Coping-Anxiety and Coping-Depression Motives Predict Different Daily Mood-Drinking Relationships

Valerie V. Grant and Sherry H. Stewart
Dalhousie University

Cynthia D. Mohr
Portland State University

Individuals with different drinking motives show distinctive patterns of alcohol use and problems. Drinking to cope, or endorsing strong coping motives for alcohol use, has been shown to be particularly hazardous. It is important to determine the unique triggers associated with coping drinking. One limitation of past research has been the failure to contend with the complexities inherent in coping motives. Using the Modified Drinking Motives Questionnaire-Revised (Grant, Stewart, O’Connor, Blackwell, & Conrod, 2007), which separates coping-anxiety and coping-depression motives, we investigated whether these motives moderated relationships between daily mood and subsequent drinking (statistically controlling for sex, baseline anxious and depressive symptomatology, initial alcohol problems, and additional drinking motives). College students (N = 146) provided daily reports of mood and alcohol consumption online for 3 weeks. Multilevel modeling analyses revealed that, as hypothesized, stronger initial coping-depression motives predicted higher daily depressed mood-alcohol consumption slopes. Also consistent with expectation, stronger initial coping-anxiety motives predicted higher anxious mood-alcohol consumption slopes. We discuss how this identification of the unique mood triggers associated with each type of coping drinking motive can provide the basis for targeted interventions.

Keywords: alcohol, drinking motives, coping, depression, anxiety

Introduction

Despite increased efforts to reduce heavy episodic alcohol use (i.e., binge drinking) among college students, the proportion of frequent heavy episodic drinkers in this population increased between 1993 and 2001 (Wechsler et al., 2002). Furthermore, rates of alcohol-related problems among college students either remained the same or grew over this time period (Wechsler et al.). Perhaps most concerning is the finding of a 1999 survey that over a third of college students met criteria for an alcohol use disorder (abuse or dependence) in the previous year (Knight et al., 2002).

This study was supported by a grant from the Social Sciences and Humanities Research Council of Canada (SSHRC) awarded to Sherry H. Stewart and by a dissertation grant award from the Society for a Science of Clinical Psychology awarded to Valerie V. Grant. This study was conducted as a component of a doctoral dissertation by Valerie V. Grant under the supervision of Sherry H. Stewart. A condensed version of this manuscript was presented in a poster at the 69th Annual Convention of the Canadian Psychological Association in June 2008 in Halifax, Nova Scotia, Canada. Valerie V. Grant has been funded by two Nova Scotia Health Research Foundation Student Awards, a SSHRC Doctoral Fellowship, and Honourary Killam Predoctoral Scholarships over the course of the completion of this research. Sherry H. Stewart is currently supported by a Killam Research Professorship from the Faculty of Science at Dalhousie University; she was supported by an Investigator Award from the Canadian Institutes of Health Research at the time this research was conducted. Cynthia Mohr was supported by NIAAA grant R03-AA014598.

Correspondence concerning this article should be addressed to Valerie V. Grant, Department of Psychology, Life Sciences Centre, Dalhousie University, Halifax, Nova Scotia, Canada, B3H 4J1.

Motivational Model of Alcohol Use

Clearly, given the high rates of heavy drinking and related problems in the college student population, it is important to determine which individuals are at relatively higher risk of problematic alcohol use. To this end, much individual differences research has focused on alcohol use motives, or reasons for drinking. In fact, drinking motives have been posited to comprise the “final common pathway to alcohol use” through which other influences on drinking behaviors operate (Cox & Klinger, 1988, p. 168).1 In Cooper’s (1994) motivational model of alcohol use, drinking motives can be distinguished along two dimensions: the type of reinforcement sought (positive or negative) and the source of the desired effects of drinking (internal or external). As compared with the external drinking motives (positive-reinforcement “social,” i.e., drinking for social/celebratory reasons, and negative-reinforcement “conformity,” i.e., drinking to avoid social disapproval), the internal, affect-regulation motives (positive-reinforcement “enhancement,” i.e., drinking to enhance positive feelings, and negative-reinforcement “coping,” i.e., drinking to avoid or alleviate negative emotional states, such as sadness or anxiety), as measured by the Drinking Motives Questionnaire-Revised (DMQ-R; Cooper), have been found to be concurrently associated with riskier alcohol use. Cooper determined that enhancement and coping motives were both positively related to typical frequency and quantity of alcohol consumption, heavy drinking, and alcohol problems. Only coping motives were posi-

1 However, others have argued that alcohol outcome expectancies are a more essential psychological determinant of drinking behavior (Goldman, Del Boca, & Darkes, 1999).
tively related to alcohol problems when usual levels of alcohol use were statistically controlled.

Furthermore, Cooper, Frone, Russell, and Mudar (1995) established that coping motives were more proximal determinants of alcohol consumption and related problems in adolescents and adults from the general community than the negative mood states thought to underlie coping drinking. Nonetheless, in a comparable investigation with college students, Read, Wood, Kahler, Madock, and Palfai (2003) found weaker evidence of the importance of coping motives. Global negative affect was concurrently related to coping motives, which were related to alcohol problems (but not to alcohol use). Prospectively though, coping motives did not predict alcohol problems when baseline alcohol use and problems were statistically controlled. Other studies investigating the associations among negative mood, coping motives, alcohol use, and/or alcohol problems have yielded varied results (Bradizza, Reifman, & Barnes, 1999; Kassel, Jackson, & Unrod, 2000; Park & Levenson, 2002; Perkins, 1999).

Decomposition of Coping Motives Into Anxiety- and Depression-Relevant Subtypes

Evidently, the relations among negative affect, coping motives, alcohol use, and alcohol problems are complex, especially in college students, as reflected in the mixed research findings described above. This complexity has prompted investigators to more closely examine the current notion of coping motives. The coping motives construct tapped by Cooper’s (1994) DMQ-R is generic, with depression- and anxiety-related items loading onto one subscale. However, some evidence suggests that depression and anxiety are associated with disparate patterns of alcohol use. For instance, a U.S. national survey of college students in 2002 showed that both alcohol use and heavy episodic drinking were more likely in those students with higher (vs. lower) levels of self-reported depression (The National Center on Addiction and Substance Abuse [CASA], as cited in CASA, 2003). Conversely, some evidence suggests a negative relationship between anxiety (especially social anxiety) and alcohol-consumption variables (e.g., mean number of binges per week) in college students (see review by Morris, Stewart, & Ham, 2005). Nevertheless, despite their different relations to alcohol use, both depression and anxiety are associated with alcohol use disorders in college students (Dawson, Grant, Stinson, & Chou, 2005).

