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Examining the Role of Drinking Motives in College Student Alcohol Use and Problems

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A motivational model of alcohol involvement (M. L. Cooper, M. R. Frone, M. Russell, & P. Mudar, 1995) was replicated and extended by incorporating social antecedents and motives and by testing this model cross-sectionally and longitudinally in a sample of college students. Participants ($N = 388$) completed a questionnaire battery assessing alcohol use and problems, alcohol expectancies, sensation seeking, negative affect, social influences, and drinking motives. Associations among psychosocial antecedents, drinking motives, and alcohol involvement differed from those found by M. L. Cooper et al. (1995). These findings point to the importance of social influences and of positive reinforcement motives but not to the centrality of drinking motives in this population.

A large body of research on the etiology of college student drinking has identified social and psychological correlates of alcohol use and misuse (e.g., Baer & Carney, 1993; Fromme & Ruela, 1994; Wechsler, Dowdall, Davenport, & Castillo, 1995). Furthermore, many have stressed the role of specific motives for drinking in this population (Carey & Correia, 1997; Karwacki & Bradley, 1996; MacLean & Lecci, 2000; Stewart & Zeitlin, 1995). A clearer understanding of these factors, their relationship to one another, and to alcohol use and problems will facilitate the development and refinement of preventive interventions designed to diminish heavy drinking and related consequences in college students.

Motivational Models of Alcohol Use and Consequences

Motivational models assert that an individual's reasons for engaging in a behavior are important in both the initiation and perpetuation of that behavior. Applications of motivational theory to drinking behavior have consistently supported the importance of motivational factors in alcohol use across adult (e.g., Abbey, Smith, & Scott, 1993; Carpenter & Hasin, 1998), adolescent (Bradizza, Reifman, & Barnes, 1999; Windle, 1996), and college (Carey & Correia, 1997; Kassel, Jackson, & Unrod, 2000; Ratliff & Burkhart, 1984) populations. Different types of drinking motives have been delineated. Most commonly, drinking motives have been categorized according to affective dimensions (e.g., drinking to enhance or stimulate positive emotion, drinking to cope with negative emotion). However, motives pertaining to social factors (social reinforcement) also have been thought to be important in understanding drinking behavior.

In 1988, Cox and Klinger posited a theoretical model of drinking motives that took into account the interplay between these motives and specific psychosocial antecedents. These authors hypothesized that factors such as mood and mood-relevant expectancies contributed to the motivation to drink alcohol, playing a critical role in the determination of alcohol use. Cooper, Frone, Russell, and Mudar (1995) proposed and tested a motivational model of drinking that was consistent with Cox and Klinger's theoretical model. Using structural equation modeling procedures, they tested whether distinct motives (enhancement and coping) were associated with alcohol involvement and whether they played a central, intervening role in the relationship between more distal psychosocial factors, such as alcohol outcome expectancies (i.e., social enhancement and tension reduction), sensation seeking, coping style, and negative emotion. Strong empirical support for this model was demonstrated in cross-sectional samples of both adolescents and adults; enhancement motives and coping motives were associated with alcohol use, and each was linked to distinct emotion and expectancy antecedents. Furthermore, enhancement

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motives mediated the associations of sensation seeking and enhancement expectancies with alcohol involvement, and coping motives mediated the associations of negative emotion and tension reduction expectancies with alcohol involvement.

Cooper et al.'s (1995) study offered an important examination of the role of drinking motives in alcohol involvement. However, the authors suggested that future studies would benefit from expanding their model to incorporate other types of drinking motives and psychosocial correlates and from testing relations among these variables prospectively. Furthermore, this model has not been tested in older adolescents. Drinking attitudes and behaviors have been shown to be somewhat unique for college students as compared to younger adolescents or adults (Muthen & Muthen, 2000; Perkins, 1999; Sher, Bartholow, & Nanda, 2001). Specifically, the social context of the college environment has been associated with heavy alcohol use (Carey, 1993, 1995), creating a culture where such use is relatively normative (Gotham, Sher, & Wood, 1997; Wechsler, Lee, Kuo, & Lee, 2000). This unique drinking environment appears to be an especially salient factor underlying heavy drinking in college students. Thus, the extent to which Cooper et al.'s (1995) etiological model of adolescent and adult alcohol misuse, which did not include social factors, is applicable for this unique group of drinkers is yet uncertain.

In the present study we sought to replicate and extend Cooper et al.'s (1995) study in three ways. First, we tested this model in a new population: college students. Second, we extended the model to incorporate an additional motive and social factors of particular relevance to college student drinkers. Third, we examined hypothesized associations longitudinally to assess the prospective influence of psychosocial factors and drinking motives on alcohol use and problems in this sample.

The Hypothesized Model: Drinking Motives and Their Antecedents

In this article we refer to *drinking motives* as the reasons for which individuals self-report drinking alcohol. We examined three types of drinking motives: enhancement, coping, and social reinforcement. We hypothesized that, as in Cooper et al.'s (1995) study, enhancement motives would mediate relations between emotional stimulation factors (i.e., social lubrication alcohol expectancies and impulsivity–sensation seeking) and alcohol involvement and that coping motives would mediate the link between negative affect and tension reduction expectancies for alcohol. We expanded the model to include social reinforcement motives and social influence factors. Social factors have been shown to play a central role in college drinking (Simons, Correia, & Carey, 2000; Stewart, Zeitlin, & Samoluk, 1996; Wood, Read, Palfai, & Stevenson, 2001). We hypothesized that social reinforcement motives would be positively associated with social influence factors and would mediate relations between social influence factors and alcohol use and problems. Below we describe the motivational and antecedent components of our model and how each may relate to alcohol use and problems in college students.

Emotional Stimulation: Enhancement Motives

Drinking behavior may be driven in part by motives to induce, increase, or maintain positive affective states (Cooper, 1994; Stewart et al., 1996). These enhancement motives have been linked to drinking behaviors in college students (Carey & Correia, 1997; Stewart et al., 1996).

