

Drinking Motives in the Prospective Prediction of Unique Alcohol-Related Consequences in College Students

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ABSTRACT. Objective: Although college students experience a diverse range of alcohol consequences, most studies focus on global, rather than distinct, consequence types. One predictor of unique consequences—drinking motives—has been studied only cross-sectionally. We aimed to examine the prediction of unique alcohol consequence domains (social/interpersonal, academic/occupational, risky behavior, impaired control, poor self-care, diminished self-perception, blackout drinking, and physiological dependence) by coping and enhancement motives over the course of one year. We hypothesized that coping motives would directly predict and that enhancement motives would indirectly (through alcohol use) predict unique consequences. **Method:** Web surveys were administered to a sample of college students ($n = 552$, 62% female) at the beginning of the fall semester for 2 consecutive academic years. Structural equation modeling was used to test direct and indirect paths from mo-

tives to consequences. **Results:** The data supported hypothesized direct, prospective paths from coping motives to several alcohol consequences (impaired control, diminished self-perception, poor self-care, risky behaviors, academic/occupational, and physiological dependence). These associations were not mediated by alcohol consumption. Enhancement motives were indirectly associated with all eight consequence domains by way of increased alcohol use at follow-up. Models were invariant across gender, year in school, and symptoms of posttraumatic stress. **Conclusions:** Findings suggest that whether motives act as a final common pathway to problem drinking may depend on which motives and which drinking outcomes are examined. As coping motives demonstrate a direct link to unique alcohol problem types over time, individuals endorsing these motives may need to be prioritized for intervention. (*J. Stud. Alcohol Drugs*, 75, 93–102, 2014)

HEAVY DRINKING PLACES COLLEGE STUDENTS at risk for negative consequences ranging in type and severity (Kahler et al., 2005; Perkins, 2002). Some individuals progress from more common and presumably less severe problems to more extreme consequences (Nelson et al., 1996; Vik et al., 2000), and unique consequence types have recently been shown to differentially predict future drinking outcomes (Read et al., 2013). Furthermore, problems that are on the more severe end of the continuum (e.g., impaired control, physiological dependence) are associated with particularly poor long-term outcomes (Chung and Martin, 2002; Nagoshi, 1999; O’Neill and Sher, 2000). Understanding antecedents to unique alcohol-related outcomes in college students could aid in identification of and intervention for those at greatest risk for more problematic developmental trajectories of alcohol misuse. Drinking motives (i.e., reasons for using alcohol) are one such antecedent of unique consequences cross-sectionally (Merrill and Read, 2010). In the present study, we sought to examine whether affectively relevant drinking motives (coping, enhancement) predict specific consequence domains prospectively in college students.

Drinking motives as predictors of alcohol use and consequences

Theory suggests that motivations for drinking, particularly those related to affect regulation, are important antecedents of alcohol use and consequences. Social learning theory (Bandura, 1986; Maisto et al., 1999) posits that cognitive factors, such as drinking motives, are proximal predictors of alcohol involvement, while highlighting a role for affect in behavior. Motivational models (Cooper, 1994; Cox and Klinger, 1988) explicitly outline the structure and role of the functions that drinking fulfills; and, in line with the mood-altering effects of alcohol (i.e., tension reducing or mood enhancing), the regulation of positive and negative affect is a primary factor theorized to motivate drinking (Cox and Klinger, 1988; Lang et al., 1999; Wills and Shiffman, 1985). Physiological theories of personality (e.g., Eysenck, 1967; Gray, 1970) also indirectly support the notion that positive and negative affect represent distinct and important motivators of alcohol use. Affect, therefore, always has been highlighted in motivational models of drinking (Cooper, 1994; Cooper et al., 1992b; Cox and Klinger, 1988; Grant et al., 2007), with two motive types consistently emerging: coping and enhancement.

Coping motives involve drinking to alleviate negative affect, whereas enhancement motives involve drinking to increase positive affect. These two motive types are most theoretically and empirically central to the understanding of affect regulation and problem alcohol use (Carey and Cor-

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reia, 1997; Cooper et al., 1992b; Kuntsche et al., 2005; Read et al., 2003). Motivational models of drinking (Cooper, 1994; Cox and Klinger, 1988) also consist of social motives (i.e., drinking to obtain social rewards or social interaction) and conformity motives (i.e., drinking to fit in, to avoid social rejection). These motive types have less affect regulatory basis and are less frequently related to college drinking (Brown and Finn, 1982; Cooper, 1994; Johnston et al., 2003; Karwacki and Bradley, 1996; MacLean and Lecci, 2000). Nonetheless, research examining the impact of affect-relevant motives typically controls for the shared variance that exists across the range of motives for drinking (Cooper, 1994; Crutzen et al., 2013; Magid et al., 2007; Merrill and Read, 2010), allowing for isolation of the specific roles for coping and enhancement motives in drinking behavior.