Since depression and anxiety may each be linked to different patterns of alcohol use, separate measures of depression-related and anxiety-related coping motives for drinking have been developed. In an effort to capture the complexities of coping-motivated drinking, Blackwell and Conrod (2003; also see Blackwell, Conrod, & Hansen, 2002) modified and extended earlier versions of Cooper’s drinking motives measures (Cooper, 1994; Cooper, Rusell, Skinner, & Windle, 1992) to create the Modified DMQ-R, which distinguishes between drinking to cope with depression (coping-depression) and drinking to cope with anxiety (coping-anxiety). Using confirmatory factor analysis to examine the Modified DMQ-R scores of college students, Grant, Stewart, O’Connor, Blackwell, and Conrod (2007) found support for a correlated five-factor structure (with separate social, conformity, enhancement, coping-depression, and coping-anxiety factors). Moreover, the correlated five-factor structure fit the data better than a correlated four-factor structure theoretically equivalent to that proposed by Cooper (i.e., with all of the coping items constrained to one generic coping factor). In addition, Grant, Stewart, O’Connor, and colleagues (2007) found that coping-depression and coping-anxiety motives were related to different patterns of alcohol use and related problems. For instance, coping-depression motives, but not coping-anxiety motives, concurrently predicted greater general quantity of drinks consumed per occasion, over and above basic demographic effects and controlling for the effects of the other drinking motives. Over and above the effects of demographics and initial alcohol use, and controlling for the other drinking motives, only coping-depression motives prospectively predicted alcohol problems. Nevertheless, when alcohol use (drinks per week) at Time 2 was also accounted for, only coping-anxiety motives prospectively predicted alcohol problems.

Between- Versus Within-Person Effects

Grant, Stewart, O’Connor, and colleagues’ (2007) findings are important because they suggest that coping-depression and coping-anxiety motives are not redundant in their relationships to alcohol use and related problems, and that both are important in predicting risk for alcohol misuse. Nevertheless, the methodology used by Grant, Stewart, O’Connor, et al. and the other studies reviewed thus far is somewhat limited in that it only allows for clarification of between-person research questions. For example, a between-person research question is: do people with higher (vs. lower) coping-depression motives consume more drinks per week, on average? (Grant, Stewart, O’Connor, et al.). However, as pointed out by Mohr et al. (2005), the predictions made by theoretical models of drinking motives are inherently process-oriented. For instance, it is expected that individuals who report that they are motivated to drink to cope with depression would increase their alcohol consumption at those times when they feel depressed. Thus, to adequately test the key predictions of motivational models of alcohol use, within-person analyses, which assess the process aspect of drinking behavior, are required. In a daily process (e.g., daily diary or experience sampling) study, participants record information about daily occurrences (e.g., about daily moods and daily drinking behavior) close to the time that they actually happen. Accordingly, a major strength of the daily process design is that recall biases are minimized.

Drinking Motive Moderation of Within-Person Mood-Drinking Relations

Few investigations have examined the effects of coping drinking motives on within-person mood-alcohol consumption relationships. In their first study of community adults (moderate-to-heavy drinkers), in which structured paper-and-pencil nightly diaries were used, Todd, Armeli, Tennen, Carney, and Affleck (2003) found that same-day associations between nervous mood and drinking and between sad mood and drinking were not moderated by measures of generic coping motives. In their second study of moderate-to-heavy drinkers, Todd et al. (2003) had participants use hand-held electronic computers for diary entries, ensuring data collection in near-real time. In this second study, generic coping motives for drinking positively moderated the relationships between weekday nervous mood and subsequent weekend drinking
and between weekday sad mood and subsequent weekend drinking. In addition, generic coping motives positively moderated the relationship between evening nervous mood and concurrent evening alcohol consumption. In a sample of relatively frequent drinkers, Todd and colleagues (2005) found that generic coping motives positively moderated nervous mood-drinking associations, but not sad mood-drinking associations.

A small number of studies have focused on the moderating effects of coping motives for alcohol use on mood-drinking associations in college students. Park, Armieli, and Tennen (2004) found that generic coping drinking motives did not moderate within-person associations between global negative affect and drinking. However, Hussong, Galloway, and Feagans (2005) found that generic coping motives did moderate daily sadness-drinking relations, with individuals displaying relatively weak coping motives showing no linear relation between sadness and alcohol consumption and those with stronger coping motives unexpectedly drinking less on days with greater sadness. Generic coping motives did not moderate linear daily fear-drinking associations, but in quadratic models they did moderate the effects of daily fear on daily drinking in theoretically expected ways. Individuals with relatively high coping motives had an increased likelihood of drinking on days with moderate or high levels of fear (vs. days with low levels of fear), while those with weaker coping motives displayed essentially no relationship between fear and daily drinking. Mohr and colleagues (2005) found that generic coping motives positively moderated the relationship between daily generic negative mood and daily drinking at home.

An additional two studies have examined situational coping motives (i.e., elicited daily reports of the extent to which alcohol was used to cope). Flynn (2000) determined that mean daily depressed mood (over a 45-day reporting period) and mean daily situational alcohol coping (i.e., the extent to which alcohol was used to cope with the most stressful event of that day) were positively correlated in a sample of college students. Conversely, Galloway (2007) found that daily situational generic coping motives did not interact with daily generic negative affect in predicting daily alcohol consumption. Likewise, dispositional generic coping motives did not moderate daily generic negative affect-drinking associations and dispositional sadness-specific coping motives did not moderate daily sad affect-alcohol consumption relations. However, Galloway did find a significant interaction of daily sadness-related coping motives and daily sad mood, such that there was a positive relationship between sad mood and drinking when greater daily sadness-related coping motives were endorsed and a negative relationship between sad mood and alcohol consumption when daily sadness-related coping motives were weaker. This result, coupled with the finding that daily generic coping motives did not interact with daily generic negative affect, highlights the potential importance of decomposing generic negative affect and generic coping motives into specific subtypes when testing potential moderation of daily mood-alcohol consumption relationships by coping drinking motives.

**The Current Study**

Given the mixed findings described earlier, it appears that further research is necessary to clarify the possible moderating effects of alcohol use motives on daily mood-alcohol consumption relations. It is possible that accounting for the complexities inherent in coping motives and the negative affect theoretically posited to underlie coping motives (see Grant, Stewart, O’Connor, et al., 2007) might help to elucidate the associations among motives, daily moods, and daily drinking. The current investigation is an extension of the Mohr et al. (2005) daily process study that examined the moderation of within-person daily mood-alcohol use associations by drinking motives among college students. However, instead of using just one measure of daily global negative mood and the four-factor DMQ-R (Cooper, 1994) with a single generic coping motives subscale, we used separate measures of daily depressed and daily anxious affect along with the five-factor Modified DMQ-R (Grant, Stewart, O’Connor, et al.), which differentiates coping-depression from coping-anxiety motives. We were most interested in determining whether coping-depression and coping-anxiety motives moderated daily depressed mood-drinking and daily anxious mood-drinking associations, respectively; thus daily positive affect was excluded from the model tested in the current study. Each afternoon for 3 weeks, participants logged onto a secure Web site to rate their moods for that day and to report the number of alcoholic beverages they had consumed the previous evening. The data had a hierarchical structure, with 3 weeks of daily assessments of mood and alcohol consumption nested within each person.

The hypotheses were: (1) that students with stronger (vs. weaker) coping-depression (but not coping-anxiety) drinking motives would consume more alcohol in the evenings following days with higher depressed mood, and (2) that those with stronger (vs. weaker) coping-anxiety (but not coping-depression) motives would drink more in the evenings following days with greater anxious mood. The analyses were focused on coping motives for drinking, because of their demonstrated relationship to problematic outcomes (Cooper, 1994; Grant, Stewart, O’Connor, et al., 2007).

