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Dispositional Drinking Motives: Associations with Appraised Alcohol Effects and Alcohol Consumption in an Ecological Momentary Assessment Investigation

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Abstract

Alcohol use can be understood as a strategic behavior, such that people choose to drink based on the anticipated affective changes produced by drinking relative to those produced by alternative behaviors. This study investigated whether people who report drinking for specific reasons via the Drinking Motives Questionnaire-Revised (DMQ-R, Cooper, 1994) actually experience the alcohol effects they purportedly seek. As a secondary goal, we examined relations between drinking motives and indices of the amount of alcohol consumed. Data were drawn from 3,272 drinking episodes logged by 393 community-recruited drinkers during a 21-day Ecological Momentary Assessment investigation. After accounting for selected covariates, DMQ-R enhancement motives uniquely predicted real-time reports of enhanced drinking pleasure. DMQR coping motives were associated with reports of increased drinking-contingent relief and punishment. Enhancement motives uniquely predicted consuming more drinks per episode and higher peak intra-episode estimated blood alcohol concentration. The findings extend the evidence for the validity of the

DMQ-R motive scores by demonstrating that internal drinking motives (enhancement and coping) are related to the experienced outcomes of drinking in the manner anticipated by theory.

Keywords

Drinking Motives; Alcohol; Ecological Momentary Assessment

Alcohol abuse exacts staggering costs from our society, underscoring a pressing need to identify effective methods for reducing problematic drinking (Bouchery, Harwood, Sacks, Simon, & Brewer, 2011; Rehm, 2011). Assessments indexing individual differences in reasons for drinking may contribute to attainment of these goals by serving as a basis for delivering targeted prevention or clinical interventions, providing clues about promising intervention strategies, or serving as outcome or process measures in applied research (e.g., Coffman, Patrick, Palen, Rhoades, & Ventura, 2007; Conrod et al., 2000, Doyle, Donovan, & Simpson, 2012; Neighbors, Larimer, & Lewis, 2004; Watt, Stewart, Brich, & Benrier, 2006).

Contemporary motivational models assume that alcohol use can be understood as a strategic behavior in which people choose to drink based on the anticipated affective changes produced by drinking relative to those produced by alternative behaviors (Cox & Klinger, 1988; 1990). According to these models, a person decides to drink as a function of anticipated affective consequences and whether these are thought to outweigh those of not drinking. Theorists have identified two related but distinguishable psychological constructs involved in this process. Drinkers differ with respect to both their *alcohol outcome expectancies* (beliefs concerning the probability that drinking will produce certain effects), and their *drinking motives* (the expected effects the individual hopes to obtain by drinking). Measures of drinking motives statistically mediate the relation between alcohol outcome expectancies and drinking, indicating that motives are the more proximal determinant of alcohol use (Cooper, Frone, Russell, & Mudar, 1995; Cooper, Russell, & George, 1988; Kuntsche, Wiers, Janssen, & Gmel, 2010).

According to Cox and Klinger (1988; 1990), drinking motives can be conceptualized as varying independently along two underlying dimensions -- approach vs. avoidance and internal vs. social. In other words, people are motivated to drink in order to attain positive incentives or to avoid negative ones, and the incentives themselves may be internal to the individual (i.e., self-focused) or external and social in nature. Thus, Cox and Klinger identify four main categories or types of motives: (1) self-focused approach motivations, such as drinking to enhance physical or emotional pleasure or for excitement (i.e., enhancement motives); (2) self-focused avoidance motives, such as drinking to cope with negative emotions (i.e., coping motives); (3) social approach motives, such as drinking as a way to bond with others or improve social gatherings (i.e., social/affiliative motives); and (4) social avoidance motives, such as drinking to avoid social censure or gain another's approval (i.e., approval or conformity motives).