Social Lubrication Outcome Expectancies

Alcohol outcome expectancies—beliefs about the effects or consequences of alcohol use—are strongly associated with alcohol use and related problems among college students (Darkes, Greenbaum, & Goldman, 1998; Kidorf, Sherman, Johnson, & Bigelow, 1995; Sher, Wood, Wood, & Raskin, 1996; Werner, Walker, & Greene, 1995). *Social lubrication expectancies* are beliefs that alcohol use will enhance social situations and make them more enjoyable. As social contexts have been linked to heavy drinking in college students (Carey, 1993, 1995) it is not surprising that expectancies regarding how alcohol will positively affect or enhance social interactions also have been shown to be important correlates of college alcohol use (e.g., MacLatchy-Gaudet & Stewart, 2001; Mooney, Fromme, Kivlahan, & Marlatt, 1987; Wall, Hinson, & McKee, 1998).

Impulsivity–Sensation Seeking

Impulsivity is characterized by a general tendency to act without planning or thinking ahead and to seek out immediate gratification (Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993). Impulsivity has often been conceptually linked to the construct of *sensation seeking* (Depue & Collins, 1999; Zuckerman, 1992, 1994), which is a dispositional need for high levels of stimulation. Impulsivity and sensation seeking are associated with increased alcohol use in college students (Beck, Thombs, Mahoney, & Fingar, 1995; Jackson & Matthews, 1988; Johnson & Cropsey, 2000; Ratliff & Burkhart, 1984; Schall, Weede, & Maltzman, 1991). Among people with this predisposition, there may be increased motivation to obtain stimulation from alcohol use, greater responsivity to the effects of alcohol, and a greater likelihood of acting on this motivation without consideration of potential consequences (Sher, 1991).

Negative Emotion: Coping Motives

Coping motives for alcohol consumption are presumed to operate on the principle of negative reinforcement and involve drinking to ameliorate negative emotions or to make such emotions more tolerable (Abrams & Niaura, 1987; Cooper, Russell, Skinner, Frone, & Mudar, 1992; Farber, Khavari, & Douglass, 1980). Several studies of coping motives and alcohol involvement in college samples have suggested that drinking to cope is a particular risk factor for alcohol problems (Carey & Correia, 1997; Kassel et al., 2000; MacLean, Collins, Morsheimer, & Koutsky, 1999). However, some evidence suggests that coping motives may affect alcohol misuse less strongly in drinkers for whom heavy alcohol use is more normative (i.e., older adolescents or college students; Bradizza et al., 1999; Perkins, 1999).

Negative Affect

Negative affect has been studied in college students and has demonstrated a complex relationship with alcohol involvement. Negative affect has been shown to be associated with alcohol

problems in college drinkers (Camatta & Nagoshi, 1995; Hutchinson, Patock, Cheong, & Nagoshi, 1998; Kassel et al., 2000; MacLean et al., 1999) but has demonstrated a less consistent relationship with alcohol use (Hufford, Shields, Balabanis, Paty, & Shiffman, 2000; Kassel et al., 2000; MacLean et al., 1999). Research suggests that a substantial portion of college undergraduates report drinking as a result of negative emotions (Beck et al., 1995; Perkins, 1999; Weinberger & Bartholomew, 1996).

Tension-Reduction Alcohol Expectancies

Tension-reduction alcohol expectancies refers to beliefs about alcohol's ability to alleviate negative mood states. It is hypothesized that individuals who have these expectancies will be motivated to drink at times when they experience such emotions (Cooper et al., 1992; P. B. Johnson & Gurin, 1994). Tension-reduction alcohol expectancies have been demonstrated to be associated with problem drinking in college students (Brown, 1985; Kassel et al., 2000).

Social Facilitation: Social Reinforcement Motives

Social reinforcement motives involve drinking alcohol for social purposes, such as to enhance the enjoyment of a social occasion, to facilitate social interaction, or to partake in a shared social activity. These motives are somewhat unique from other drinking motives as they presumably motivate alcohol consumption that is in keeping with standard social activity (see Cooper, 1994). Given the alcohol-supportive social milieu of college, it is perhaps not surprising that these motives have been suggested to be particularly salient for college drinkers (Neighbors, Nichols-Anderson, Segura, & Gillaspy, 1999; Stewart et al., 1996).

Alcohol Offers

According to Graham, Marks, and Hansen (1991), direct and explicit offers to use alcohol (e.g., being offered a drink) are an active type of social influence that may be associated with increased alcohol use. Alcohol offers represent a more direct form of social pressure that may uniquely motivate drinking behaviors (see Graham et al., 1991; Wood et al., 2001).

Perceived Peer Drinking Environment

Drinking behavior also may be influenced indirectly by the behaviors and attitudes observed in a proximal reference group (i.e., peers), such that individuals who perceive their peers as reinforcing alcohol use may be more likely to drink. Numerous studies have provided empirical support for such an effect, particularly among college students (Collins, Parks, & Marlatt, 1985; Costa, Jessor, & Turbin, 1999; Graham et al., 1991).

The Present Study

Based on previous research and the conceptual associations described above, the present study had three main objectives. We sought (a) to examine whether Cooper et al.'s (1995) motivational model of alcohol use would generalize to a college sample, (b) to extend this model to include social factors (social influence antecedents and social reinforcement motives), and (c) to test this extended model in a longitudinal sample.

Method

Participants

Participants were college students at a mid-sized public university in the northeastern United States. As part of a three-wave, longitudinal study of alcohol use, 578 students were recruited in the summer before their first year of college (Wave 1). Of these, 425 students were targeted for longitudinal follow-up (all 202 men originally in the study and 223 randomly selected women). For the present study, only data from freshman (Wave 2, $N = 388$) and sophomore (Wave 3, $N = 356$) time points were analyzed. At Wave 2, participants were 18.6 ($SD = 0.56$) years old. The majority of participants (87%, $n = 336$) were White, and slightly more than half (56%, $n = 216$) were female. Participants received $8, $20, and $25 for their participation in Waves 1, 2, and 3, respectively.

Procedure

Students were contacted initially by mail during the summer before their matriculation and were invited to complete a confidential survey of college student health behaviors. All participants provided signed informed consent and then completed a battery of questionnaires. In the spring of their freshman (Wave 2) and sophomore years (Wave 3), participants were readministered the questionnaire packet, typically on site, but in some cases (21 at Wave 2, 48 at Wave 3) by mail.