Research has suggested that the effects of coping motives on alcohol consequences are direct, whereas effects of enhancement motives are indirect (occurring through higher levels of drinking). Although coping motives are shown to be associated with consequences in college students (Carey and Correia, 1997; Kassel et al., 2000), evidence that coping motives are associated with greater alcohol use is more equivocal. Although some research supports an association (Cooper et al., 2000; Labouvie and Bates, 2002), other research, particularly with college students, has not shown a direct link between coping motives and alcohol use (LaBrie et al., 2012; Magid et al., 2007; Merrill and Read, 2010; Patrick et al., 2011). Of importance, however, theory and data suggest that coping motives predict alcohol consequences regardless of quantity or frequency of drinking (Cooper et al., 1995; Molnar et al., 2010; Patrick et al., 2011; Read et al., 2003). In contrast, enhancement motives consistently predict alcohol use and tend to be linked to alcohol consequences indirectly, through higher levels of drinking (Cooper et al., 1988, 1995; Magid et al., 2007; Merrill and Read, 2010; Read et al., 2003). The primary goal of the present study was to establish whether direct and indirect effects of coping and enhancement motives, respectively, replicate in a prospective test examining unique consequence types as outcomes.

Prediction of unique consequence domains

The extent to which coping and enhancement motives operate through different pathways (direct vs. indirect) to predict unique consequence domains is less well established. Much of the research among college students has examined drinking motives in the prediction of consequences in aggregate, despite existing measures that group consequences into meaningful subtypes. One cross-sectional study of college students (Merrill and Read, 2010) did examine coping and enhancement motives as predictors of unique consequence types. Results showed direct associations between coping motives and both risky behaviors and academic/occupational consequences, and indirect associations between enhance-

ment motives and several consequence types (risky behaviors, academic/occupational problems, social/interpersonal problems, impaired control, diminished self-perception, and physiological dependence), occurring as a function of higher levels of alcohol use. Thus, specific consequence domains do seem to be directly influenced by coping motives but indirectly influenced by enhancement motives, with some evidence that the influence of these two motive types is consequence specific.

In the present study, we provide an important contribution to the literature by extending previous research through a prospective examination of coping and enhancement motives as predictors of unique consequence domains. We expected that individuals with relatively higher coping and/or enhancement motives at the beginning of one academic year also would report higher levels of consequences, relative to other students, at the beginning of the following academic year. We posited that these prospective associations would be direct for paths from coping motives to consequence domains and indirect (through alcohol use) for paths from enhancement motives to consequence domains. In addition, we examined whether a prospective model of drinking motives on unique consequences was invariant across gender, year in school, and posttraumatic stress symptomatology.

Given the lack of prior longitudinal literature predicting unique consequence types, no hypotheses were forwarded regarding the specificity of motive effects on particular consequence domains. Although exploratory, examination of these unique paths can provide clinically relevant information on the long-term outcomes that students reporting each motive might be expected to experience, with implications for intervention prioritization and foci.

Method

Participants and procedure

Study procedures were approved by the university's institutional review board. Data for the present study come from a larger longitudinal study of associations between traumatic stress and substance use among college students described in detail previously (Read et al., 2012). Participants at a midsize public university were recruited in two cohorts upon matriculation to college (Cohort 1 in Fall 2005, Cohort 2 in Fall 2006). In the summer before beginning college, 2,574 students across the two cohorts were screened for inclusion criteria (age 18–24 years old, incoming freshmen, and enrolled in college either part- or full-time) as well as Criterion A trauma and symptoms of posttraumatic stress disorder (PTSD). Individuals who reported Criterion A trauma exposure and who endorsed at least one symptom from each PTSD symptom cluster (reexperiencing, avoidance/numbing, arousal; American Psychiatric Association, 2000; $n = 485$) and an equal number of students who did not meet these

criteria were invited to participate in the longitudinal arm of the study. A total of 81% ($n = 783$) of those invited to take part in the study agreed to participate and were assessed several times over the course of their college years. Participants received gift cards for the completion of each survey.

For the present study, measures of interest were not included until Fall 2009 (Time 1 [T1] of the present study). Of the 783 in the longitudinal sample, 710 (91%) completed this time point. There were no significant differences on alcohol use or consequences reported at the beginning of the longitudinal study between those who remained in the study in Fall 2009 and those who dropped out before this time (all $ps > .05$). Of these 710 participants, only those who reported drinking at least one drink in the past month ($n = 552$, 62% female; 70% of larger sample) at T1 were included in the present study. We used the data from T1 and from an assessment 1 year later, in Fall 2010 (T2), for the present analysis, allowing us to avoid influences of seasonal variability on our findings (e.g., breaks, finals) in college student drinking (Del Boca et al., 2004).