Based on an extensive review of the literature, Cooper and colleagues (in press) concluded that people drink for each of these four reasons; that each drinking motive is embedded in a

distinct etiologic or nomologic network; and that the nature of these networks can be understood with respect to the two dimensions hypothesized to underlie and give rise to the individual motives. Of greatest relevance to the present study, there is persuasive evidence that drinking to cope and drinking to enhance are embedded in negative and positive emotion pathways, respectively. For example, people high (vs. low) in coping motives report higher levels of neuroticism-linked traits, including negative emotionality, depression, anxiety, emotional instability, and punishment sensitivity (Cooper, et al., in press). They also hold stronger beliefs about alcohol's capacity to reduce dysphoric mood states (Cooper, et al., 1995; Kuntsche, et al., 2010), and have been shown in at least some diary studies to be more likely to drink or to drink more heavily on days characterized by elevated negative mood or stress (Mohr, et al., 2005; Todd, et al., 2005), as well as to start drinking sooner following a negative mood or stressful experience (Armeli, Todd, Conner, & Tennen, 2008; Hussong, 2007; Todd, Armeli, & Tennen, 2009). In contrast, people high (vs. low) in enhancement motives report higher levels of extraversion-linked traits (especially reward sensitivity, excitement seeking, and surgency; see Cooper et al., in press), and hold stronger beliefs about alcohol's capacity to promote or enhance positive affective experiences (Cooper, et al., 1995; Kuntsche, et al., 2010).

Test validation involves accumulating evidence that supports interpretation of test scores for particular purposes (AERA, APA, & NCMEE, 1999; Messick, 1995). As described above, measures of drinking motives are expected to be useful for prevention and clinical efforts because test scores will provide information about the functional role of alcohol use in a given drinker's experience. Although considerable research has investigated how drinking motives are related to *affective antecedents* of drinking and *alcohol outcome expectancies*, we know surprisingly little about how motives scores relate to the actual *experienced effects* of alcohol use. Do those who say they drink to enhance their mood actually feel pleasure as a result of drinking? Do those who say they drink to relieve dysphoria actually feel relief? Research probing whether the experienced consequences of drinking align with self-reported motives addresses a basic and important gap in the evidence base concerning the interpretation of drinking motives scores in functional terms.

To investigate this foundational issue, the present study used Ecological Momentary Assessment (EMA; Shiffman, Stone, & Hufford, 2008) data collected during actual drinking episodes to determine if individuals who score high on specific drinking motives, as assessed by the Drinking Motives Questionnaire-Revised (DMQ-R; Cooper, 1994) systematically differ with respect to their explicit appraisals of the effects of recently consumed drinks. The DMQ-R was specifically developed to assess the four dimensions of drinking motivation identified by the Cox and Klinger (1988; 1990) model and is the most widely used measure of drinking motives in contemporary alcohol research (Kuntsche, Knibbe, Gmel & Engels, 2005).

We expected that self-focused motives (enhancement, coping) would be more strongly related to drink appraisals compared to external motives (social, conformity). Persons who drink for self-focused reasons are presumably seeking specific alcohol-contingent outcomes. In contrast, those motivated by external or social factors presumably consume alcohol in pursuit of valued interpersonal goals rather than alcohol effects per se. Based on both

empirical and theoretical links between expectations of relief from aversive mood states and coping motives, we hypothesized that individuals high (vs. low) in coping motives would report stronger relief from drinking. Similarly, based on links between expectations of pleasure and enhancement motives, we expected those high (vs. low) in enhancement motives would report experiencing stronger pleasure from alcohol.

As a secondary focus, we also examined relations between dispositional drinking motives and alcohol consumption. In prior research (for a review, see Cooper, et al., in press), enhancement motives have been consistently linked to heavier alcohol consumption, presumably reflecting the appetitive nature of drinking to enhance and the desire to experience pleasant sensations associated with being “high.” Drinking to cope, on the other hand, has been associated with elevated rates of drinking problems that cannot be explained by consumption alone. Both social and conformity motives have been consistently linked with light to moderate consumption, mostly in social settings. However, most of this research has used retrospective measures of typical consumption aggregated over long time intervals, such as the past 30 days (Cooper, et al., in press). The current research extends the literature by examining whether motives predict consumption in particular real-world drinking episodes. Based on the existing literature, we hypothesized that enhancement motives would be most strongly predictive of the amount of alcohol consumed per episode.