Measures

Alcohol outcome expectancies. Alcohol outcome expectancies were assessed with a scale developed by Sher, Walitzer, Wood, and Brent (1991) and further validated by Kushner, Sher, Wood, and Wood (1994). Two of four previously derived subscales were included in the models tested in the present study. These were Social Lubrication (8 items, $\alpha = .89$) and Tension Reduction (9 items, $\alpha = .90$). Items from the Social Lubrication factor include "Drinking makes celebrating more enjoyable" and "Drinking makes me feel cool." Items from the Tension Reduction factor include "Drinking helps me forget problems at work or school" and "Drinking helps me to feel better when I'm down." Response options for the expectancy items ranged from 0 (*not at all*) to 4 (*a lot*).

Impulsivity–sensation seeking. Personality traits related to impulsivity and sensation seeking were measured by the Impulsivity/Sensation Seeking Scale (Zuckerman, 1994), a 19-item measure that uses a true–false format. Coefficient alpha was .81 in this sample.

Negative affect. Negative affect was assessed with the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988), in which participants rated 10 positive and 10 negative emotions according to how much they generally (on average) experienced each of the emotions listed. No specific time frame was offered. Response options for this scale ranged from 1 (*very slightly or not at all*) to 5 (*extremely*). Coefficient alpha for this variable in this sample was .83.

Alcohol offers. A four-item measure assessed how frequently, in the past year, the participant had been offered, bought, or given a drink, without asking for one or had been provided with unsolicited refills. Response options were on a 5-point scale that ranged from 0 (*never*) to 4 (*10 or more times in the past year*). Coefficient alpha for this scale was .88.

Perceived peer drinking environment. The perceived peer drinking environment variable was a composite of five self-report items adapted from measures previously used by Jessor, Jessor, and Donovan (1981) and queried participants on drinking by close friends and close friends' attitudes toward drinking. Responses were rated on a 5-point continuous-response scale ranging from 0 (*never*) to 4 (*3 or more times in the past*

year). Coefficient alpha for the perceived peer drinking environment variable in this sample was .86.

Drinking motives. Drinking motivations were assessed with the 20-item scale developed and validated by Cooper (1994). Subscales for enhancement (α = .92), coping (α = .88), and social reinforcement (α = .92) motives were used in the analyses for this article. Response options for this measure ranged from 1 (*almost never/never*) to 5 (*almost always/always*).

Alcohol use. Consistent with Wood et al. (2001), we assessed alcohol use with two items regarding typical quantity and frequency of alcohol consumption per week in the past 3 months. These items were multiplied to produce a weighted quantity–frequency index of weekly consumption.

Alcohol-related consequences. Consequences associated with alcohol consumption were assessed with a reduced-item version of the Young Adult Alcohol Problems Screening Test (Hurlbut & Sher, 1992). Because of the 6-month interval from Wave 1 to Wave 2 in our study, we altered the typical past-year time frame to 6 months. Thus, this 24-item questionnaire assessed frequency of alcohol problems over the past 6 months. The measure assesses both general consequences (e.g., hangovers, blackouts, driving under the influence of alcohol) and consequences believed to be more specific to college students (e.g., missing class, getting involved in regrettable sexual situations). Coefficient alpha for this scale was .81, with a 12 month test–retest reliability of .79.

Results

Descriptive Statistics for Drinking Behaviors

At Wave 2, in the spring of their freshman year, participants reported engaging in heavy drinking (5 or more drinks in one sitting) approximately once per week over the past 30 days (M = 5.6, SD = 1.6). Participants indicated that they drank, on average, approximately 8.0 (SD = 12.4) drinks per week over the past 3 months.

Reported consequences of heavy drinking at least once in the past 6 months included hangovers (58%, n = 226), feeling sick or vomiting from drinking (49%, n = 190), missing work or school (29%, n = 113), being in sexual situations later regretted (22%, n = 86), driving under the influence of alcohol (14%, n = 53), and damaging or destroying property (13%, n = 49). In addition, a number of signs of physical dependence on alcohol were reported in this sample; 45% (n = 173) of participants reported having blackouts, 56% (n = 133) reported increased tolerance, and 5% (n = 21) reported experiencing physical withdrawal from alcohol (i.e., tremors the day after drinking) after stopping or cutting down on drinking.

Overview of Data Analyses

Path analyses. We tested two sets of nested structural models. The first set examined cross-sectional, structural relations among model variables. These included seven exogenous variables (sex, social lubrication expectancies, impulsivity–sensation seeking, tension reduction expectancies, negative affect, alcohol offers, and perceived peer drinking environment), three intervening variables (enhancement, coping, and social reinforcement motives) and two endogenous variables (alcohol use, alcohol problems). The second set of nested models examined the same variables longitudinally. The first model tested in each set examined associations hypothesized by Cooper et al. (1995) as well as social influences and social reinforcement motives. The second model in each set is the revised model, with additional, nonhypothesized paths based on information gleaned from Lagrange multiplier tests (Bentler, 1989).

Model specification. We estimated all models from covariance matrices using a maximum-likelihood estimation procedure with manifest (measured) variables. Covariances were estimated among all exogenous variables, including gender (MacCallum, 1995). In longitudinal models, we controlled for Wave 2 alcohol use and problems by including them as exogenous variables with paths estimated respectively to Wave 3 use and problems. In all models, covariances were estimated among error terms for motives measures.

Evaluation of model fit. We evaluated model fit for each of the nested structural equation models using omnibus chi-square tests and goodness-of-fit and comparative fit indices. Models were compared by examination of chi-square difference scores and Type II indices of incremental fit (Marsh, Balla, & McDonald, 1988).

Examination of distributions. Examination of univariate distributions of model variables revealed significant skewness and kurtosis—greater than 2.0 and 4.0, respectively, in four of the variables (Waves 2 and 3 alcohol quantity–frequency, Waves 2 and 3 alcohol problems). Following procedures detailed by Tabachnick and Fidell (1996), we adjusted scores for "far outliers" to equal 1 value greater than the largest non–far-outlying value. Subsequent analyses indicated that skewness and kurtosis were within acceptable limits ($<$1.0).

Cross-Sectional Path-Analytic Models

We tested cross-sectional models to determine whether Cooper et al.'s (1995) motivational model would replicate in a college sample and whether the inclusion of social influence factors and social reinforcement motives in this model provided a good fit to the data. We tested two cross-sectional models: one positing full mediation by drinking motives and the other allowing for estimation of direct paths suggested by the Lagrange modification index to be likely to improve overall model fit (as indicated by goodness-of-fit indices).

