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Protective Behavioral Strategies, Alcohol Expectancies, and Drinking Motives in a Model of College Student Drinking

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Abstract

An extensive body of research asserts alcohol expectancies, or beliefs regarding the effects of alcohol, as an important influence on drinking. However, the extent to which expectancies are related to drinking motives and protective behavioral strategies (PBS) has yet to be examined. Existing alcohol mediational models suggest associations between expectancies and drinking motives as well as positive drinking motives and PBS use. Thus, it is possible that drinking motives and PBS use act as intervening factors in the relationship between expectancies and alcohol outcomes. Consequently, the present cross-sectional study aimed to test the indirect effect of expectancies (i.e., social facilitation) on alcohol outcomes through drinking motives and PBS use. Participants were 520 (358 female) college student drinkers with a mean age of 20.80 ($SD = 4.61$) years old. Students completed measures of expectancies, drinking motives, PBS use, alcohol use, and alcohol-related problems. Results from structural equation modeling indicated that drinking motives and PBS mediated the relationship between social expectancies and alcohol use. In particular, expectancies were associated with greater positive drinking motives, drinking motives were associated with less PBS use, and PBS was associated with less alcohol use and fewer alcohol-related problems. Given the key role of PBS in explaining drinking outcomes in our model, active efforts to incorporate PBS in alcohol interventions may be particularly beneficial for college students. Further, our findings support the consideration of PBS use as a part of the motivational model of alcohol use in future work.

Keywords

Alcohol expectancies; drinking motives; protective behavioral strategies; motivational model of alcohol use

Alcohol consumption is prevalent across many college campuses in the United States. An estimated 44% engaged in heavy episodic drinking (i.e., at least 4/5 drinks in one sitting for women/men) in the past two weeks (Wechsler & Nelson, 2008). Many drinkers are at risk for experiencing a wide range of negative consequences, including academic/occupational problems, risky sexual behaviors (Wechsler, Lee, Kuo, Seibring, Nelson, & Lee, 2002), and alcohol use disorders (Wu, Pilowsky, Schlenger, & Hasin, 2007). Given the potential

severity of problems associated with heavy alcohol use, additional research into refining conceptual models and identifying relevant predictive factors of college drinking is needed.

Alcohol Expectancies

Alcohol expectancies are one's beliefs about the effects of alcohol consumption (Brown, Goldman, & Christiansen, 1985; Goldman, Brown, Christiansen, & Smith, 1991; Maisto, Carey, & Bradizza, 1999). Expectancies can be learned directly or indirectly through one's experience with alcohol (see Jones, Corbin, & Fromme, 2001 for a review). One of the most salient alcohol expectancies among young adults is social facilitation (e.g., Kong & Bergman, 2010; Smith, Goldman, Greenbaum, & Christiansen, 1995; Young, Connor, Ricciardelli, & Saunders, 2006). Social expectancies, or beliefs that drinking will enhance social interactions, are shown to be modifiable, to mediate college drinking intervention effects (Lau-Barraco & Dunn, 2008), and to account for some of the associations between social influence and alcohol outcomes (e.g., Lau-Barraco, Braitman, Leonard, & Padilla, 2012; Wood, Read, Palfai, & Stevenson, 2001). These studies support social expectancies as a key factor in understanding college drinking behavior.

Drinking Motives

A strong body of research supports drinking motives, or one's reasons for consuming alcohol, to be an important determinant of alcohol use. Cooper's (1994) motivational model of alcohol use suggests that individuals drink to attain specific outcomes that fulfill a particular need. Positive reinforcement motives include drinking to obtain social rewards (social) or to increase one's positive affect (enhancement). Negative reinforcement motives consist of drinking to ease negative affect (coping) or avoid negative evaluation (conformity). Positive and negative motives each uniquely associate with alcohol outcomes (Cooper, 1994). Some research has found college students to have stronger positive than negative motives and that positive motives are more salient in predicting alcohol outcomes in this population (Read, Wood, Kahler, Maddock, & Palfai, 2003).