Method

Data were drawn from an EMA study focused on subjective responses to alcohol among smokers and nonsmokers. This data set has been the focus of prior reports dealing with aspects other than drinking motives (Piasecki, Alley, et al., 2012; Piasecki, Wood, Shiffman, Sher, & Heath 2012; Piasecki, et al., 2011; Robertson, et al., 2012) A total of 404 participants were recruited from the community surrounding a Midwestern university using mass emails, flyers, and published advertisements. The current analyses focus on a subset of 393 (97%) participants who logged at least one user-initiated drinking report in the diary and had complete data on drinking motives and body weight (necessary for computation of momentary estimated blood alcohol concentrations; see below). To be eligible for the study, participants had to report consuming alcohol on at least 4 occasions in the past month and be at least 18 year of age. Exclusion criteria included attempts or plans to quit smoking, use of smoking cessation pharmacotherapy, regular use of tobacco products other than cigarettes, seeking treatment for an alcohol use disorder, a history of unsuccessful attempts to quit or cut down drinking or alcohol-related arrests (excepting status offenses) and, among females, pregnancy or plans to become pregnant. The analyzed subsample contained 196 women (49.9%), 338 Whites (86.0%), and averaged 23.3 years of age ($SD = 7.2$, range 18-70, 74.8% between ages 18 and 23). Participants reported an average of 19.5 drinks per week ($Mdn = 15.1$, $SD = 15.3$) on a Timeline Followback (TLFB; Sobell and Sobell, 1992) measure spanning the past 30 days. Of 390 participants with complete data on the Alcohol Use Disorder Identification Test (AUDIT; Saunders, Aasland, Babor, De La Fuente, & Grant, 1993), 201 (51.5%) achieved scores from 8-15, indicating alcohol use that exceeds low-risk guidelines and another 105 (26.9%) scored 16 or higher, indicating harmful or hazardous drinking (Babor et al., 2001). Current smokers (i.e., self-report of at least one cigarette per week) comprised approximately 2/3 of the sample ($n = 249$, 63.4%). Most

smokers ($n = 175$, 70.3%) reported smoking on a daily basis. According to their TLFB reports, daily and nondaily smokers averaged 77.2 ($Mdn = 63.5$, $SD = 79.2$) and 11.5 ($Mdn = 7.9$, $SD = 13.7$) cigarettes per week, respectively, during the past 30 days. The average number of TLFB drinks per week did not differ by smoking status (smoker $M = 20.02$, $SD = 14.6$; nonsmoker $M = 18.6$, $SD = 16.4$; $t(391) = 0.85$, $p = .39$)

At an initial visit, participants were weighed and completed a battery of questionnaires including a smoking history questionnaire, the AUDIT, and the TLFB. Drinking motives were assessed using the 20-item DMQ-R (Cooper, 1994). Participants rate how frequently they drink for the reason described in each item using a 5-point scale (1 = “almost never/never”; 3 = “half the time”; 5 = “almost always/always”). Five items each tap motives in the social (e.g., “Because it makes social gatherings more fun”), coping (e.g., “Because it helps you when you feel depressed or nervous”), enhancement (e.g., “Because it gives you a pleasant feeling”), and conformity (e.g., “Because your friends pressure you to drink”) domains. Subscale scores were computed by averaging ratings for the pertinent items. Internal consistency was good for all 4 subscales ($\alpha = .79$ to $.86$). The subscale means indicate that participants drank, on average, more than half the time for approach-related reasons (social $M = 3.69$, $SD = .91$; enhancement $M = 3.40$, $SD = .93$). Avoidance motives were endorsed less strongly (coping $M = 2.10$, $SD = .78$; conformity $M = 1.56$, $SD = .71$).

At a second visit, participants received training in the use of the diary, were issued a device, and instructed to begin recording. The diary was implemented using personal digital assistants (Palm m500, Sunnyvale, CA) and software custom-written by invivodata, inc. (Pittsburgh, PA). Participants carried the diary for 21 days, responding to prompted assessments and initiating recordings when smoking cigarettes or consuming alcohol. Participants could earn up to \$150 for completing the study.

Participants were instructed to initiate a diary recording when they had finished the first drink in a drinking episode. After this report, the diary delivered prompted follow-ups at 30, 90, and 150 min latencies. If any new drinks were reported in a follow-up assessment, an additional follow-up was scheduled to be delivered 60 min after the last signal in the current queue. This sequence continued until all prompts were delivered or until the participant put the diary into sleep mode, indicating s/he was retiring for the evening. In reports of the first drink and any follow-ups reporting new drinks, participants were asked to rate the extent to which the last drink was “pleasurable” (a proxy for positive reinforcement), “relieved an unpleasant feeling or symptom” (negative reinforcement), and “made me feel worse” (punishment) using a Likert scale ranging from 1 (“not at all”) to 5 (“extremely”).