Model 1: Motivational model. In this model we hypothesized that each of the exogenous variables would demonstrate positive associations with relevant drinking motives and, through these motives, with alcohol use and problems. Accordingly, in this model, we estimated paths hypothesized by Cooper et al. (1995), including a path from coping motives to alcohol problems and additional paths from social influence factors (alcohol offers, perceived peer drinking environment) to alcohol use and problems through social reinforcement motives.

The overall fit of the initial model was modest (see Table 1). Sex was positively associated with alcohol use, such that male gender was associated with higher levels of use. Alcohol use was strongly associated with alcohol problems. As can be seen in Figure 1, all exogenous variables demonstrated significant, positive associations with respective drinking motives. Enhancement motives and social reinforcement motives each demonstrated significant associations with alcohol use, although the relation between coping motives and alcohol use was nonsignificant. Finally, as hypothe-

Table 1
Model Fit Indices

Model	χ^2	*df*	GFI	CFI	R^2 alcohol use	R^2 alcohol problems
Cross-sectional models						
Model 1	533.72	29**	.85	.80	.40	.72
Model 2	39.82	19*	.98	.99	.49	.68
Longitudinal models						
Model 3	363.52	37**	.89	.88	.56	.62
Model 4	79.42	29**	.97	.98	.61	.64

Note. GFI = goodness-of-fit index; CFI = comparative fit index.
* $p < .01$. ** $p < .0001$.

sized, coping motives demonstrated significant positive associations with alcohol problems. In this model, 40% of the variance in alcohol use and 72% of the variance in alcohol problems was explained.

Model 2: Revised model. The initial model (motivational model) assumed that relations between exogenous and endogenous variables are fully mediated by drinking motives. Given the less-than-desirable fit indices observed in the initial model, we examined the increment in fit associated with freely estimating paths for the 10 largest Lagrange multipliers from the Gamma matrix (Bentler, 1989). Thus, paths were estimated from alcohol offers, perceived peer drinking environment, and tension reduction expectancies to enhancement motives; from social lubrication and tension reduction expectancies to social reinforcement motives; from alcohol offers and perceived peer drinking environment to alcohol use; and from alcohol offers and perceived peer drinking environment to alcohol problems (see revised model; Figure 2).

The overall fit of the revised model to the obtained data was very good (see Table 1). In addition, the fit of this model was substantially improved compared with the motivational model, as assessed by both chi-square difference tests and a Type II index of incremental fit, $\Delta\chi^2(10) = 420.80$, $p < .0001$; relative Type II non-normed fit index = .926. Paths from exogenous variables to their respective drinking motives were all significant. Only enhancement motives demonstrated significant associations with alcohol use, and only coping motives demonstrated significant associations with alcohol problems in this model. Social influence factors (alcohol offers and perceived peer drinking environment) demonstrated significant direct associations with alcohol use ($ps < .001$) and problems ($ps < .01$). This model also revealed significant cross-associations between emotional stimulation and social antecedents and social reinforcement and enhancement motives. Alcohol offers and perceived peer drinking environment demonstrated significant associations with enhancement motives, whereas the social lubrication expectancies variable was significantly associated with social reinforcement motives. Nonhypoth-

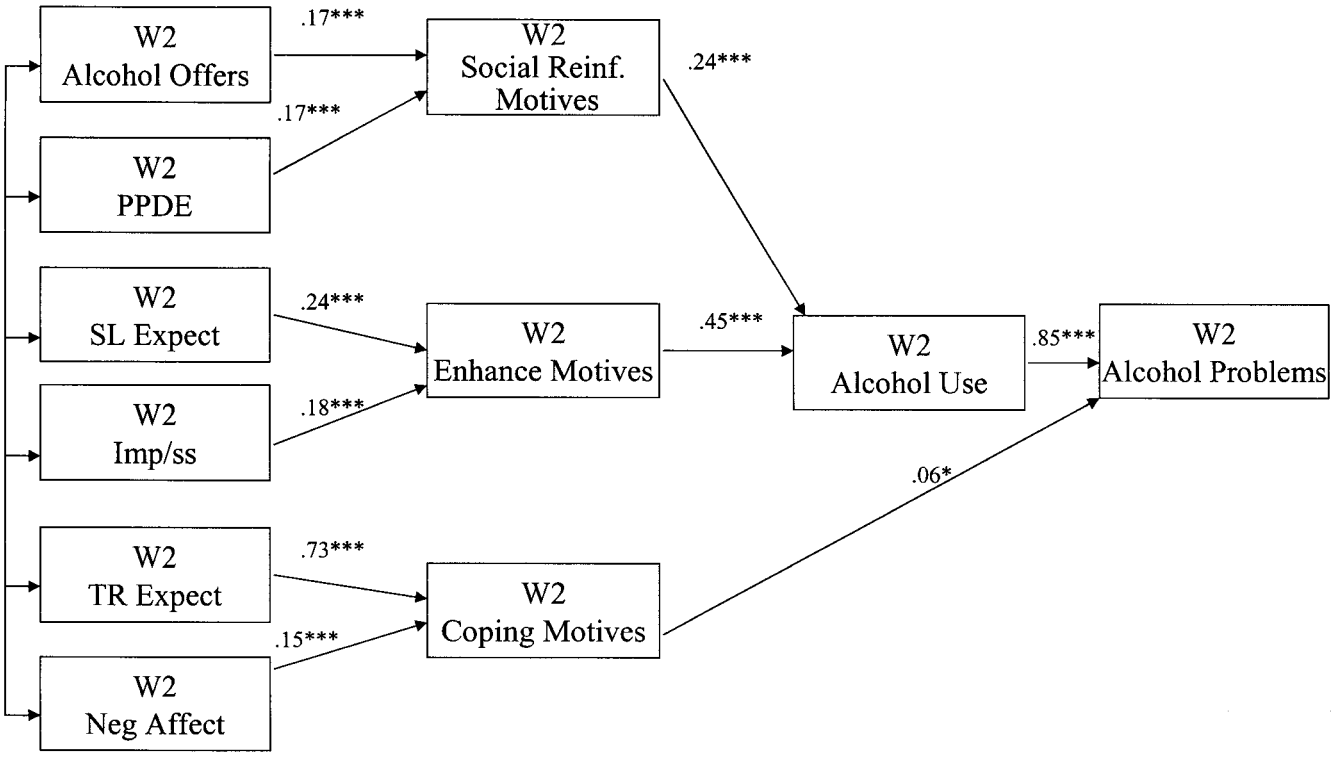

Figure 1. Cross-sectional motivational model. An additional exogenous variable, gender, was included in the model but is not depicted here. Only significant structural paths are shown. W2 = Wave 2; PPDE = perceived peer drinking environment; SL Expect = social lubrication expectancies; Imp/ss = impulsivity–sensation seeking; TR Expect = tension reduction expectancies; Neg Affect = negative affect; Social Reinf. Motives = social reinforcement motives; Enhance Motives = enhancement motives. * $p < .05$. *** $p < .001$.