Ethnicity was reported as 80.3% ($n = 443$) White (non-Hispanic), 9.1% ($n = 50$) Asian, 4.3% ($n = 24$) Black (non-Hispanic), 3.4% ($n = 19$) Hispanic/Latino, 2.2% ($n = 12$) biracial, 0.4% ($n = 2$) American Indian/Alaskan, 0.2% ($n = 1$) Hawaiian/Pacific Islander, and 0.2% ($n = 1$) not reported. During data collection for the present study, participants were primarily juniors ($n = 223$, 40.4%) or seniors ($n = 288$, 52.2%) in college. The majority of participants were age 20 ($n = 214$, 38.8%) or 21 ($n = 317$, 57.4%); the remainder were 22 ($n = 21$, 3.8%).

Measures

Drinking motives. At T1, using the Drinking Motives Questionnaire Revised (Cooper, 1994), respondents rated their frequency of drinking for each of 20 reasons for drinking on a scale from 1 (*almost never/never*) to 5 (*almost always/always*). Subscale scores were created by summing the five subscale items. In the present sample, internal reliabilities were $\alpha = .87$ (coping), $\alpha = .87$ (enhancement), $\alpha = .91$ (social), and $\alpha = .83$ (conformity).

Alcohol use. At T1 and T2, participants completed single items regarding typical past-month drinking quantity and frequency (Wood et al., 2001). The frequency question read, "Think of all the times in the past month when you had something to drink. How often have you had some kind of beverage containing alcohol?" The quantity question read, "In the past month, when you were drinking alcohol, how many drinks did you usually have on any ONE occasion?" The alcohol use variable in the present study was the product of these two items.

Alcohol consequences. At T1 and T2, the Young Adult Alcohol Consequences Questionnaire (Read et al., 2006) was used to assess eight consequence domains over the past month.

Response options are dichotomous. Participants reporting no past-month drinking (11% at T2) received a score of zero for each consequence type at that assessment point. Reliability (Cronbach's α) was derived through the use of tetrachoric correlations because of the dichotomous nature of items and was averaged across two time points. Reliabilities were as follows: social/interpersonal (6 items, $\alpha = .91$; e.g., "Said things while drinking that I later regretted"), academic/occupational (5 items, $\alpha = .92$; "Missed work or classes at school because of my drinking, a hangover, or illness caused by drinking"), risky behavior (8 items, $\alpha = .91$; "Driven a car when I knew I had too much to drink to drive safely"), impaired control (6 items, $\alpha = .92$; "Often drank more than I originally had planned"), poor self-care (8 items, $\alpha = .94$; "Because of my drinking I have not slept properly"), diminished self-perception (4 items, $\alpha = .95$; "Felt badly about myself because of my drinking"), blackout drinking (7 items, $\alpha = .94$; "Awakened the day after drinking and found that I could not remember a part of the evening before"), and physiological dependence on alcohol (4 items, $\alpha = .86$; "Needed a drink after I'd gotten up [that is, before breakfast]").

Data analytic approach

Data preparation. Before substantive analyses, we examined univariate distributions to identify significant skewness, kurtosis, and outliers. Four far outliers (i.e., greater than 3.29 SD above the mean and clearly disconnected from the rest of the distribution) on alcohol use variables were set to 1 value greater than the next largest, non-outlying value (Tabachnick and Fidell, 2007). Several variables were moderately to highly skewed (skewness ranged from 0.18 to 4.46, kurtosis ranged from 0.86 to 29.47). Therefore, analyses used robust maximum likelihood estimation to accommodate nonnormality in the data.

All but one participant had complete data on T1 variables. Retention rates were high, with 95% ($n = 525$) of the participants providing complete data at T2. Participants who were missing data on any T2 variables ($n = 27$) did not differ significantly from participants with complete data at T2 ($n = 525$) on demographics, baseline alcohol use, or drinking motives (all $ps > .05$). However, relative to participants with complete data, those with missing data reported significantly greater academic/occupational ($M = 0.48$ vs. $M = 0.19$), $t(549) = 2.15$, $p = .032$; physiological dependence ($M = 0.48$ vs. $M = 0.19$), $t(549) = 2.97$, $p = .003$; and risky behavior consequences ($M = 1.11$ vs. $M = 0.56$), $t(549) = 2.28$, $p = .023$, at baseline. We used full-information robust maximum likelihood estimation, allowing us to include all 552 participants in the analyses regardless of missing data.