To rule out the possibility that any potential coping-motive moderation of anxious mood- or depressed mood-drinking slopes might be entirely attributable to differences in anxious or depressive symptomatology, we controlled for baseline symptoms of anxiety and depression in the analyses. The other (non-coping) drinking motives were also statistically controlled. Moreover, to ensure that any evidence of motive moderation of the mood-drinking slopes was not simply the result of relationships among motives and alcohol problems, we controlled for initial alcohol problems in the analyses. Sex was also controlled in the analyses, given the possibility that the relationships among mood and drinking for individuals with different drinking motives might vary as a function of sex (e.g., Birch, Stewart, Girling, & Berish, 2006).

**Method**

**Participants**

College students enrolled in psychology courses at Dalhousie University were recruited from mass screenings conducted in 2005 (from a paper-and-pencil screening battery administered in introductory psychology classes) and 2006–2007 (from online screening open to students taking undergraduate psychology courses at all levels), for a study described as “An Examination of Daily Health and Daily Activities” (see detailed description of Sample 3 in Grant, Stewart, O’Connor, et al., 2007, which is the same as the
current sample). To be eligible, students had to indicate that they had consumed alcohol at least 4 or 5 times in the 30 days prior to the screening (on the Lifestyles Questionnaire). One hundred and eighty-four undergraduates agreed to participate in the study, but 6 never actually commenced the study, resulting in 178 participants, of which 5 indicated that they wished to have their data be excluded from the analyses (an option given to all participants for ethical reasons pertaining to avoidance of coercion of students to participate in research). Remaining participants were excluded because their screening data indicated that they had consumed alcohol only 2 to 3 times in the 30 days prior to the screening (n = 1), because they did not complete all of the questionnaires in the initial assessment (n = 2), because they were much older than the majority of the undergraduate participants (n = 1), or because of a technical problem with the daily survey (n = 1), leaving 168 participants.

As the relevant daily alcohol consumption items pertained to drinking done in the previous evening, a lead variable for alcohol consumption was created so that daily mood could predict subsequent evening drinking. Thus, each missed survey resulted in loss of 2 reporting days and the upper limit of reporting days was reduced to 20 per participant. Only those reporting days for which there were both a daily mood report and a subsequent alcohol consumption report were retained. Thirteen (8%) of the remaining 168 remaining participants were excluded from the remaining analyses because they did not have any full daily entries. An additional 9 (6%) of the remaining 155 participants were eliminated from the rest of the analyses because they abstained from drinking during the entirety of the daily reporting component of the study, leaving a final sample of 146 participants (with 1,488 full daily entries).

An analysis of level-1 residuals (see Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2004) revealed 29 outlying daily entries (i.e., > [M + 3.29 SD]; Tabachnick & Fidell, 2001) for 28 separate participants. The outlying daily entries were removed, leaving 1,459 daily reports (i.e., 50% of a possible 20 × 146 = 2,920), corresponding to a mean number of reporting days of 9.99 per participant (SD = 4.72). The participants included in the final sample were predominantly female (n = 113; 77%), Caucasian (n = 137; 94%), and in the first (n = 82; 56%) or second (n = 35; 24%) year of undergraduate studies.

Materials

Screening

Lifestyles Questionnaire. This author-compiled measure assesses an array of lifestyle behaviors performed in the past 30 days. It was administered during the mass screenings and again in the initial assessment battery, but for the purposes of the current study, just one item administered at screening was analyzed. Specifically, one alcohol-related item that asked about the frequency of alcohol consumption in the past 30 days was used to determine eligibility for the current study (i.e., participants had to have consumed alcohol at least 4 or 5 times in the 30 days before the screening).

Scale anchors were 0 (Not Applicable [Only if you did NOT drink alcohol in the past 30 days]) and 4 (6 or more times). Of the final sample of participants included in the current study, 75 individuals (51%) reported having consumed alcohol 4 or 5 times in the 30 days prior to the screening, and the rest (n = 71; 49%) reported having consumed alcohol 6 or more times in the 30 days before the screening.

Initial Assessment Battery

A variety of measures were administered to the current sample, but only those pertinent to the present study will be described herein. The initial assessment battery took about 25 minutes to complete (including the measures not described below).

Demographics Questionnaire. In order to minimize the salience of the alcohol-related questions (Babor, Brown, & Del Boca, 1990), this 29-item questionnaire presented open-ended items about usual alcohol consumption (quantity and frequency) amongst items about other behaviors (e.g., exercise, caffeine intake, and cigarette smoking) and typical demographics items. Participants reported their usual number of drinking occasions per week (or per month, if less often than weekly; or per year, if less often than monthly). In addition, participants indicated their typical number of alcoholic beverages (one alcoholic beverage = one bottle of beer, one cooler, one small [4-ounce] glass of wine, or one shot/mixed drink containing an ounce of hard liquor) per occasion. At the outset of the study, participants reported that, on average, they drank 1.61 times per week (SD = 1.00) and had a mean of 6.03 alcoholic beverages per occasion (SD = 2.84).

Modified Drinking Motives Questionnaire-Revised. The 28-item Modified DMQ-R (Blackwell & Conrod, 2003; Grant, Stewart, O’Connor, et al., 2007) is a modified version of Cooper’s (1994; Cooper et al., 1992) earlier drinking motives measures which differentiates between drinking alcohol to cope with depressed feelings (coping-depression) and drinking to cope with anxious emotions (coping-anxiety). It has items representing five motives for drinking: 5 social items (alphas presented are for final sample in current study; α = .68), 5 conformity items (α = .90), 5 enhancement items (α = .82), 9 coping-depression items (α = .94), and 4 coping-anxiety items (α = .68). Participants indicated how often they are motivated to drink for the reason provided in each item on a 5-point Likert scale ranging from 1 (almost never/never) to 5 (almost always/always). Each subscale is scored as the mean of its component items. See Grant, Stewart, O’Connor, et al. for evidence of the good to excellent psychometric properties of this measure. See Table 1 for means and SDs of the Modified DMQ-R subscales.

2 One participant who did not complete the entire initial questionnaire battery was inadvertently excluded from the sample description in Grant, Stewart, O’Connor, et al. (2007), but is included in the current sample description.

3 Because of a technical problem, some participants were able to access the daily survey more than once per day. If a participant provided multiple daily reports on the same day, all of that participant’s entries for that day were deleted, because it is impossible to determine which report was intended for that actual day. In total, only 131 daily mood surveys for 57 unique reporting days (i.e., just 2% of 2,289 unique reporting days) for 31 participants were deleted, leaving 2,232 unique mood reporting days. Similarly, 96 daily alcohol surveys for 40 unique reporting days (i.e., 2% of 2,277 unique reporting days) for 16 participants were deleted, leaving 2,237 unique daily alcohol reports. One participant had only duplicate entries and was thus excluded from the remainder of the analyses.
Table 1