Researchers have extended Cooper's motivational model to include expectancies given their influence on drinking (e.g., Cooper, Frone, Russell, & Mudar, 1995; Cox & Klinger, 1988). The motivational model contends that drinking motives are more proximal than alcohol expectancies in predicting alcohol outcomes. That is, if individuals have strong perceptions that alcohol will enhance social situations, for instance, they will in turn be more motivated to drink to achieve those effects (e.g., Cooper et al., 1995). This model suggests that because expectancies can be formulated well before drinking initiation (Zucker et al., 1995) whereas drinking motives can change daily (e.g., Arbeau, Kuiken, & Wild, 2011), expectancies are conceptualized as antecedents to drinking motives. The motivational model is supported by research showing that positive expectancies are consistently and strongly related to social and enhancement drinking motives (e.g., Engels, Wiers, Lemmers, & Overbeek, 2005; Kong & Bergman, 2010; Kuntsche, Knibbe, Engels, & Gmel, 2007). That is, individuals who perceive more positive outcomes of alcohol use are also more motivated to drink to be social and to enhance their positive affect. Further, cross-sectional research has identified an indirect effect of expectancies on alcohol outcomes through drinking motives (Cooper et al.,

1995; Hasking, Lyvers, & Carlopio, 2011; Kong & Bergman, 2010; Kuntsche et al., 2007) such that stronger positive motives partially explain the association between social expectancies and alcohol outcomes. Thus, it may be reasoned that holding strong expectations that alcohol will enhance one's sociability may be related to drinking for social reasons or to enhance positive affect, and consequently, would be associated with alcohol use.

Protective Behavioral Strategies

Protective behavioral strategies (PBS) are cognitive-behavioral strategies implemented by the drinker to reduce consumption and related harms (e.g., Bonar et al., 2012; Martens, Ferrier, Sheehy, Corbett, Anderson, & Simmons, 2005; Novik & Boekeloo, 2011; Pearson, 2013; Sugarman & Carey, 2007). Previous research investigating PBS has focused on strategies that individuals could use while drinking to moderate use. This may include alternating alcoholic and non-alcoholic beverages or avoiding drinking games. Other types of strategies can be used to help a drinker avoid alcohol consumption altogether. This includes finding alternatives to drinking or choosing to participate in enjoyable activities that do not include drinking (Sugarman & Carey, 2007). More frequent PBS use is related to lower alcohol consumption, fewer alcohol-related problems (e.g., Martens, Taylor, Damann, Page, Mowry & Cimini, 2004), fewer heavy episodic drinking episodes (Martens, Pederson, LaBrie, Ferrier, & Cimini, 2007), and lower blood alcohol concentration (Sugarman & Carey, 2007).

PBS and expectancies

Little is known regarding the association between PBS use and expectancies. However, preliminary research has found that a greater likelihood of using alcohol reduction strategies (e.g., eat a meal before starting to drink) was negatively associated with alcohol expectancies (Bonar et al., 2012). Additionally, two studies assessed the association between expectancies and self-efficacy of PBS use but these investigations produced mixed results. Lienemann and Lamb (2013) found that stronger positive expectancies were associated with lower perceived ability to engage in protective behaviors in drinking situations (e.g., using condoms during sex while under the influence of alcohol) while Kraus and colleagues (2012) found no such support.

The use of PBS may be particularly relevant for individuals with stronger social expectancies as PBS use is linked to drinking within a social context (Martens et al., 2007). Specifically, because some strategies involve a social element (e.g., having a friend let you know when you have had enough), these strategies may be more difficult to utilize for those who favor a social environment or perceive more social benefits from drinking. It is possible that expecting social effects from drinking is associated with a lower likelihood of implementing PBS.

PBS and drinking motives

Recent research suggests that PBS use is associated with one's motives for drinking. Specifically, individuals who typically endorse more positive reinforcement drinking

motives are less likely to use PBS, which is associated with greater alcohol use and negative outcomes (e.g., LaBrie, Lac, Kenney, & Mirza, 2011; Martens, Ferrier, & Cimini, 2007). Further, PBS has been found to mediate the relationship between positive, but not negative, reinforcement drinking motives and alcohol outcomes (Martens et al., 2007). This is likely because many PBS are restricted to social environments (e.g., parties) where drinkers interact with others (Martens et al., 2007). Overall, individuals who drink to be social and enhance positive affect seem to be less motivated to use PBS and experience worse harms.