Path models. We conducted observed variable path analysis using MPlus Version 6.1 (Muthén and Muthén, 1998–2011). In the hypothesized path model, predictor variables included all four drinking motives at T1, the mediating

TABLE 1. Means and standard deviations for drinking motives, alcohol use, and consequences

Variable	Time 1 <i>M (SD)</i>	Time 2 <i>M (SD)</i>
Drinking motives		
Coping motives	8.99 (3.93)	
Enhancement motives	12.14 (4.97)	
Conformity motives	7.81 (3.45)	
Social motives	14.87 (5.24)	
Alcohol use		
Typical quantity (past month)	4.72 (2.23)	4.08 (2.48)
Typical frequency (past month)	2.63 (1.02)	2.47 (1.31)
Past month Q × F	13.30 (9.35)	11.94 (9.69)
Consequence types		
Social/interpersonal	0.92 (1.33)	0.80 (1.26)
Impaired control	0.76 (1.25)	0.75 (1.29)
Self-perception	0.34 (0.86)	0.31 (0.81)
Self-care	0.79 (1.53)	0.65 (1.39)
Risky behaviors	0.58 (1.24)	0.44 (1.02)
Academic/occupational	0.21 (0.68)	0.14 (0.56)
Physiological dependence	0.20 (0.51)	0.19 (0.49)
Blackouts	1.19 (1.67)	1.14 (1.67)
Total consequences	4.99 (6.96)	4.41 (6.53)

Notes: Typical quantity is represented by number of drinks per drinking day. Typical frequency was coded on a scale where 2 = 2–3 times in the past month and 3 = once or twice per week. Q = quantity; F = frequency.

variable was T2 alcohol use, and outcome variables included the eight consequence domains at T2. We included alcohol use and the eight consequence domains at T1 to control for autoregressivity, allowing us to test whether individuals reporting relatively greater drinking motives at T1 would report relatively greater consequences at T2. We estimated direct paths from all motives to alcohol use and all consequence domains. Although no hypotheses were forwarded for conformity or social motives, direct paths were included to isolate the unique influence of motives of interest. All variables within each time point were allowed to freely covary. We used a Satorra–Bentler correction for chi-squares (scaled chi-square), which is robust to nonnormality (Chou et al., 1991; Satorra and Bentler, 2001). Model fit was considered good if the chi-square index (scaled χ^2 / df) < 3.0, the root mean square error of approximation (RMSEA) < .05, the comparative fit index (CFI) > .95, and the Tucker–Lewis index (TLI) > .95. To test the significance of the proposed in-

direct paths, we applied the bias-corrected bootstrap method to calculate 95% confidence intervals (Efron and Tibshirani, 1993; MacKinnon et al., 2004).

Multiple group models. We performed multiple group analyses to determine whether model results were invariant across demographic and sample selection variables that might be expected to influence alcohol use and consequences. These included gender (men vs. women), year in school (Cohort 1 vs. Cohort 2), and PTSD status (one or more symptoms in each cluster vs. below this threshold). For each grouping variable, we first estimated a model in which all parameters were allowed to freely vary across the groups. We then constrained all path coefficients in the model to be equal across both groups, with a significant decrement in model fit providing evidence for differences across the groups. To compare fit across models, we used a computer program (Crawford and Henry, 2003) to compute significance tests on the difference between Satorra–Bentler scaled chi-square statistics.

Results

Descriptives

See Table 1 for descriptive statistics and Table 2 for intercorrelations between T1 motives and T2 alcohol use and consequences. All model variables (including those not shown in Table 2) were significantly and positively intercorrelated ($ps < .01$), with the exception of T1 diminished self-perception and T2 alcohol use. Whereas all students reported drinking at least once in the past month at T1, approximately 11% of the sample at T2 reported no past-month drinking and, therefore, were assigned automatic scores of zero for all consequences. Thus, the slightly lower estimates of alcohol use and consequences at T2 relative to T1 may reflect a regression to the mean process resulting from our selection of only drinkers at T1.

Men drank more than women at both T1 and T2 and experienced higher levels of risky behaviors and academic/occupational consequences at T2 ($ps < .05$). There were no gender differences on motives or other consequences.