Descriptive Statistics and Bivariate Correlations

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sex a</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>2. Social</td>
<td>3.04</td>
<td>0.78</td>
<td>−1.1</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>3. Conformity</td>
<td>1.42</td>
<td>0.72</td>
<td>−0.6</td>
<td>0.30*</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>4. Enhancement</td>
<td>2.99</td>
<td>0.98</td>
<td>−0.2</td>
<td>0.55*</td>
<td>0.15</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>5. Coping-depression</td>
<td>1.49</td>
<td>0.77</td>
<td>−1.2</td>
<td>0.07</td>
<td>0.61*</td>
<td>0.10</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6. Coping-anxiety</td>
<td>1.94</td>
<td>0.74</td>
<td>−2.4*</td>
<td>0.19</td>
<td>0.46*</td>
<td>0.30*</td>
<td>0.66*</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>7. Anhedonic depression</td>
<td>5.03</td>
<td>13.38</td>
<td>0.07</td>
<td>0.21</td>
<td>0.47*</td>
<td>0.34*</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>8. Anxious arousal</td>
<td>27.64</td>
<td>9.03</td>
<td>0.1</td>
<td>0.15</td>
<td>—</td>
<td>0.22*</td>
<td>0.25*</td>
<td>0.27*</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>9. Alcohol problems b</td>
<td>16.25</td>
<td>14.29</td>
<td>−0.01</td>
<td>0.23*</td>
<td>0.28*</td>
<td>0.35*</td>
<td>0.37*</td>
<td>0.44*</td>
<td>0.20*</td>
<td>0.36*</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>10. Depressed mood d</td>
<td>0.55</td>
<td>0.60</td>
<td>0.03</td>
<td>0.34*</td>
<td>0.41*</td>
<td>0.32*</td>
<td>0.45*</td>
<td>0.39*</td>
<td>0.25*</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>11. Anxious mood d</td>
<td>0.88</td>
<td>0.76</td>
<td>0.07</td>
<td>−0.02</td>
<td>0.28*</td>
<td>−0.01</td>
<td>0.27*</td>
<td>0.28*</td>
<td>0.26*</td>
<td>0.38*</td>
<td>0.18*</td>
<td>0.65*</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>12. Drinks d</td>
<td>0.86</td>
<td>0.93</td>
<td>−1.17</td>
<td>0.12</td>
<td>−0.02</td>
<td>0.27*</td>
<td>0.09</td>
<td>0.17</td>
<td>0.00</td>
<td>0.23</td>
<td>0.32*</td>
<td>−0.07</td>
<td>−0.03</td>
<td>—</td>
</tr>
</tbody>
</table>

Note. N = 146.

* Sex was coded so that women = +1 and men = −1.  b Alcohol problems = initial Rutgers Alcohol Problem Index total scores.  c Person-level means were used in the analyses.  d Mean score of each participant’s mean daily sum of alcoholic beverages consumed at home and those consumed away from home, capped at 6 drinks.

p < .05.  ** p < .01.  *** p < .001.

Rutgers Alcohol Problem Index (RAPI). The RAPI (White & Labouvie, 1989) has 23 items that measure alcohol-related problems among adolescents and young adults. On a scale of 0 (never) to 4 (more than 10 times), respondents indicated how frequently they had experienced each consequence of alcohol use in the past 3 years. As indicated in Table 1, the mean RAPI total (summed) score was 16.25, which is above the score of 15 that indicates significant alcohol problems (Thombs & Beck, 1994). In the current study, Cronbach’s α for this subscale was .93. RAPI scores will be referred to as “alcohol problems” throughout the Results and Discussion sections.

Mood and Anxiety Symptom Questionnaire (MASQ). The MASQ (Watson & Clark, 1991; Watson, Clark, et al., 1995) consists of 90 items that were derived from anxiety and mood disorder symptom criteria. As part of the initial assessment, participants were asked to indicate the extent to which they had experienced each symptom in the past week, including the day that they completed the MASQ, on a scale from 1 (not at all) to 5 (extremely). For the current study, two subscales were analyzed (see Watson, Weber, et al., 1995): anxious arousal (sum of 17 items; current study α = .86), which includes anxiety-specific symptoms of body tension and physical hyperarousal, and anhedonic depression* (sum of 21 items; current study α = .91), which is comprised of depression-specific items reflecting anhedonia and loss of interest, as well as reverse-scored items reflecting positive affect (see Table 1 for descriptive statistics).

Daily Questionnaire Battery

Daily affect. Participants were instructed to indicate the degree to which each of 13 words described their mood “today.” To conform to the procedure of Mohr et al. (2005), participants selected (clicked) a response for each item from a 5-point scale ranging from 0 (not at all) to 4 (extremely). We used the same items from the self-report mood scales used in prior research (Grant & Stewart, 2007; Grant, Stewart, & Birch, 2007) to measure depressed (sad, depressed, and blue) and anxious affect (nervous, anxious, and tense, from Shacham [1983]). The remaining 7 items measured angry and positive affect, but were not employed in the current analyses. Mood subscale scores were means of component items. Internal consistencies for the mood subscales were computed for 3 days representing the beginning (day 2; n = 63), middle (day 9; n = 62), and end (day 16; n = 78) of the daily reporting component of the study, which resulted, respectively, in α = .92, .87, and .86 for depressed mood and α = .88, .87, and .89 for anxious mood.

Daily alcohol use. Each day, participants were asked to report the number of alcoholic beverages they had consumed the previous evening (i.e., subsequent to completing the previous survey or after 6:00 p.m. on the eve of the first day they completed the daily reporting; see Mohr et al., 2005) at home and away from home. Consistent with the Mohr et al. investigation, participants in the current study indicated on a scale from 0 to 13 (with 13 indicating greater than 12 drinks) the number of drinks they consumed at home, capped at 6 drinks.

Because this questionnaire was completed by participants on a secure Web site in the current study, we did not have the ability to immediately respond appropriately to a participant who threatened to harm themselves. Therefore, for ethical reasons, we removed the one MASQ item on the anhedonic depression scale that pertains to suicidal ideation.
the daily alcohol use items were embedded amongst several additional questions pertaining to caffeine use, cigarette smoking, Internet usage, exercise, studying, and social interactions. A daily events checklist was also administered, but not included in the current analyses. The entire daily questionnaire battery took approximately 5 minutes to complete. No studies have explicitly tested the validity of daily Internet self-reports of alcohol consumption and mood states. However, daily self-reports of drinking using interactive voice response technology have been validated against objective measures of alcohol consumption (i.e., blood alcohol concentrations measured from breath samples; Perrine, Mundt, Searles, & Lester, 1995). Furthermore, Knapp and Kirk (2003) found that mode of questionnaire administration (pencil-and-paper, touch-tone telephone, or Internet, as in the current study) did not affect participants’ responses to a survey covering a broad range of topics (e.g., sexual behavior, alcohol use, and suicidal ideation) when anonymity was guaranteed.

Procedure

Eligible screened students who had indicated preliminary interest in participating in “An Examination of Daily Health and Daily Activities” were sent an e-mail providing them with access to a secure, password-protected Web site. At the outset of the study, participants were presented with an online informed consent form and were given the option to not participate, to participate as a research “observer” only (i.e., data were not to be used in the analyses), or to participate as a typical research participant (i.e., data were to be used in the analyses).

After students provided consent and commenced the questionnaire, they were given a maximum of 1 week to complete the initial assessment battery. Subsequently, participants had approximately 2 weeks in which to complete their first daily online interview. To help ensure consistent reporting, automatic reminder e-mails (containing a link to the secure study Web site) were sent to participants each morning for the 21 consecutive days of the study.\(^5\) The online questionnaires were only available between 3:30 p.m. and 7:00 p.m., consistent with Mohr and colleagues (2005). Missed daily surveys could not be completed at later date (if they were, they were not included in the data analyses). Participants were debriefed in person and were awarded credit (if they were, they were not included in the data analyses). See Table 1 for descriptive statistics for the daily drinks variable averaged across all reporting days (i.e., not just across drinking days). Daily reporting was generally consistent across days of the week, ranging from 11% (n = 161) of reporting occurring on Fridays to 16% (n = 235) of reporting occurring on Wednesdays. Drinking levels varied by day of the week, with the highest alcohol consumption occurring on Friday nights (M = 2.27 drinks, SD = 2.57) and the lowest consumption occurring on Monday nights (M = 0.09 drinks, SD = 0.52).