PBS, expectancies, and drinking motives

Previous research supports a sequential interplay of expectancies, drinking motives, and PBS use in accounting for alcohol use. Specifically, those with stronger positive expectancies are more likely to endorse positive reinforcement drinking motivations (e.g., Kong & Bergman, 2010) and those endorsing positive motives are less likely to use PBS (e.g., Martens et al., 2007). Individuals who use PBS less frequently consume more alcohol and experience more alcohol-related problems (e.g., Martens et al., 2005). Furthermore, as mentioned, some cross-sectional models suggest drinking motives as the final pathway to alcohol outcomes, serving as a mediator between expectancies and drinking (Cooper et al., 1995; Kong & Bergman, 2010; Read et al., 2003). Other cross-sectional research supports PBS use as a more proximal determinant of alcohol use than drinking motives (LaBrie et al., 2011; Martens et al., 2007). This latter model posits that although drinking motives are a necessary decision-making factor in deciding to drink, there may be other variables that intervene in the relationship between drinking motives and alcohol outcomes during the drinking occasion (Martens et al., 2007). For instance, elevations in social drinking motivations may be associated with a reduction in behaviors, such as PBS, that could reduce the likelihood of experiencing social rewards from drinking. PBS also may be viewed as a more proximal predictor of alcohol outcomes given that it must be used in the event that an individual is drinking, whereas expectancies and drinking motives can exist prior to the drinking occasion. While prior research has examined separate aspects of the associations between motives, expectancies, and PBS, previous studies have not tested these constructs in a single model despite their interrelationships that could ultimately advance existing conceptual frameworks.

Study Purpose

The primary aim of the current study was to test a conceptual model that considers expectancies, motives, and PBS in explaining college student drinking. We hypothesized that social expectancies would relate to alcohol outcomes through drinking motives and PBS use. We expected that stronger social expectancies would positively relate to drinking motives, which would be negatively associated with PBS use, and ultimately relate to more severe alcohol outcomes (i.e., alcohol use and alcohol-related problems). The secondary aim of this study was to address a gap in the literature regarding the relationship between expectancies and PBS use. It was hypothesized that stronger social expectancies would be related to less frequent use of PBS.

Method

Participants

Participants were a convenience sample of 520 (358 female) college student drinkers recruited from an online psychology research participation system. Non-psychology and psychology majors participated in the study. To be eligible, participants must have reported consuming at least one drink in the past month. Mean age of the sample was 20.80 ($SD = 4.61$) years old. Ethnicity was 53% Caucasian, 31.2% African American, 5.8% Hispanic, 4.8% Asian, 0.6% Native Hawaiian, and 4.1% 'other'. Class standing was 37.1% freshmen, 29.2% sophomores, 17.3% juniors, and 15.0% seniors. Approximately 36% of women and 40% of men in our sample reported heavy episodic drinking on an average drinking day.

Procedure

Data collection was administrated in groups with a maximum of 20 participants. Following informed consent, participants completed a battery of self-report questionnaires that took approximately 1 to 1.5 hours to complete. This study was approved by the university's college committee on human subjects research and followed APA guidelines (APA, 2002). Participants received course credit as compensation for their participation.

Measures

Alcohol expectancies—The Comprehensive Effects of Alcohol (CEOA; Fromme, Stroot, & Kaplan, 1993) was used to measure one's perceptions of negative and positive effects of alcohol. This 38-item scale measures how the participant believes alcohol will affect them when under the influence ranging from “disagree” (1) to “agree” (4). For the purpose of the present study, only the social facilitation subscale (e.g., “I would be outgoing”) was included.

Drinking motives—Drinking motives were assessed using the Drinking Motives Questionnaire (DMQ-R; Cooper, 1994). The DMQ-R consists of 20 items assessing reasons for drinking. The DMQ-R consists of four subscales, but only two were the foci of the present study: (1) social (e.g., “Because it makes social gatherings more fun”) and (2) enhancement (e.g., “Because it gives you a pleasant feeling”). Participants indicated how often they are motivated by each item when they drink, with responses ranging from 1 (*almost never/never*) to 5 (*all of the time*).