TABLE 2. Intercorrelations between T1 drinking motives and T2 alcohol use and YAACQ subscale scores

Predictors	T2 use and consequences								
	Alc Use	Soc/Int	Cont	Self-p	Self-c	Risk	Ac/Oc	Dep	Blk
T1 enhancement	.41	.30	.28	.14	.24	.25	.16	.28	.34
T1 coping	.28	.26	.31	.24	.29	.27	.25	.30	.25
T1 conformity	.14	.19	.23	.15	.21	.21	.17	.19	.13
T1 social	.37	.30	.25	.16	.21	.23	.15	.25	.31

Notes: T1 = Time 1; T2 = Time 2; YAACQ = Young Adult Alcohol Consequences Questionnaire; Soc/Int = social consequences subscale; Cont = impaired control over drinking subscale; Self-p = self-perception consequences subscale; Self-c = self-care consequences subscale; Risk = risky behavior consequences subscale; Ac/Oc = academic/occupational consequences subscale; Dep = physiological dependence consequences subscale; Blk = blackout drinking consequences subscale. All correlations, including those not shown (among T1 use and consequences), are significant at $p < .01$, with the exception of the correlation between T1 diminished self-perception and T2 alcohol use.

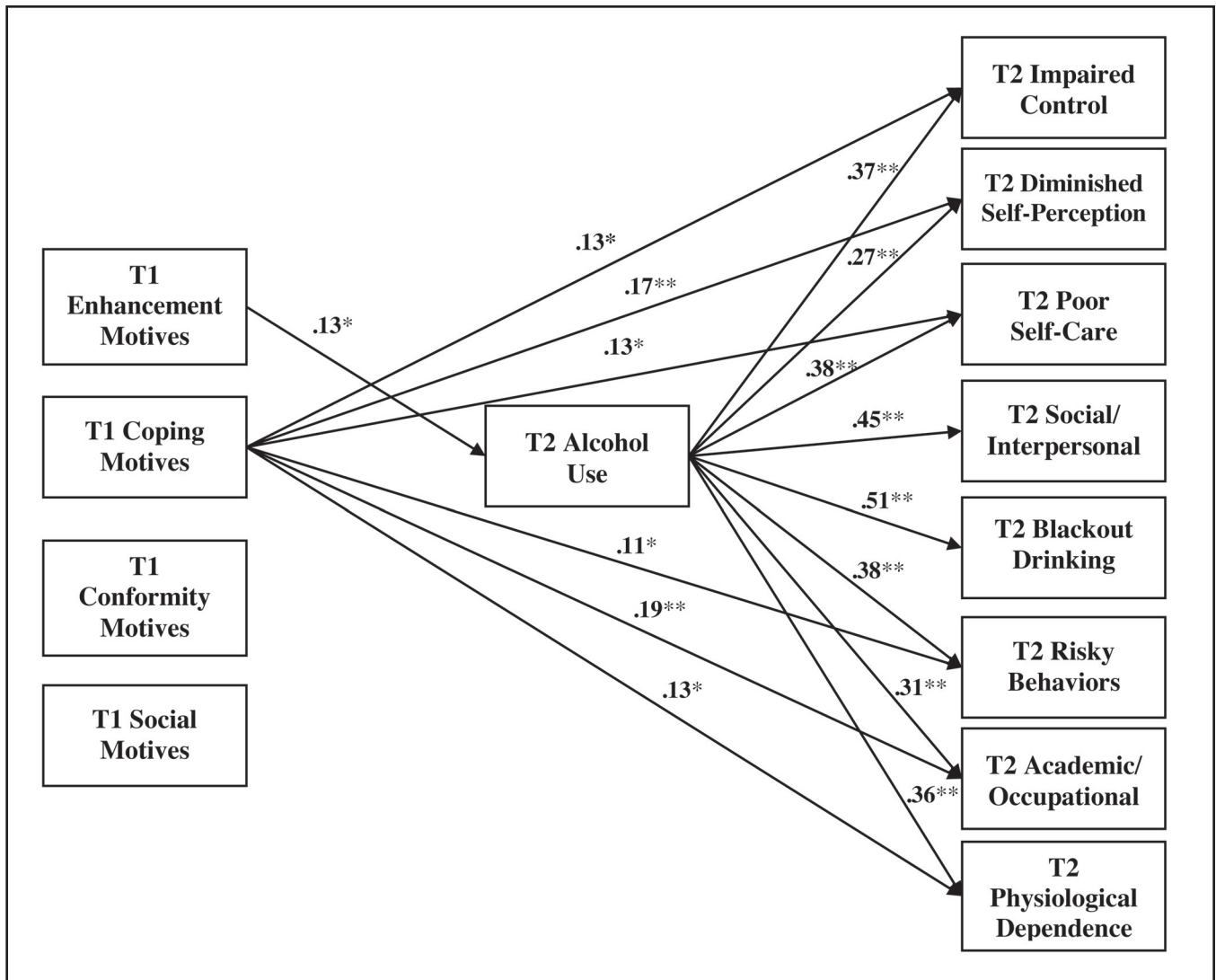


FIGURE 1. Significant prospective effects of drinking motives on unique consequences. *Note:* Coefficients represent standardized betas. Autoregressive paths (from Time 1 [T1] to Time 2 [T2] use and from T1 to T2 unique consequence types) are not shown, although all were significant. * $p < .05$; ** $p < .01$.