Table 1 displays descriptive statistics and zero-order correlations among the variables included in the multilevel regression analyses. It should be noted that the daily mood and daily drinks variables presented in this table are aggregated (i.e., they are derived from person-level summary scores) and do not, therefore, address the within-person associations of interest. All of the drinking motives intercorrelations were positive and significant, except the social—coping-depression, enhancement—coping-depression, and enhancement—conformity correlations. The highest correlation was between coping-anxiety and coping-depression, but these subshapes fell well short of multicollinearity (i.e., r ≥ .90; Tabachnick & Fidell, 2001). In general, men and women endorsed similar levels of each type of drinking motive, with the exception of coping-anxiety, which was more heavily endorsed by men (M = 2.27, SD = 0.83) than by women (M = 1.85, SD = 0.69), r(144) = 2.94, p = .004. Each of the drinking motives, as well as the initial measures of depressive symptomatology and anxious symptomatology, were significantly positively correlated with initial alcohol problems. Despite their respective significant correlations with baseline alcohol problems, social motives, conformity motives, coping-depression motives, and baseline depressive symptomatology were not related to mean drinks per day consumed during the daily reporting portion of the study. However, the other drinking motives (enhancement and coping-anxiety) and baseline anxious symptomatology were positively correlated with drinking during the daily reporting study component.

Mean daily depressed mood was positively correlated with both types of coping motives, but more strongly so to coping-depression than to coping-anxiety motives, and was also positively correlated with conformity motives and baseline depressive and anxious symptomatology, as well as with mean daily anxious mood. Furthermore, though mean daily depressed mood was unrelated to mean drinking during the study, it was positively related to baseline alcohol problems. Mean daily anxious mood was positively correlated to coping-anxiety motives, coping-depression motives, conformity motives, baseline depressive and (more so) to anxious symptomatology, as well as to baseline alcohol problems, but not to mean daily drinking.

---

5 Because of some technical problems, several participants were not sent daily reminder e-mails for a couple of days.

6 Because of a technical problem, some participants were able to access the daily survey more than once per day. If a participant provided multiple daily reports on the same day, all of that participant’s entries for that day were deleted, because it is impossible to determine which report was intended for that actual day. In total, only 131 daily mood surveys for 57 unique reporting days (i.e., just 2% of 2,289 unique reporting days) for 31 participants were deleted, leaving 2,232 unique mood reporting days. Similarly, 96 daily alcohol surveys for 40 unique reporting days (i.e., 2% of 2,277 unique reporting days) for 16 participants were deleted, leaving 2,237 unique daily alcohol reports. One participant had only duplicate entries and was thus excluded from the remainder of the analyses.
Multilevel Analyses Testing the Central Hypotheses

Data Analytic Plan for Multilevel Modeling

To test the multilevel (hierarchical) hypotheses, we used HLM software (Version 6.06; Raudenbush, Bryk, & Congdon, 2005). This program permits estimation of within-person (daily, level-1) and between-person (level-2) effects in diary data with missing level-1 observations. Each individual’s (level-2) final regression coefficient estimates are weighted to account for their number of level-1 observations; thus individuals with fewer (vs. more) level-1 entries have less influence on the ultimate results (Raudenbush & Bryk, 2002). Given that the level-1 outcome variable (daily alcoholic drinks consumed) was a count with many zeros in the distribution, a Poisson sampling model (with constant exposure) with a log-link function was employed in the analyses (Mohr et al., 2005). The population-average model with robust standard errors was interpreted and an over-dispersion parameter was included. First, in the level-1 analyses, we tested the within-person main effects of daily mood on subsequent evening alcohol consumption, without considering possible moderation of these associations by individual difference variables (e.g., drinking motives, sex). Next, in the level-2 analyses, we tested our central hypotheses by examining whether drinking motives moderated the within-person main effects of daily mood on subsequent evening drinking.

Level-1 Analyses: Mood-Drinking Associations

As displayed in Equation 1, nightly alcohol consumption each day (capped at 6 drinks) was modeled as a function of depressed and anxious mood ratings provided earlier in the day:

\[
\text{Drinks}_i = b_0 + b_1(\text{depressed mood}_i) + b_2(\text{anxious mood}_i) + \epsilon_i
\]  

(1)

Although not demonstrated in Equation 1, the level-1 model controlled for possible day-of-week effects using six day-of-week dummy variables for Tuesday through Sunday, inclusive, which were modeled as fixed effects (as in Mohr et al., 2005). Each of the level-1 predictors was person-centered (e.g., an individual’s mean daily depressed mood was subtracted from each of his/her daily depressed mood subscale scores), with the exception of the day-of-week variables. Accordingly, the level-1 intercept, \(b_0\), can be interpreted as the predicted number of drinks at day \(t\) for individual \(i\) at mean levels of the individual’s predictor variables. The level-1 slopes, \(b_{1i}\) and \(b_{2i}\), are the partial within-person regression coefficients, or the respective expected changes in daily drinks associated with a unit increase in daily depressed and anxious moods, controlling for the other mood and for the day-of-week effects, for person \(i\). The overdispersion parameter is represented by \(\epsilon_i\).

Consistent with Mohr et al. (2005), the random components of the level-1 slopes (but not of the level-1 intercept) were set to 0. Without considering the impact of the level-2 individual difference predictors, on average, the depressed mood-drinking partial slope was not significantly different from 0, \(b_{1i} = -0.11, SE = 0.09, p = .24\). The average anxious mood-drinking partial slope was negative and significant, \(b_{2i} = -0.16, SE = 0.08, p = .04\). So, in general, across the entire sample, daily depressed mood did not trigger subsequent evening alcohol consumption and daily anxious mood was protective against subsequent evening drinking. In multilevel models using the Poisson sampling model with a log-link function, exponentiation of partial slope coefficients yields odds ratios and thus can aid in the interpretation of the findings by offering an effect size index (see Mohr et al., 2005). The exponentiated anxious mood-drinking partial slope, \(\exp(b_{2i} = -0.16) = 0.85\), indicates that for each unit increase in daily anxious mood (controlling for the other level-1 predictors), subsequent evening drinking decreased by 15%. As expected, each of the day-of-week fixed effects was positive and significant (indicating higher alcohol consumption relative to Monday): for Tuesday, \(b_{2i} = 1.16, SE = 0.38, p = .003\); for Wednesday, \(b_{2i} = 1.77, SE = 0.41, p < .001\); for Thursday, \(b_{2i} = 2.36, SE = 0.42, p < .001\); for Friday, \(b_{2i} = 3.25, SE = 0.41, p < .001\); for Saturday, \(b_{2i} = 3.12, SE = 0.41, p < .001\); and for Sunday, \(b_{2i} = 1.31, SE = 0.38, p = .001\).