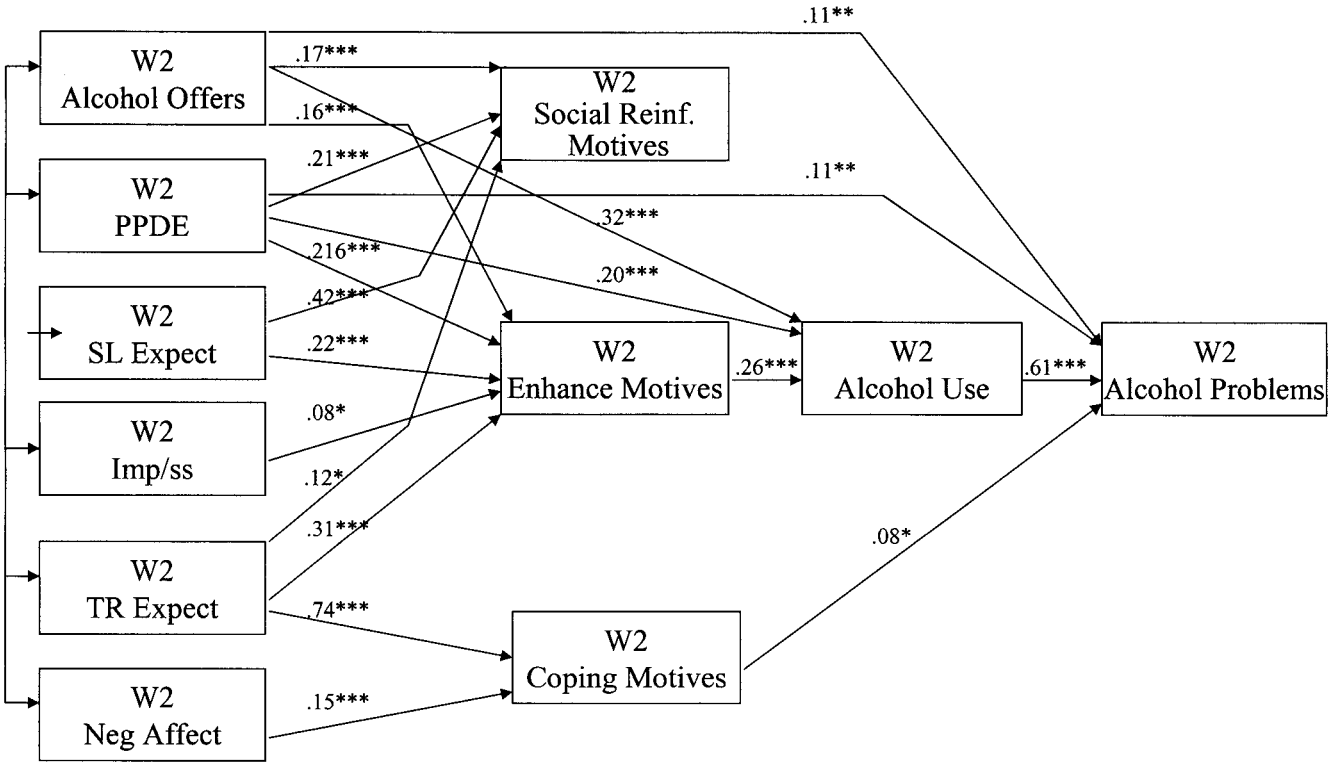

Figure 2. Cross-sectional revised model. An additional exogenous variable, gender, was included in the model but is not depicted here. Only significant structural paths are shown. W2 = Wave 2; PPDE = perceived peer drinking environment; SL Expect = social lubrication expectancies; Imp/ss = impulsivity–sensation seeking; TR Expect = tension reduction expectancies; Neg Affect = negative affect; Social Reinf. Motives = social reinforcement motives; Enhance Motives = enhancement motives. * $p < .05$. ** $p < .01$. *** $p < .001$.

esized associations between tension reduction expectancies and both social reinforcement and enhancement motives also were observed. This model explained 49% of the variance in alcohol use and 68% of the variance in alcohol problems.

Longitudinal Analyses

Longitudinal models were tested using data collected during the spring of participants' freshman and sophomore years. These models were tested in the same manner as the cross-sectional models (Models 1 and 2), but they predict alcohol use and problems over a 12-month period, controlling for baseline relations.

Model 3: Motivational model. This model tested whether the extended motivational model examined in our cross-sectional analyses would replicate with longitudinal data. Aside from controlling for contemporaneous associations among alcohol use, alcohol problems, other exogenous factors, and motives, all other aspects of model specification were consistent with cross-sectional model testing.

The results of these analyses revealed very strong autoregressive effects, as significant prospective associations over 1 year were observed for alcohol use ($\beta = .69$, $p < .001$) and for alcohol problems ($\beta = .49$, $p < .001$) were observed. The overall fit of Model 3 was adequate (see Table 1). All independent variables demonstrated hypothesized significant associations with drinking motives (see Figure 3). Consistent with Cooper et al.'s (1995) results, enhancement motives significantly predicted Wave 3 alcohol use. In contrast to our hypotheses, no other prospective effects were observed from drinking motives to alcohol use, and coping motives did not prospectively predict alcohol problems. In this model, 56% of the variance in alcohol use and 62% of the variance in alcohol problems was explained.

Model 4: Revised model. As in our cross-sectional analyses, we examined modification indices and then recomputed the model, adding paths for the eight largest Lagrange multipliers. These paths were from social lubrication and tension reduction expectancies and negative affect to social reinforcement motives; from alcohol offers, perceived peer drinking environment, and tension reduction expectancies to enhancement motives; and from alcohol offers and perceived peer drinking environment to alcohol use. The overall fit of the revised model was very good (see Table 1). In addition, in direct comparison to the longitudinal motivational model, model fit was substantially improved in the revised model, as assessed by both chi-square difference tests and a Type II index of incremental fit, $\Delta\chi^2(8) = 284.10$, $p < .02$; relative Type II non-normed fit index = .80.