The older cohort reported greater coping motives, and the younger cohort reported greater levels of alcohol use and some consequences (blackout drinking, dependence, academic/occupational problems, risky behaviors) at T2 ($ps < .05$).

Path models

The hypothesized model (203 free parameters) provided good fit to the data, scaled $\chi^2(72) = 107.04$, $\chi^2 / df = 1.49$; TLI = .96; CFI = .98, RMSEA = .03. See Figure 1 for a depiction of significant paths of interest.

Direct paths. As hypothesized, significant direct paths across the 1-year interval were observed from T1 coping motives to six of the eight T2 consequence domains:

impaired control, diminished self-perception, poor self-care, risky behaviors, academic/occupational problems, and physiological dependence ($ps < .05$). No significant direct paths were observed between any of the other motive types and consequences. Despite significant bivariate correlations between all drinking motives and alcohol use at T2, after T1 use and the shared variance among all four motive types was controlled for, only enhancement motives predicted T2 alcohol use. The model accounted for 40% of the variability in T2 use and the following variability in T2 consequence types: 39% (self-care), 16% (self-perception), 33% (impaired control), 35% (social/interpersonal problems), 17% (academic/occupational problems), 40% (blackout drinking), 34% (physiological dependence), and 31% (risky behaviors).

TABLE 3. Indirect effects from enhancement motives to unique problem domains

Variables	Indirect effect (<i>B</i>)	[95% CI]	Indirect effect (β)	[95% CI]
Enh→Use→Poor self-care	0.014	[0.002, 0.028]	.051	[.004, .097]
Enh→Use→Diminished self-perception	0.006	[0.001, 0.012]	.036	[.002, .069]
Enh→Use→Impaired control	0.013	[0.001, 0.025]	.049	[.004, .094]
Enh→Use→Social/interpersonal	0.015	[0.001, 0.029]	.060	[.005, .114]
Enh→Use→Academic/occupational	0.005	[0.001, 0.010]	.042	[.002, .082]
Enh→Use→Blackout drinking	0.023	[0.002, 0.042]	.068	[.008, .127]
Enh→Use→Physiological dependence	0.005	[0.000, 0.010]	.048	[.002, .094]
Enh→Use→Risky behavior	0.010	[0.001, 0.021]	.051	[.003, .098]

Notes: CI = confidence interval; enh = enhancement motives.

Indirect paths. We observed the hypothesized indirect effect of enhancement motives on all eight consequence domains (95% confidence intervals did not contain 0) (Table 3). There were no significant indirect paths between any of the other motive types and the consequence domains.

Multiple group models

The multiple group tests suggested that the models were invariant across gender, year in school, and PTSD status (four participants were missing PTSD data at T1 and were not included in this test). Relative to models in which all paths varied freely across groups, no decrements in model fit were observed when constraining paths to be equal across men ($n = 208$) versus women ($n = 344$), Cohort 1 ($n = 326$) versus Cohort 2 ($n = 226$), or participants with one or more symptoms in each cluster ($n = 99$) versus participants below this threshold ($n = 449$) ($ps < .05$).

Discussion

In this study, we examined links between drinking motives and alcohol-related consequences in a sample of college students. The prospective design of this study with excellent follow-up rates, inclusion of all four drinking motives in analytic models, and use of distinct, validated consequence domains as outcome variables represent strengths of this study. The findings extend previous literature by demonstrating that coping motives are directly, prospectively associated with several unique consequence domains, whereas enhancement motives predict consequences only by way of higher levels of drinking over the course of one year. These two drinking motives appear to be important predictors of a wide range of unique consequence types over the time. Findings for each motive type are discussed below.

Coping motives

Theory suggests that, among the many factors that may motivate drinking, the desire to regulate affect is a prominent one (Cox and Klinger, 1988; Lang et al., 1999; Maisto et

al., 1999; Wills and Shiffman, 1985). In the present study, students who reported higher coping motives at T1 also reported higher levels of six unique consequence types, relative to other students, at T2—impaired control, diminished self-perception, poor self-care, risky behaviors, academic/occupational problems, and physiological dependence. Findings indicate that, when considering these particular alcohol-related consequences as outcomes, motivation to cope with negative affect in particular is important.