Level-2 Analyses: Drinking Motive Moderation of Mood-Drinking Associations

The central hypotheses are concerned with testing individual differences in (specifically, drinking motive moderation of) daily mood-drinking relations. Statistically, individual differences in daily mood-drinking relations are expressed as cross-level interactions (e.g., level-2 coping-depression motives by level-1 depressed mood). To determine the effects of the between-person (level-2) variables on the within-person (level-1) mood-drinking relations, the level-1 regression coefficients were each regressed on all of the level-2 predictors (including sex, drinking motives, initial depression and anxiety symptoms, and initial alcohol problems). The intercept model (i.e., average daily alcohol consumption, \(b_{0i}\), at person-centered levels of daily depressed and anxious moods, controlling for the day-of-week effects, predicted by sex, motives, depression and anxiety symptoms, and alcohol problems) is displayed in Equation 2 (see results in Table 2). Equations 3 and 4, which test the key hypotheses concerning drinking motive moderation of daily mood-drinking associations, show the level-2 regression models predicting the within-person, level-1 mood-drinking partial slopes for depressed (\(b_{1i}\)) and anxious (\(b_{2i}\)) moods, respectively.

\[
b_{0i} = \gamma_{00} + \gamma_{01}(\text{sex}) + \gamma_{02}(\text{social}) + \gamma_{03}(\text{conformity}) + \gamma_{04}(\text{enhancement}) + \gamma_{05}(\text{coping-depression}) + \gamma_{06}(\text{coping-anxiety}) + \gamma_{07}(\text{anhedonic depression}) + \gamma_{08}(\text{anxious arousal}) + \gamma_{09}(\text{alcohol problems}) + \epsilon_{0i}
\]

(2)

\[
b_{1i} = \gamma_{10} + \gamma_{11}(\text{sex}) + \gamma_{12}(\text{social}) + \gamma_{13}(\text{conformity}) + \gamma_{14}(\text{enhancement}) + \gamma_{15}(\text{coping-depression}) + \gamma_{16}(\text{coping-anxiety}) + \gamma_{17}(\text{anhedonic depression}) + \gamma_{18}(\text{anxious arousal}) + \gamma_{19}(\text{alcohol problems})
\]

(3)

\[
b_{2i} = \gamma_{20} + \gamma_{21}(\text{sex}) + \gamma_{22}(\text{social}) + \gamma_{23}(\text{conformity}) + \gamma_{24}(\text{enhancement}) + \gamma_{25}(\text{coping-depression}) + \gamma_{26}(\text{coping-anxiety}) + \gamma_{27}(\text{anhedonic depression}) + \gamma_{28}(\text{anxious arousal}) + \gamma_{29}(\text{alcohol problems})
\]

(4)
All of the level-2 predictors (with the exception of contrast-coded sex) were grand-mean centered, so $\gamma_{10}$ and $\gamma_{12}$ are interpreted as the average within-person partial regression coefficients for the daily mood-alcohol consumption slopes (for depressed and anxious mood, respectively) across the participants. The sex coefficient, $\gamma_{11}$, for instance, is interpreted as the difference between women (coded as +1) and men (coded as −1) in the depressed mood-alcohol consumption partial correlation, controlling for the other level-2 predictors (i.e., drinking motives, etc.). The social coefficient, $\gamma_{12}$, for example, is interpreted as the partial relationship between social motives and the daily depressed mood-drinking partial slopes, or the cross-level interaction between level-2 social motives and level-1 depressed mood.

**Level-2 depressed mood-drinking slope model.** As predicted, coping-depression motives positively moderated the partial association between daily depressed mood and daily alcohol consumption (controlling for the levels of the other level-2 predictors; see Table 2). We conducted follow-up simple slope tests for the average level-1 mood-drinking associations, which involved inspecting the level-2 intercepts (i.e., average) of the level-1 slopes when the relevant level-2 predictor (coping-depression in this case) was recentered so that 0 represented the level or group of interest (Aiken & West, 1991). Using this procedure, we found that when coping-depression motives were re-centered so that 0 represented relatively strong coping-depression motives, operationally defined as 1 SD above the mean, the average level-1 depressed mood-alcohol consumption partial slope was not statistically different from 0, $\gamma_{10} = 0.02$, $SE = 0.12$, $p = .88$, $exp(0.02) = 1.02$. Conversely, when weaker coping-depression motives, defined as 1 SD below the mean on coping-depression, were entered in the model, the average level-1 depressed mood-drinking partial slope was significantly negative, $\gamma_{10} = -0.49$, $SE = 0.21$, $p = .02$, $exp(-0.49) = 0.62$. Specifically, for each unit increase in depressed mood, controlling for the levels of the other level-2 predictors, for day-of-week effects and for the level of daily anxious mood, subsequent alcohol consumption decreased by 38% among those with relatively weak coping-depression motives. See Figure 1 for a graphical representation of the Coping-depression × Depressed mood cross-level interaction.

Surprisingly, social motives also positively moderated the partial association between daily depressed mood and drinking (see Table 2). When relatively strong social motives ($M + 1SD$) were entered in the model, the average level-1 depressed mood-drinking partial slope was not statistically different from 0, $\gamma_{10} = 0.05$, $SE = 0.19$, $p = .78$, $exp(0.05) = 1.05$. However, when relatively weak social motives ($M - 1SD$) were entered in the model, the average level-1 depressed mood-drinking partial slope was significantly negative, $\gamma_{10} = -0.52$, $SE = 0.18$, $p = .004$, $exp(-0.52) = 0.60$. So, for each unit increase in depressed mood, controlling for the levels of the other level-2 predictors, for day-of-week effects and for the level of daily anxious mood, conse-

---

**Table 2**  
*Prediction of Daily Mood-Alcohol Use Intercept and Slopes by Sex, Drinking Motives, Initial Symptoms of Depression and Anxiety, and Alcohol-Related Problems*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Intercept model (average daily drinking)</th>
<th>Daily mood-alcohol consumption slope models</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>SE</td>
<td>$p$</td>
<td>Coefficient</td>
</tr>
<tr>
<td>Intercept</td>
<td>$-2.40$</td>
<td>0.42</td>
<td>&lt;.001</td>
<td>$-0.23$</td>
</tr>
<tr>
<td>Sex$^a$</td>
<td>$-0.22$</td>
<td>0.07</td>
<td>.003</td>
<td>0.04</td>
</tr>
<tr>
<td>Social</td>
<td>0.14</td>
<td>0.10</td>
<td>.18</td>
<td>0.37</td>
</tr>
<tr>
<td>Conformity</td>
<td>$-0.35$</td>
<td>0.17</td>
<td>.04</td>
<td>$-0.38$</td>
</tr>
<tr>
<td>Enhancement</td>
<td>0.07</td>
<td>0.09</td>
<td>.41</td>
<td>$-0.30$</td>
</tr>
<tr>
<td>Coping-depression</td>
<td>0.20</td>
<td>0.10</td>
<td>.05</td>
<td>0.33</td>
</tr>
<tr>
<td>Coping-anxiety</td>
<td>0.08</td>
<td>0.13</td>
<td>.55</td>
<td>0.20</td>
</tr>
<tr>
<td>Anhedonic depression</td>
<td>0.00</td>
<td>0.01</td>
<td>.62</td>
<td>-0.01</td>
</tr>
<tr>
<td>Anxious arousal</td>
<td>0.02</td>
<td>0.01</td>
<td>.10</td>
<td>0.01</td>
</tr>
<tr>
<td>Alcohol problems$^b$</td>
<td>0.01</td>
<td>0.00</td>
<td>.12</td>
<td>-0.01</td>
</tr>
</tbody>
</table>

Note. $N = 146$. Outcome variable is daily sum of alcoholic beverages consumed at home and those consumed away from home, capped at 6 drinks. These analyses controlled for day-of-week effects. The population-average model with robust standard errors is reported. Significant partial regression coefficients (at $p < .05$) are bolded. Coefficients are unstandardized and thus cannot be directly compared with one another.  
$^a$ Sex was coded so that women = +1 and men = −1.  
$^b$ Alcohol problems = initial Rutgers Alcohol Problem Index total scores.