As with the previous longitudinal model, substantial autoregressivity was noted. As can be seen in Figure 4, Wave 2 alcohol use ($\beta = .58$, $p < .001$) and problems ($\beta = .48$, $p < .001$) were significantly prospectively associated with Wave 3 use and problems. Also consistent with the previous model is that all of the

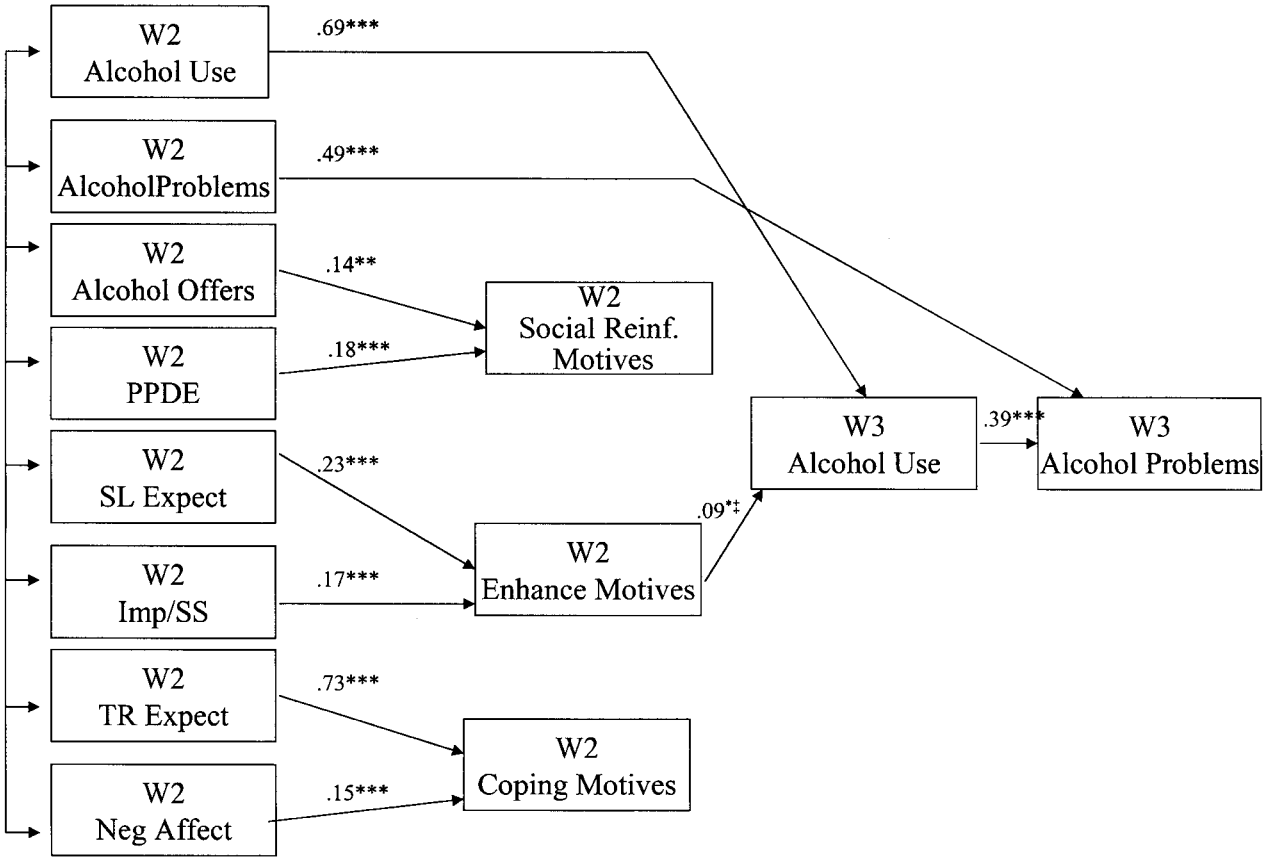

Figure 3. Longitudinal motivational model. An additional exogenous variable, gender, was included in the model but is not depicted here. Only significant structural paths are shown. W2 = Wave 2; W3 = Wave 3; PPDE = perceived peer drinking environment; SL Expect = social lubrication expectancies; Imp/SS = impulsivity–sensation seeking; TR Expect = tension reduction expectancies; Neg Affect = negative affect; Social Reinf. Motives = social reinforcement motives; Enhance Motives = enhancement motives; ‡ = one-tailed. * $p < .05$. ** $p < .01$. *** $p < .001$.

paths from exogenous variables significantly predicted their hypothesized respective drinking motives. However, consistent with Model 2, there were substantial cross-associations between the two positive reinforcement motives and their hypothesized antecedents, and significant nonhypothesized associations between tension reduction expectancies and positive reinforcement motives again were observed. In addition, in this model none of the drinking motives demonstrated significant prospective relations with alcohol use or problems. Consistent with the cross-sectional revised model, both alcohol offers and perceived peer drinking environment demonstrated significant, direct, prospective associations with alcohol use (*p*s $< .01$ and .05). In Model 4, a total of 61% of the variance in alcohol use, and 64% of the variance in alcohol problems, was explained.

Discussion

In the present study we sought to replicate and extend the work of Cooper et al. (1995) by examining the role of drinking motives as they relate to putative psychosocial antecedents of drinking and to alcohol use and problems in college student drinkers. In particular, we sought to test whether Cooper et al.'s (1995) model was descriptive of college student drinking behaviors, whether this model would be augmented by the incorporation of social influence variables and social reinforcement motives, and whether this model would replicate in longitudinal analyses.

Our findings build on those of Cooper et al. (1995) and help to delineate associations among psychosocial antecedents and drinking motives in a college sample. Furthermore, consistent with other research (Costa et al., 1999; Curran, Stice, & Chassin, 1997), our results also underscore the importance of social factors in regard to alcohol involvement in this population. Our data suggest that drinking motives do contribute to alcohol use and problems in college students; however, drinking motives did not appear to act consistently as central, intervening variables between other psychosocial factors and alcohol involvement variables. In particular, the role of social reinforcement motives was equivocal, with significant associations between these motives and alcohol use and problems observed in only one of the four models examined. Furthermore, social reinforcement motives demonstrated conceptual and statistical overlap with enhancement motives, calling into question the utility of distinguishing between these two types of motives in an etiological model of college drinking.