As hypothesized, associations between coping motives and consequence types were direct, not mediated by alcohol use. Coping motives did not predict alcohol use at T2, consistent with other studies that also have not found associations between coping motives and alcohol use in college students (LaBrie et al., 2012; Merrill and Read, 2010; Patrick et al., 2011). Students who endorse coping motives may have a tendency toward worsening drinking problems independent of consumption (Stacy et al., 1991). Cooper et al. (1995) discuss several reasons for this finding, including potential associations between higher coping motives and lower volitional control over drinking, poor alternative coping skills, and potential reliance on alcohol to cope resulting in continued drinking in the face of problems. Assuming that those reporting coping motives are actually drinking to cope, the use of alcohol may be just one of many maladaptive coping strategies on which students rely, resulting in additional problems in a number of domains. Although we did not directly examine these mechanisms in the present study, our data paint a picture consistent with these theoretical speculations.

Our results align with those of previous work regarding risk conferred by negative affect-relevant motives more broadly (Carey and Correia, 1997; Cooper et al., 1995; Kassel et al., 2000; Merrill and Read, 2010). The results also align with cross-sectional research linking coping motives specifically to some of these same unique outcomes—physiological dependence (Carpenter and Hasin, 1998a, 1998b; Cooper et al., 1992a), academic/occupational consequences, risky behaviors, and poor self-care (Merrill and Read, 2010). Two consequence domains (impaired control, diminished self-perception) predicted by coping motives in this study

were not observed in prior work, including our own (Merrill and Read, 2010).

It is likely that the primary reason for these discrepancies is the cross-sectional versus longitudinal nature of these tests. When measured concurrently, coping motives may not be linked to difficulties turning down opportunities to drink or feeling bad about oneself because of drinking. However, over time, if the use of alcohol to alleviate negative moods is reinforced (i.e., if drinking actually results in improved mood), the likelihood that students will forgo opportunities to drink, or to drink more in a given event (i.e., impaired control), may decrease. Likewise, it may take the passage of time for an accumulation of consequences to result in students reporting more discontent (Baumeister et al., 1994) and less positive self-perceptions as a function of their drinking. Other reasons that findings might differ across studies is that participants in the present study also were older and presumably had more drinking experience; and we likely had more power to detect effects with the larger sample size in the present study. Nonetheless, given that we did not specify a priori hypotheses regarding unique consequence types in this study, additional longitudinal research is needed to replicate these findings.

Overall, findings across prior cross-sectional work and the present prospective investigation imply that college drinkers whose drinking may be driven by a desire to alleviate negative emotions are at increased risk for problematic outcomes, thus rendering an already vulnerable group more vulnerable still. This is concerning not only for potential immediate impacts on student success and well-being but also because some of these consequence domains (e.g., physiological dependence, impaired control) may be associated with later progression to even more severe symptoms (Chung and Martin, 2002; Nagoshi, 1999; Nelson et al., 1996; O'Neill and Sher, 2000).

Enhancement motives

As hypothesized, the effect of enhancement motives on consequences was indirect, occurring through increased levels of alcohol use at T2. There was no specificity in the types of consequences that were more likely to occur as a function of the indirect effect of enhancement motives through drinking when examined over the course of one year. In previous cross-sectional work (Merrill and Read, 2010), indirect paths from enhancement motives to two of these consequence types (self-care and blackouts) were not observed. Although replication of our findings is needed, this result suggests that increases in these two consequence domains as a function of enhancement drinking take time to develop. However, discrepancies also could be attributable to the methodological differences described above.

Of note, two consequence domains that were specific to an indirect effect of enhancement motives and were not

observed as outcomes related to coping motives in the present study were blackout drinking and social/interpersonal problems. Drinkers seeking alcohol's positively reinforcing effects (i.e., those reporting enhancement motives) may not simply drink in larger overall quantities, but may drink faster or in larger sips, a style of drinking that may place them at greater risk for blackouts (Goodwin, 1995; Goodwin et al., 1969; Perry et al., 2006). The increased risk for social/interpersonal problems among those reporting higher enhancement motives may be a result of the contexts in which enhancement-motivated drinking takes place. Enhancement-motivated drinkers may be more extraverted (Stewart and Devine, 2000) and therefore may seek out contact and communication or have an assertive personality that lends itself to increased opportunities for problems within interactions with others, whereas this may not be the case for those who report coping motives. Of note, these same two consequence types (blackouts, social/interpersonal) also stood out in another study using unique consequence domains as predictors of later drinking rather than outcomes (Read et al., 2013). During the first year of college, blackouts were associated with later increases in drinking for men but decreases in drinking for women; social/interpersonal consequences were linked to increased frequency of heavy episodic drinking in both genders. These two types of consequences seem to act differently in relation to drinking—both as antecedents and as outcomes of alcohol involvement.