Protective behavioral strategies—Protective behavioral strategies were measured using the Protective Behavioral Strategies Survey (PBSS; Martens et al., 2005), based on its predictive validity of alcohol outcomes over other measures of PBS use (Pearson, Kite, & Henson, 2012). This scale consists of 15 items ranging from 1 (*never*) to 5 (*always*). The individual items associated with each scale were summed to create three subscales: limiting/stopping drinking (e.g., “Have a friend let you know when you've had enough”), manner of drinking (e.g., “Avoid drinking games”), and serious harm reduction (e.g., “Use a designated driver”). Participants indicated the extent to which they utilize these strategies when using alcohol or partying.

Alcohol consumption—Alcohol consumption was measured using the Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985). Participants reported the number of drinks they typically consume each day of the week averaged over the past three months. Typical number of drinks consumed per drinking day was used to measure alcohol use quantity.

Alcohol-related problems—Alcohol-related problems were measured using the Young Adult Alcohol Consequences Questionnaire (YAACQ; Read, Kahler, Strong, & Colder, 2006). The YAACQ, a 48-item self-report instrument, measures problems experienced in the past year with *yes* (2) or *no* (1) response options (e.g., “When drinking, I have done impulsive things that I regretted later”).

Results

Preliminary analyses

Prior to model testing, data were inspected for outliers and missing values. To help keep variability in the data, outliers were identified at the univariate level by values that were four standard deviations from the variable grand mean. Using this criterion, six participants were identified as outliers and deleted from the data. The sample size used in subsequent data analyses was 514. With regards to missing data, missingness ranged from less than 1% on the harm reduction subscale of the PBSS to 12.8% of the YAACQ. Prior to making a decision on how to handle missing data, the pattern of missingness was examined. Specifically, results of Little's (1988) omnibus test for the pattern missing completely at random (MCAR) was not significant, $\chi^2(133) = 118.31, p = .815$, which suggested that the data were MCAR. Model-based imputation methods, such as full information maximum likelihood (FIML) are appropriate when data are assumed to be MCAR (Schafer & Graham, 2002). Therefore, missing data were handled using FIML.

Correlations

Descriptive statistics and intercorrelations among study variables are presented in Table 1. Overall, correlations indicated that stronger social expectancies were associated with less frequent limiting/stopping drinking and manner of drinking PBS, but were unassociated with serious harm reduction PBS.

Hypothesized model

To test the hypothesized model, structural equation modeling was used with maximum likelihood estimation in Mplus 5.2 (Muthén & Muthén, 2008). Bootstrapping was used to address non-normality in the data. Statistical significance was assessed with 95% and 99% bias-corrected (BC) confidence intervals generated from 5,000 bootstrap samples (Efron & Tibshirani, 1993). If zero is not contained in the 95% or 99% BC confidence intervals, the parameter estimate is considered statistically significant at the .05 and .01 levels, respectively. The chi-square goodness of fit statistic (χ^2), comparative fit index (CFI), root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR) were used to assess model fit.

Before examining structural paths, a measurement model was used to fit to the data. Specifically, two latent variables were created in the measurement model: (1) the use of PBS with the three subscale scores of the PBSS specified as the indicator variables and (2) positive drinking motives specified as the indicator variables. Results of the measurement model indicated a mediocre fit to the data, $\chi^2(4) = 43.32, p = .001, CFI = .934, RMSEA = .138, SRMR = .056$ (Hu & Bentler, 1999). To improve model fit, based on modification indices, the error terms for harm reduction and limiting/stopping drinking indicators were specified to covary. A chi-square difference test demonstrated allowing these errors to covary significantly improved model fit, $\chi^2(1) = 32.24, p < .05$. Moreover, other fit indices indicated the model provided a good fit to the data, $CFI = .986, RMSEA = .072, SRMR = .022$ (Hu & Bentler, 1999).