---

**Figure 1.** The cross-level interaction of coping-depression and daily depressed mood on daily alcohol consumption.
quent drinking decreased by 40% among those with relatively weak social motives.

In addition, as seen in Table 2, conformity and enhancement motives both negatively moderated the partial association between daily depressed mood and alcohol consumption. At relatively high levels of conformity and enhancement motives ($M + 1 SD$), the average level-1 depressed mood-drinking partial slopes were significantly negative (for conformity, $\gamma_{10} = -0.51, SE = 0.17, p = .003$, exp$[-0.51] = 0.60$, and for enhancement, $\gamma_{10} = -0.53, SE = 0.18, p = .004$, exp$[-0.53] = 0.59$). However, at relatively low levels of conformity and enhancement motives ($M - 1 SD$), the average level-1 depressed mood-drinking partial slopes were flat (for conformity, $\gamma_{10} = 0.04, SE = 0.15, p = .79$, exp$[0.04] = 1.04$, and for enhancement, $\gamma_{10} = 0.07, SE = 0.17, p = .70$, exp$[0.07] = 1.07$).

Level-2 anxious mood-drinking slope model. As anticipated, coping-anxiety motives positively moderated the association between daily anxious mood and daily alcohol consumption (see Table 2). A simple slope test revealed that when relatively strong coping-anxiety motives ($M + 1 SD$) were used in the model, the average anxious mood-drinking partial slope was not significantly different from 0, $\gamma_{20} = -0.02, SE = 0.10, p = .83$, exp$(-0.02) = 0.98$. When the coping-anxiety variable was re-centered to represent relatively weak coping-anxiety motives ($M - 1 SD$), the average level-1 anxious mood-alcohol consumption partial slope was significantly negative $\gamma_{20} = -0.36, SE = 0.13, p = .006$, exp$(-0.36) = 0.70$. See Figure 2 for a graphical representation of the Coping-anxiety $\times$ Anxious mood cross-level interaction.

As shown in Table 2, conformity motives also positively moderated the daily anxious mood-drinking relationship. Using stronger conformity motives ($M + 1 SD$) in the model, the average anxious mood-drinking partial slope was not significantly different from 0, $\gamma_{20} = 0.14, SE = 0.11, p = .20$, exp$(0.14) = 1.15$. When weaker conformity motives ($M - 1 SD$) were entered in the model, the average anxious mood-drinking partial slope was significantly negative, $\gamma_{20} = -0.52, SE = 0.12, p < .001$, exp$(-0.52) = 0.60$.

Finally, social motives negatively moderated the daily anxious mood-alcohol consumption relationship (see Table 2). Simple slope tests revealed that at the level of relatively strong social motives ($M + 1 SD$), the average anxious mood-drinking partial slope was significantly negative, $\gamma_{20} = -0.43, SE = 0.13, p = .001$, exp$(-0.43) = 0.65$, whereas at the level of weaker social motives ($M - 1 SD$), the average anxious mood-drinking partial slope was flat, $\gamma_{20} = 0.05, SE = 0.10, p = .64$, exp$(0.05) = 1.05$.

Discussion

Motivational models of alcohol use (e.g., Cooper, 1994) predict that individuals who endorse high (vs. low) levels of coping motives would have more positive associations between negative emotion and alcohol consumption. However, the results of process-oriented studies testing this prediction in college students have been fairly mixed (e.g., Mohr et al., 2005; Park et al., 2004). It is possible that the findings to date have been equivocal because researchers have not accounted for the complexities inherent in the coping motives construct (i.e., they have typically used generic coping motives measures). The current study extends prior research by examining the impact of two specific subtypes of coping motives, coping-depression and coping-anxiety, on daily mood-drinking relations.

Drinking Motive Moderation of Within-Person Mood-Drinking Relations

There was support for both of the hypotheses of this investigation, which were related to coping drinking motive moderation of daily mood-drinking relationships. As predicted, we found that coping-depression alcohol use motives positively moderated the daily depressed mood-alcohol consumption association. Weaker coping-depression motives (controlling for sex differences, the levels of the other drinking motives, baseline depressive and anxious symptomatology, and baseline alcohol problems) were associated with a negative average daily depressed mood-drinking partial slope, whereas stronger coping-depression motives were associated with a flat average depressed mood-alcohol consumption partial slope. In addition, as hypothesized, coping-anxiety motives positively moderated the daily anxious mood-alcohol consumption association. Relatively weak coping-anxiety motives (controlling for sex differences, the levels of the other drinking motives, baseline depressive and anxious symptomatology, and

---

7 We re-estimated the multilevel models with the purpose of trimming effects that did not achieve marginal significance ($p < .10$) in either the intercept model or in the slope models (i.e., anxious arousal). The pattern of significant results was largely the same as in the original models, with two exceptions; alcohol problems became a significant positive predictor in the intercept model, $\gamma_{00} = 0.01, SE = 0.00, p = .02$, and the Coping-depression $\times$ Depressed mood cross-level interaction no longer reached significance, $\gamma_{13} = 0.29, SE = 0.18, p = .10$. Nevertheless, the form of the Coping-depression $\times$ Depressed mood cross-level interaction was highly similar to that in the original analysis, with a basically flat slope at the level of high coping-depression motives, $\gamma_{10} = 0.01, SE = 0.13, p = .97$, exp$(0.01) = 1.01$, and a (marginally) significant negative slope at the level of low coping-depression motives, $\gamma_{10} = -0.44, SE = 0.23, p = .05$, exp$(-0.44) = 0.64$. Thus, following Snijders and Bosker (1999), we retained the original analysis, because even nonsignificant covariates can have a modest influence on parameter estimates and should be included if theory dictates.
baseline alcohol problems) were associated with a negative average daily anxious mood-alcohol consumption partial slope. Conversely, stronger coping-anxiety motives were associated with an effectively flat daily anxious mood-drinking partial slope. The current investigation is the first to demonstrate that two specific subtypes of coping motives for drinking moderate the relationships between corresponding specific subtypes of daily negative affect and alcohol consumption. That is, coping-depression, but not coping-anxiety, motives positively moderated the daily depressed mood-drinking relationship and coping-anxiety, but not coping-depression, motives positively moderated the daily anxious mood-drinking association.