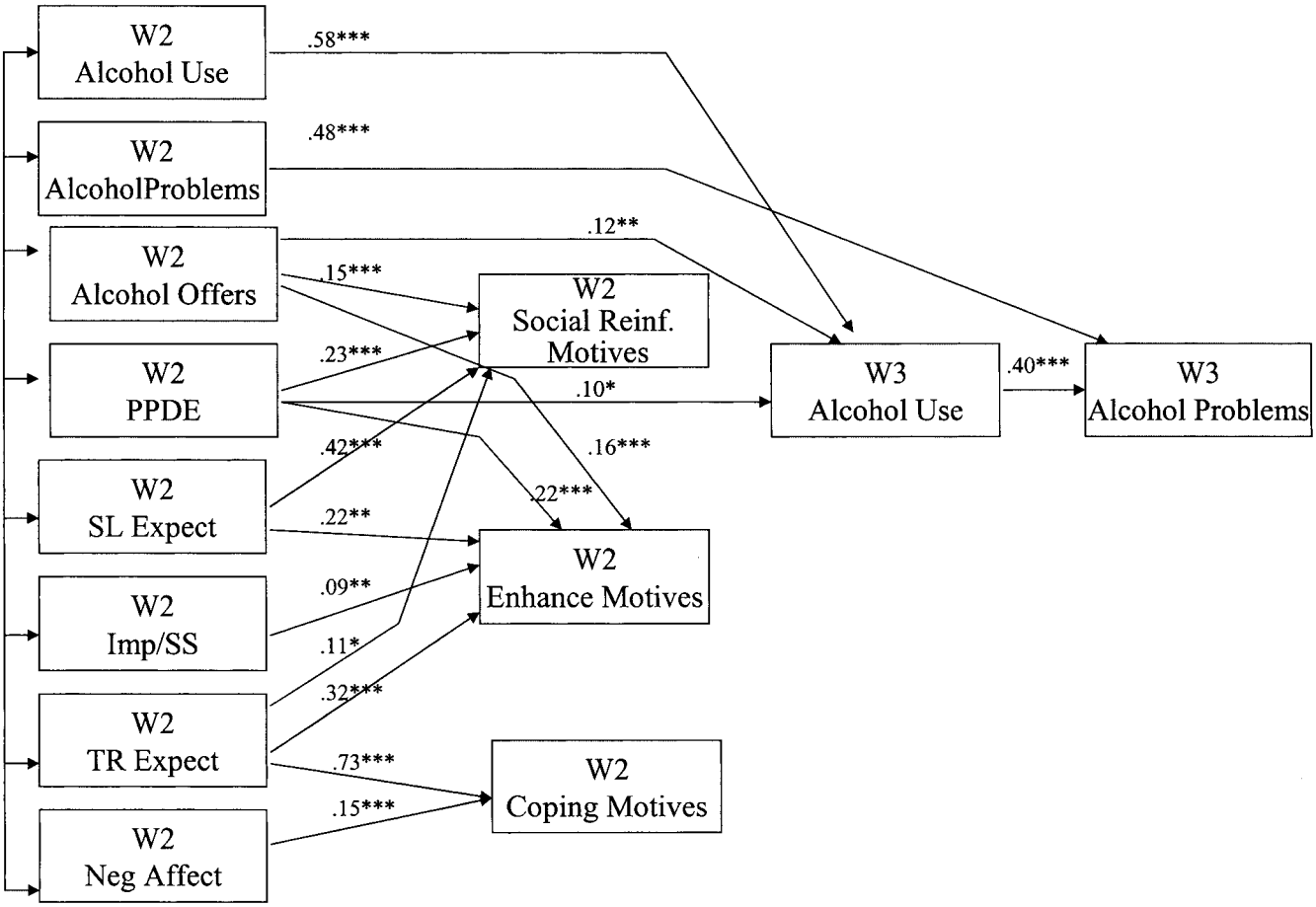

Figure 4. Longitudinal revised model. Only significant structural paths are shown. W2 = Wave 2; W3 = Wave 3; PPDE = perceived peer drinking environment; SL Expect = social lubrication expectancies; Imp/SS = impulsivity–sensation seeking; TR Expect = tension reduction expectancies; Neg Affect = negative affect; Social Reinf. Motives = social reinforcement motives; Enhance Motives = enhancement motives. * $p < .05$. ** $p < .01$. *** $p < .001$.

Consistent with Cooper et al. (1995), we found support for multiple etiological pathways to alcohol use and problems and some support for a mediational role for drinking motives in relations between psychosocial antecedents and drinking outcomes. Yet there also was divergence from Cooper et al.'s (1995) findings. In cross-sectional analyses, the role of coping motives in relation to alcohol use was not observed in any of our models, and these motives did not demonstrate significant associations with alcohol problems in either of the longitudinal models. Likewise, direct associations between exogenous and outcome variables differed from those demonstrated by Cooper et al. (1995), and not all of the antecedents demonstrated unique hypothesized associations with their respective drinking motives. Finally, tests of the motivational and revised models with longitudinal data did not support the central role of drinking motives in predicting alcohol outcomes.

Cross-Sectional Findings

Findings from our cross-sectional analyses indicated that variables related to emotional stimulation (e.g., social lubrication expectancies, impulsivity–sensation seeking) demonstrated indirect associations with alcohol involvement through enhancement motives. Variables pertaining to the management of negative emotion (i.e., tension reduction expectancies and negative affect) were associated with coping motives, which were significantly associated with alcohol problems but not with alcohol use. Social influence factors demonstrated indirect (through social reinforcement motives) cross-sectional associations with alcohol use in the first model and direct cross-sectional associations with alcohol use and problems in the second model. These findings suggest that drinking in college is strongly and directly influenced by the social environment. These findings also point to the possibility that college student alcohol use may be more related to positive reinforcement/celebratory motives than to negative reinforcement motives—a conceptualization that has been supported in other research (e.g., Ratliff & Burkhart, 1984; Stewart et al., 1996).