After fitting the measurement model, structural paths were added and the hypothesized model was tested. Results indicated that the hypothesized model (see Figure 1) provided an acceptable fit to the data, $\chi^2(12) = 55.99, p < .001, CFI = .954, RMSEA = 0.084, SRMR = .041$ (Hu & Bentler, 1999). Several indirect effects were examined to test the hypotheses of interest. Consistent with our hypothesis, social expectancies were associated with more positive drinking motives, positive drinking motives were related to less frequent use of PBS, and PBS use was associated with fewer alcohol-related problems, $B = 0.38$ with 99% BC CI [0.21, 0.58] and less alcohol use, $B = 0.10$ with 99% BC CI [0.04, 0.26]. Individual pathways also are presented in Table 2. Results revealed that drinking motives did not mediate the association between social expectancies and alcohol outcomes. PBS use did mediate the association between drinking motives and alcohol outcomes.

Discussion

While evidence supports expectancies, drinking motives, and PBS as separate variables explaining alcohol outcomes, previous research has not investigated them jointly in a model of college student drinking. Consequently, the primary aim of our study was to examine the relationship between social facilitation expectancies and alcohol outcomes through drinking motives and PBS use. Findings from the overall model supported our hypothesis. That is, individuals with greater expectations that alcohol will produce positive social effects were more motivated to drink to enhance positive affect and sociability. In turn, this was associated with using fewer PBS, and ultimately, poorer alcohol outcomes. The overall model accounted for 34% of the variance in problems and 26% in use. Comparatively, previous studies assessing models of (1) expectancies and motives and (2) PBS and motives accounted for between 20 to 26% of the variance in alcohol use (Kong & Bergman, 2010; Martens et al., 2007) and 24% of the variance in problems (Martens et al., 2007). Thus, in the present study, we were able to explain more variance in alcohol outcomes by including expectancies, motives, and PBS in a single model.

It is interesting to note that when individual paths were examined, the indirect effect of expectancies to alcohol outcomes as mediated by drinking motives was no longer significant after controlling for PBS use. This suggests that drinking motives only explain the association between expectancies and alcohol use or problems when a drinker's typical PBS use is taken into account in the model. This finding is inconsistent with past research that

has shown drinking motives to mediate associations between expectancies and alcohol use (Kong & Bergman, 2010; Read et al., 2003). These previous studies did not, however, include PBS use as another potential intervening factor in their models. Our findings suggest that including PBS in the motivational model could contribute to a more complete understanding of the association between expectancies, drinking motives, and college drinking.

A secondary goal of the present study was to examine the relationship between expectancies and PBS use as limited research has investigated such a relationship. Consistent with the findings of Bonar and colleagues (2012), our study supports a negative association. Results indicated that the more an individual expects social facilitation effects from drinking, the less likely they are to use certain protective strategies while drinking. Specifically, they are less likely to use strategies centered around directly or indirectly stopping/slowing down their alcohol intake, such as alternating alcoholic and nonalcoholic drinks (Martens et al., 2005). They also are less likely to avoid risky drinking behaviors, such as not participating in drinking games and drinking slowly rather than gulping or chugging alcohol (i.e., manner of drinking).

An implication of the present findings is the potential utility of targeting PBS use in college drinking interventions. Previous research demonstrated PBS use as an intervening factor in reducing college drinking-related harms in feedback-based drinking interventions (e.g., Barnett, Murphy, Colby, & Monti, 2007; Larimer et al., 2007). These interventions have included PBS use, or other drinking control strategies, as a kills-training component of the program. Our findings further support the use of such approaches for college drinkers. Those working with this population may emphasize PBS education, such as discussing their current use of PBS as well as ways to increase their PBS use. Furthermore, intervention work may need to take into account the social context of use as well as the drinker's motivation to use such strategies. Given that college students tend to drink around others (e.g., O'Hare, 1990), this social context of drinking, particularly one that promotes heavy alcohol use, may decrease a drinker's motivation to implement PBS in the drinking situation. This may be especially relevant for those college drinkers seeking the social benefits of alcohol use. Thus, interventions that help individuals gain awareness into these issues may facilitate their willingness to ultimately implement drinking moderation strategies. One example is the Brief Alcohol Screening and Intervention for College Students (BASICS; Dimeff, Baer, Kivlahan, & Marlatt, 1999), a motivational approach whereby participants receive feedback on their alcohol-related risk and are provided training on PBS use in risky drinking contexts. Through such intervention efforts, college drinkers may develop stronger motivation and self-efficacy to actually use PBS.