Other motives

Although conformity and social motives were not part of the intended focus of the present study, the inclusion of these motives in our models allowed us to isolate the specificity of coping and enhancement motives on consequences. Of note, we observed no direct or indirect effects of conformity or social motives on alcohol use or consequences over the course of the year. The lack of effects of social motives on alcohol use and consequences replicates other cross-sectional work (Magid et al., 2007; Merrill and Read, 2010; Patrick et al., 2011). Other work also has shown nonsignificant associations between conformity motives and alcohol use (Crutzen et al., 2013; Magid et al., 2007; Merrill and Read, 2010; Patrick et al., 2011) and suggests that conformity motives may not be particularly relevant for college students (e.g., Karwacki and Bradley, 1996).

Clinical implications

The developmental period that characterizes older adolescents and emerging adults—particularly those who enter the college environment—is one that may put them at increased risk for problematic alcohol use (Slutske, 2005; Slutske et al., 2004). As others have noted, it is more effective to target high-risk youths in intervention efforts than it is to target a

more general population (Gottfredson and Wilson, 2003; Masterman and Kelly, 2003). In our study, coping motives demonstrate the most long-term risk regardless of one's levels of drinking. Although alcohol use may change naturalistically over the course of college and beyond (e.g., Littlefield et al., 2010), coping motives may place young adults at risk for experiencing problems even at lower levels of alcohol use. Therefore, students reporting coping motives are those who may need to be included in such high-risk intervention efforts. For those individuals, interventions may aim to teach more effective ways of managing negative emotional states or to change the beliefs about the negative reinforcement properties of alcohol (Carpenter and Hasin, 1998b). However, because enhancement motives also were associated with higher levels of alcohol use and in turn all types of consequences, these motives also present a risk factor to be targeted. For individuals reporting enhancement motives, a more direct focus on the quantity and frequency of their drinking within the context of intervention would seem appropriate. Such drinkers could be provided with alternative behaviors from which to derive positive reinforcement (e.g., Murphy et al., 2012). As an alternative, personalized feedback regarding the types of consequences students have experienced, or might expect to experience given their drinking motives, could be provided.

Limitations and future directions

This study has some limitations that highlight future research directions. First, our sample comprised juniors and seniors in college in the Northeast, and thus findings may not generalize to younger students and/or non-college students. In addition, the larger study from which we drew our participants was oversampled for individuals who reported symptoms of traumatic stress. Nonetheless, our findings were invariant across students who did and did not report significant PTSD symptoms at the time of data collection, as well as across gender and year in school, augmenting our confidence in the generalizability of findings.

Some research suggests that there is value in examining motives for coping with depression and anxiety separately (Grant et al., 2007). Future research predicting unique consequences could examine the specific contribution of coping with different negative emotions. In addition, although we examined temporal associations between motives reported one year and consequences the following year, the correlational nature of these data do not allow determination of cause and effect. We built our model based on the assumption that motives lead to drinking and not vice versa, but there may be other ways to conceptualize the direction of associations tested (Crutzen et al., 2013). Future research could examine whether experience with consequence domains results in any change in drinking motives.

There also are some other limitations with our measures. We used a measure of quantity by frequency of drinking as our mediator in the present study. Other consumption indices more closely linked to problem drinking (e.g., peak drinking, peak blood alcohol concentration) might have yielded different findings. In addition, the use of the Drinking Motives Questionnaire to measure drinking motives has limitations. High endorsement of a drinking motive should not be interpreted as frequent drinking for that motive, as the Drinking Motives Questionnaire stem reads, "Thinking of all the times you drink, how often would you say that you drink for each of the following reasons?" A student who drinks very rarely may have a high enhancement motives score if the few times he or she drinks it is always for enhancement reasons. However, there is the potential for confounding of motive scores with drinking frequency if respondents do not understand that their responses should reflect the proportion of drinking episodes (Gmel et al., 2012). Last, it is possible that untested variables such as depression, anxiety, or general maladaptive coping skills account for the direct link between coping motives and consequences in the present study. In future research, it will be interesting to examine such factors that may further elucidate associations between drinking motives and unique consequence domains.

Conclusion

The present study contributes to the literature a prospective examination of motivational pathways to unique consequence types in college students. Overall, our findings suggest that coping motives directly affect unique alcohol consequences, whereas enhancement motives are indirectly associated with consequences by way of increased alcohol use. Such findings imply that the extent to which the suggestion based on social learning theory and motivational models—that motives are a "final common pathway" to alcohol use behaviors—may depend on which motive and which drinking outcomes are examined.

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