Although associations between coping motives and alcohol use and problems have been demonstrated fairly consistently in the literature on early adolescent (Cooper et al., 1995; Windle & Windle, 1996) and adult drinking (Carpenter & Hasin, 1998;

Cooper et al., 1995; Perkins, 1999), findings from research with college drinkers have shown this relationship to be more complex. In the present study, coping motives were not significantly associated with alcohol use and showed only inconsistent significant associations with alcohol problems (i.e., in neither of the longitudinal models). Although such findings are consonant with some previous studies (Bradizza et al., 1999; MacLean et al., 1999), the inconsistent association between coping motives and alcohol problems in our sample is more perplexing in light of the extant literature (e.g., Carey & Correia, 1997; Kassel et al., 2000; MacLean et al., 1999).

One possible explanation for these findings is that alcohol use and problems in our sample demonstrated a stronger association than is commonly found in the literature (.72 at Wave 3). This unusually high association may have left little variance to be explained by other variables in the model. In addition, high associations among all exogenous variables likely contributed to multicollinearity, also reducing the explanatory power of each exogenous variable. Furthermore, in longitudinal models, past (Wave 2) alcohol problems may have explained enough of the variance in Wave 3 alcohol problems to obscure the effect of coping motives. Finally, measures of drinking motives and alcohol problems have varied across studies, creating a challenge in the comparison of disparate findings. Still, it is worth considering that drinking to cope may be a less salient predictor of drinking behavior while in college, during which time social factors and positive affect enhancement play a greater role.

It is noteworthy that social influence factors demonstrated significant positive associations with alcohol involvement variables either indirectly (through social reinforcement motives) or directly, above and beyond their indirect associations through social reinforcement motives. This robust, direct association is consistent with previous work (Wood et al., 2001). Because these factors appear to play an important role in college student drinking, they should specifically be included in interventions designed to diminish college drinking and its associated consequences (e.g., drink refusal skills training and social norms correction approaches). Furthermore, these findings may have particular implications for college students who are affiliated with or intend to become affiliated with social groups (e.g., fraternities or sororities, particular campus activities or residence halls) where more overt modeling of heavy drinking may occur.

Longitudinal Findings

Overall evidence for a mediational role of drinking motives was quite limited in our longitudinal models, yet it is of note that in the longitudinal motivational model (Model 3) emotional-stimulation antecedents were significantly and positively associated with enhancement motives, which in turn predicted alcohol use at Wave 3. These associations were fairly robust, as they remained even after controlling for past drinking behaviors. This finding is consistent with the cross-sectional findings of Cooper et al. (1995), with motivation theory forwarded by Cooper et al. (1992) and by Cox and Klinger (1988), and with previous research among college student samples (Ratliff & Burkhart, 1984). Nonetheless, to date there has been relatively little examination of enhancement motives and their etiological role in drinking. Thus, a substantial contribution of the present study is that these data provide further support for the importance of these types of motives, especially as they may enhance understanding of drinking in college.

Limitations and Conclusions

Our data offer valuable information regarding relations among correlates of drinking, drinking motives, and alcohol use and problems in college students. Also, the models tested here offer support for the inclusion of social influence factors and possibly for associated social reinforcement motives in a model of drinking behavior in this population. However, there are limitations to the present study. First, the inclusion of social reinforcement motives (and antecedents) added some challenges to the interpretation of our findings. Factor analytic examination of drinking motives has supported two distinct constructs (Cooper, 1994; MacLean & Lecci, 2000), yet these two types of motives are clearly not orthogonal. Strong associations among these constructs, as well as among their hypothesized antecedents, likely contributed to multicollinearity and thus may have resulted in a less-than-optimal model fit (Hu & Bentler, 1999).

The high level of autoregressivity (e.g., stability) in alcohol use and problems over the 1-year assessment interval may have limited our ability to detect prospective effects. Identification of the appropriate measurement interval in longitudinal research is a critical issue (Gollob & Reichardt, 1987), and some studies with late adolescents have suggested that longer (e.g., greater than 1-year) measurement intervals may be more optimal for identifying associations between psychosocial variables and alcohol involvement (Sher et al., 1996). Given the stability of alcohol use and problems in this population, future longitudinal research would profit from longer measurement intervals.

A type of negative reinforcement motive not measured in the present study is that of conformity (Cooper, 1994; MacLean & Lecci, 2000). As a result, the potential role of these motives in mediating relations between psychosocial factors and alcohol involvement is unknown. Future studies may benefit from the inclusion of these and other types of drinking motives to determine whether they may serve as a common pathway to alcohol involvement among college students.

The consistent association between tension reduction expectancies and social reinforcement and enhancement motives in the revised models, although not hypothesized, is not necessarily surprising. Indeed, some items on the Tension Reduction factor include beliefs regarding alcohol's ability to enhance self-esteem and to facilitate relaxation and expression of ideas. In anticipation of these effects, an individual then may be more motivated to drink to increase the pleasurable and celebratory aspects associated with such "loosening up." To our knowledge, the present study is the first to examine the combined influences of positive and negative expectancies as well as positive and negative reinforcement motives in a college sample. Although preliminary, these data suggest a complex association between tension reduction expectancies and positive reinforcement motives in this population.

Our data suggest that social factors are a relevant and necessary component to an etiological model of college drinking. However, the addition of these factors and their related social reinforcement motives also introduced conceptual and measurement challenges to tests of the hypothesized model. For example, in both cross-sectional and longitudinal models social influence and

emotional-stimulation antecedents demonstrated significant cross-associations with enhancement and social reinforcement motives. Thus, the pathways to alcohol use and problems were not clearly delineated in our college sample. A number of researchers have argued that alcohol expectancies might best be conceptualized along broad conceptual domains, such as positive and negative expectancies, rather than according to more specific subtypes of expectancies (Fromme, Stroot, & Kaplan, 1993; Leigh & Stacy, 1993; Wall et al., 1998). Our data are consistent with this broader conceptualization and suggest that different types of alcohol expectancies are not uniquely linked to specific types of motives.

Our findings suggest the importance of distinguishing between positive and negative types of motives for alcohol use in college drinkers. These findings also underscore the complexity of associations between specific psychosocial antecedents and these motives in this population, for whom the social milieu is somewhat unique from that of drinkers at other life stages. Accordingly, our data also support the inclusion of social influence factors in an explanatory model of college drinking, as these factors demonstrate strong direct and indirect associations with college drinking behaviors. These data offer some insight into etiological pathways to drinking in college but also suggest challenges in measurement and theory that yet need to be addressed.

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