The current study had several limitations. First, our cross-sectional design prevents inferences about causality in the associations between study variables. It is possible that other pathways exist, such as motives predicting expectancies, which predicts outcomes (e.g., Corbin, Iwamoto, & Fromme, 2011). Collecting daily diary assessments or longitudinal data would enable conclusions regarding the prospective nature of hypothesized relationships. Second, participant self-reports of alcohol outcomes could be biased due to concerns of social desirability. However, self-report measures of alcohol outcomes are

shown to be reliable and valid (DelBoca & Darkes, 2003). Finally, the present study focused on specific types of expectancies, motives, and PBS. Future work may consider other relevant expectancies (e.g., liquid courage), motives (e.g., drinking to cope), and type of PBS (e.g., strategies used to avoid alcohol) as they could differentially relate to outcomes experienced.

Overall, the present study represents the first to examine social expectancies and drinking by considering motives and PBS as intervening variables. This investigation contributed to the literature by testing a comprehensive model that incorporates key constructs identified in previous research on college drinking. Our study demonstrated that in addition to social expectancies being a strong determinant, there are additional factors through which social expectancies are related to alcohol outcomes. The current findings support the consideration of these constructs in larger theoretical frameworks of college drinking.

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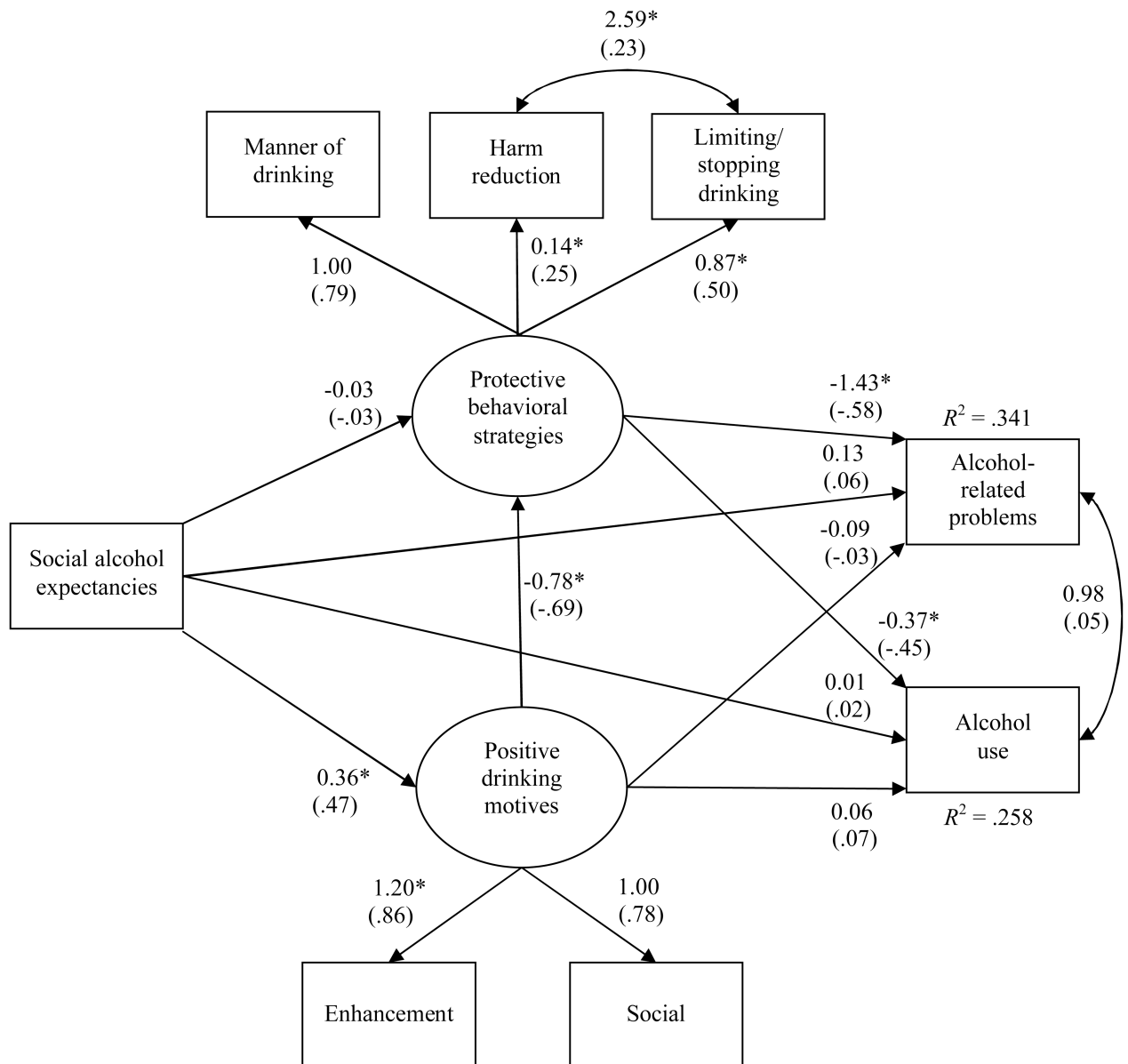


