**	-.07**	-.21**	-.24**	-.18**	-.17**	-.12**
3. Latino	---	---	---	-.09**	-.11**	-.03	.06**	.06**	.00	.03	-.09**	-.04*	.12**	-.05*	.02	.05	-.02	-.04	-.05	.05*	-.01	-.02
4. African Am	---	---	---	---	-.06**	-.07**	-.07**	-.05*	-.08**	-.06**	-.07**	.05*	-.03	-.09**	-.10**	-.11**	-.12**	-.12**	-.14**	-.13**	-.12**	.05*
5. Multiethnic	---	---	---	---	---	.00	.02	.00	.00	-.01	-.04	.00	-.02	.03	-.01	-.02	-.05*	.00	.02	-.02	-.03	.05
6. Drunk1	---	---	---	---	---	---	.74**	.80**	.87**	.74**	.20**	.58**	.53**	.31**	.38**	.40**	.24**	.43**	.35**	.32**	.42**	.30**
7. Quantity1	---	---	---	---	---	---	---	.80**	.78**	.70**	.19**	.63**	.55**	.29**	.41**	.43**	.24**	.41**	.37**	.36**	.45**	.29**
8. Frequency1	---	---	---	---	---	---	---	---	.82**	.74**	.18**	.59**	.58**	.29**	.42**	.41**	.24**	.41**	.39**	.35**	.44**	.31**
9. Binge1	---	---	---	---	---	---	---	---	---	.74**	.18**	.59**	.56**	.29**	.42**	.38**	.24**	.41**	.37**	.35**	.45**	.31**
10. RAPI1	---	---	---	---	---	---	---	---	---	---	.17**	.52**	.51**	.31**	.34**	.35**	.23**	.36**	.31**	.31**	.39**	.35**
11. Motives	---	---	---	---	---	---	---	---	---	---	---	.23**	.17**	.22**	.19**	.23**	.21**	.22**	.20**	.23**	.22**	.17**
12. Values	---	---	---	---	---	---	---	---	---	---	---	---	.46**	.38**	.40**	.58**	.31**	.42**	.36**	.36**	.43**	.30**
13. Descriptive1	---	---	---	---	---	---	---	---	---	---	---	---	---	.25**	.46**	.32**	.15**	.32**	.25**	.31**	.35**	.26**
14. Expectancies1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	.20**	.26**	.42**	.23**	.19**	.21**	.22**	.20**
15. Values5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	.52**	.30**	.50**	.46**	.49**	.51**	.35**
16. Descriptive5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	.42**	.51**	.47**	.48**	.52**	.34**
17. Expectancies5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	.29**	.28**	.30**	.30**	.28**
18. Drunk8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	.77**	.73**	.86**	.64**
19. Frequency8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	.74**	.77**	.59**
20. Quantity8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	.78**	.56**
21. Binge8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	.63**
22. RAPI8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

* $p < .05$,** $p < .01$.

The “1” after the name of the variable represents Time 1, Freshman year of college, 5 = Sophomore year of college, 8 = Senior year of college. Drunk = Times intoxicated due to alcohol. RAPI = Rutgers Alcohol Related Problems. Values = Personal drinking values. Descriptive = Descriptive norms.