The present coping motives findings are consistent with certain aspects of findings from prior daily process investigations. For instance, the current results are congruent with the Mohr et al. (2005) finding that generic coping motives moderated the negative affect-alcohol consumption (at home) relation in college students. Other researchers (e.g., Hussong et al., 2005; Park et al., 2004; Todd et al., 2003, 2005) might have found more reliable evidence of the expected coping motive moderation of negative affect-drinking relations had they examined specific types of negative affect (i.e., depressed and anxious mood, respectively) and corresponding specific coping motives subtypes (i.e., coping-depression and coping-anxiety, respectively).

Galloway (2007) was the only prior investigator to attempt to match a specific subtype of coping motives (sadness-specific) to a specific type of negative affect (sadness) in a study of drinking motive moderation of daily mood-drinking relations. His finding that daily sadness-specific coping motives positively moderated daily sad mood-alcohol consumption slopes is consistent with the current results. However, his finding that dispositional sadness-specific coping motives did not moderate daily sadness-drinking relations is at odds with the present findings. Perhaps the discrepancy between the current results and Galloway’s findings is because of a difference in psychometric characteristics. The current coping-depression motives subscale has been psychometrically validated (see Grant, Stewart, O’Connor, et al., 2007), whereas Galloway’s measure of dispositional sadness-specific coping motives has not undergone rigorous psychometric evaluation. The above explanation is speculative of course, as the absence of a comprehensive psychometric evaluation of Galloway’s dispositional sadness-specific coping motives measures precludes a comparison of its psychometric properties with those of the current coping-depression scale. The psychometric properties of Galloway’s measure of daily sadness-specific coping motives have not been tested either, and are not necessarily better than those of his measure of dispositional sadness-specific coping motives. However, tests of daily (vs. dispositional) motive moderation of affect-drinking relations may be relatively less stringent because daily motives are measured concurrently with daily alcohol use, whereas tests of dispositional motive moderation of affect-drinking associations are prospective.

In addition to the effects discussed earlier, there were several unhepthesized moderation effects. First, conformity motives positively moderated the daily anxious mood-drinking association. This finding is perhaps not surprising in light of some evidence that measures of social anxiety are positively correlated with conformity motives for drinking in undergraduates (Stewart, Morris, Mellings, & Komar, 2006). On the other hand, conformity motives negatively moderated the daily depressed mood-drinking association. Taken with Mohr and colleagues’ (2005) finding that conformity motives negatively moderated the global negative mood-drinking at home association, the current findings (that conformity motives positively moderated the anxious mood-drinking association and negatively moderated the depressed mood-drinking relation) highlight our earlier conclusion that it is crucial to differentiate between subtypes of negative affect in examining daily mood-drinking relationships.

Unexpectedly, social motives positively moderated the daily depressed mood-drinking relation. Thus, it seems that depressed mood is more likely to precede drinking among individuals endorsing high levels of social motives than among those endorsing low levels of social motives. It is possible that information about drinking context (i.e., solitary vs. with others; see Cooper et al., 1992) might help us to understand why social motives and coping-depression motives showed surprisingly similar cross-level interactions with daily depressed mood in the prediction of daily drinking. Perhaps among those with higher (vs. lower) social motives, depressed mood is more likely to trigger drinking in social contexts, with the aim of allowing for enjoyment of good times with friends. On the other hand, the depressed mood-triggered drinking that is more likely among those with higher (vs. lower) coping-depression motives might be more likely to occur in solitary contexts, with the aim of eliminating the depressed affect. Alternatively, it may be that, as Mohr and colleagues (2005) suggested, endorsement of social motives represents a socially desirable justification for drinking behavior instead of representing one’s true reasons for drinking. In contrast to social motives’ effect on the daily depressed mood-drinking association, social motives negatively moderated the daily anxious mood-drinking association, once more underscoring the importance of differentiating between subtypes of negative affect and between subtypes of coping motives. The simple slopes analyses revealed that individuals with high social motives showed the normative pattern (seen in the level-1 model) of inhibiting drinking when anxiety levels increased, which may explain why social motives are “safer” in terms of relations with heavy drinking and alcohol-related problems (Cooper, 1994). It is unclear, though, why there was a difference in the direction of social motives’ moderating influence on depressed mood-drinking versus anxious mood-drinking relations. It may be that low social motives are a proxy for high social anxiety, which might explain why drinking is not inhibited by anxious mood at the level of low social motives, similar to the pattern seen at relatively high levels of coping-anxiety and conformity motives. Finally, enhancement motives negatively moderated depressed-mood drinking slopes. If depressed mood is assumed to be negatively correlated with positive mood, this finding is perhaps not surprising given Mohr and colleagues’ (2005) finding that enhancement motives positively moderated positive affect-alcohol consumption (at home) slopes.

Strengths, Limitations, and Clinical Implications

The main strength of this research is that it is more ecologically valid than laboratory investigations which have examined the impact of drinking motives on the mood triggers of alcohol consumption (e.g., Birch et al., 2006) and that it employs daily process methodology to evaluate the inherently process-oriented research
questions posed by motivational models of alcohol use (Tennen & Affleck, 1996). The current study does, however, have several limitations. First, for a variety of reasons (i.e., participant noncompliance, technical problems, outliers) only 50% of possible daily reports were included in the analyses. Our sample, though it was reflective of the sex composition of undergraduates taking psychology courses, did not permit a comprehensive test of sex differences given the relatively small number of male participants. Also, our sample was predominantly Caucasian, which is consistent with previous studies at this university, but which may limit the generalizability of the results. There is some evidence to suggest that coping motives are more predictive of drinking behavior and/or consequences for females (vs. males, e.g., Birch et al., 2006) and for Black adolescents (vs. White adolescents, e.g., Cooper et al., 2008). Thus, future studies should endeavor to recruit a higher proportion of males and individuals from racially diverse populations. Furthermore, it would be interesting to measure daily motives for alcohol use (as per Galloway, 2007) to determine whether the current conclusions would hold. Nonetheless, there are good reasons for studying dispositional drinking motives. First, drinking motives have been shown to be relatively stable across time (Grant, Stewart, O’Connor, et al., 2007) and second, the clinical implications are much stronger if dispositional motives are shown to prospectively predict drinking outcomes (vs. being concurrently associated with drinking behavior, like in studies of daily alcohol use motives).

The present findings, especially those pertaining to the coping-depression and coping-anxiety motives for drinking that have been found to be particularly risky (Grant, Stewart, O’Connor, et al., 2007), can inform clinical intervention approaches. According to the results of a recent meta-analytic review of individual-level interventions designed to reduce drinking among college students, interventions providing feedback on alcohol expectancies and/or drinking motives were more successful at diminishing alcohol-related problems than those that did not (Carey, Scott-Sheldon, Carey, & DeMartini, 2007). It is conceivable that incorporating personalized feedback about undergraduates’ distinct subtypes of coping motives for drinking might enhance the success of extant interventions. As the current study is the first to examine the differential impact of coping-anxiety and coping-depression motives on daily negative affect-drinking relations, it is important that additional research is undertaken before the potential clinical utility of the Modified DMQ-R is evaluated. Nonetheless, the current findings help to elucidate the intricate associations among coping drinking motives, negative affect, and alcohol use.

References


Knight, J. R., Wechsler, H., Kuo, M., Seibring, M., Weitzman, E. R., &
MOTIVES PREDICT DAILY MOOD–ALCOHOL RELATIONSHIPS


Received June 29, 2008

Revision received December 9, 2008

Accepted December 9, 2008