Figure 1. Protective behavioral strategies latent factor and positive drinking motives latent factor as mediators of the relationship between (1) social expectancies and alcohol use and (2) social expectancies and alcohol-related problems. Statistical significance levels pertain to unstandardized estimates based on 95% and 99% BC confidence intervals generated from 5,000 bootstrap samples. Standardized estimates are enclosed in parentheses. * $p < .01$.

Table 1
Intercorrelations and Descriptive Statistics for Study Variables

Variable	1	2	3	4	5	6	7	8
1. Alcohol-related problems	.94							
2. Alcohol use	.34***	–						
3. Social expectancies	.25***	.21***	.84					
4. PBSS-M	-.44***	-.39***	-.30***	.72				
5. PBSS-H	-.33***	-.14**	.01	.18***	.64			
6. PBSS-L	-.30***	-.29**	-.12**	.40***	.31***	.77		
7. DMQ-E	.34***	.35***	.39***	-.50***	-.02	-.27***	.89	
8. DMQ-S	.33***	.28***	.38***	-.42***	-.09*	-.27***	.67***	.90
Mean	58.84	4.32	26.59	14.78	13.33	19.96	12.85	15.34
Standard deviation	9.17	2.99	4.22	4.65	2.15	6.36	4.49	4.15
Range	48 – 93	1 – 18	9 – 32	5 – 25	5 – 15	7 – 35	5 – 20	5 – 20

Note. Correlation, mean, and standard deviation estimates are based on full-information maximum likelihood; PBSS = Protective Behavioral Strategies Survey (M = manner of drinking subscale; H = harm reduction subscale; L = limiting/stopping drinking subscale); DMQ = Drinking Motives Questionnaire (E = enhancement motives; S = social motives). Internal consistency estimates are in reported along the diagonal.

 $p < .001$.

**
 $p < .01$.

*
 $p < .05$.

Table 2

Summary of Indirect Effects

Indirect Effect	β	95% BC CI for B		99% BC CI for B		
		LL	UL	LL	UL	
Social expectancies → Alcohol-related problems						
Total	.17	0.38*	0.25	0.52	0.21	0.58
via Drinking motives	-.01	-0.03	-0.37	0.19	-0.54	0.28
via Drinking motives & PBS	.19	0.41*	0.22	0.73	0.17	0.90
Social expectancies → Alcohol use						
Total	.18	0.12*	0.09	0.17	0.08	0.18
via Drinking motives	.03	0.02	-0.07	0.08	-0.14	0.10
via Drinking motives & PBS	.15	0.10*	0.05	0.20	0.04	0.26
Drinking motives → Alcohol-related problems via PBS	.40	0.29*	0.14	0.51	0.12	0.66
Drinking motives → Alcohol use via PBS	.31	1.14*	0.65	2.00	0.50	2.38

Note. PBS = protective behavioral strategies; BC = bias-corrected; 95% and 99% BC confidence intervals generated from 5,000 bootstrap samples. → = direct effect interpreted as covariate relates to criterion.

* $p < .01$.