The diary delivered up to 5 randomly-timed audible prompts per day, and smokers were also instructed to initiate recordings if they smoked. These assessments asked whether the participant had consumed alcohol in the past hour. If this question was answered affirmatively, the sequence of drinking follow-ups was triggered. This feature was designed to capture instances of drinking in which the participant failed to initiate recording. In practice, it was also possible for a random prompt to sound or for the participant to initiate a cigarette report during consumption of the first drink, effectively pre-empting the user-initiated first drink log. Notably, items assessing drink appraisals were not administered

during cigarette reports or random prompts. Thus, appraisals of the first drink were not available for 1,189 episodes (36.3%) in which these record types triggered the follow-up assessment sequence.

Subjective effects of alcohol vary according to both blood alcohol concentration and whether blood alcohol is rising or falling (Sher, Wood, Richardson, & Jackson, 2005). We used the equation of Matthews and Miller (1979) to combine information concerning participants' gender, body weight, and the number of drinks logged since the initiation of drinking to calculate an estimated blood alcohol concentration (eBAC) at each momentary report in the post-drinking period. The amount of time spent consuming the first drink was not explicitly assessed. To make eBAC estimates more realistic, we arbitrarily assumed 20 minutes were spent consuming the first drink and added 20 minutes to each of the follow-up latencies to estimate time since initiation of drinking. Note this assumption displaces the eBAC values by a constant and therefore affects the magnitude but not the rank order of the eBAC scores. Following Hustad and Carey (2005), we assumed that all participants eliminated alcohol at the population average rate of .017 g/dl/hr. Negative eBAC estimates were recoded to zero prior to analysis. Successive differences between moments within an episode were computed to identify moments where eBAC had decreased since last report. These records were coded as belonging to the descending eBAC limb.

Because alcohol consumption is strongly determined by day of the week (e.g., Wood, Sher, & Rutledge, 2007), date and time stamps automatically recorded by the diary device were used to determine whether a report was made on a weekend (defined, as appropriate for a college town, as occurring between 6 pm Thursday and 6 pm Sunday). All statistical models included weekend vs. weekday status, two dummy-coded variables indexing daily and nondaily smoker status, and participant sex as covariates. All data analyses were conducted using IBM SPSS Statistics (ver. 20, IBM Corp., Armonk, NY).

To test the central hypotheses, separate three-level linear mixed models (moments nested within drinking episodes nested within persons) were estimated in which each drink appraisal was predicted from the DMQ-R motives. These models included eBAC, descending eBAC and an eBAC x Descending interaction term. The interaction term acknowledges the possibility of acute tolerance, viz., a diminished response at a given blood alcohol concentration on the descending vs. ascending limb. Participants' typical quantity/frequency of alcohol use was also covaried. This was indexed by the product of two items on the AUDIT assessing the past-year frequency of drinking (0 = 'never' to 4 = '4 or more times a week') and the number of drinks consumed on a typical drinking occasion in the past year (0 = '1 or 2' to 4 = '10 or more').

We estimated two additional two-level (episodes nested in persons) generalized linear mixed models (Hedeker, 2005) to examine relations between motives and the amount of alcohol consumed. Conventional linear models assume the dependent measure is normally distributed. Because alcohol consumption data frequently violate this normality assumption, generalized models permitting alternative distributional assumptions are preferable (Neal & Simons, 2007). The peak eBAC value calculated within the episode was the dependent measure in one model. Because the eBAC data are continuous, positively skewed and

bounded by zero, this model was fit using a gamma distribution and a log link function. The second model predicted the total number of drinks logged during the episode. A Poisson distribution and log link function were used in this model, as appropriate for a skewed count variable.

The motives scales were positively interrelated (all $ps < .001$) with correlation coefficients ranging from .25 (enhancement-conformity) to .59 (enhancement-social). The shared variance among these scales can be thought of as indexing the overall level of motivation to drink, while the specificity of prediction is hypothesized to be attributable to the unique variance in each scale (e.g., Cooper, et al., in press; Kuntsche, et al, 2005; Stewart & Devine, 2000). For this reason, all motive scales were entered simultaneously as predictors in our primary tests. For descriptive purposes, we also conducted a series of secondary analyses examining the association with each outcome measure when motive scales were entered alone (after the non-motive covariates).

Results

The participants logged 11,591 diary records, including 7,423 records with drink appraisal ratings, during 3,272 drinking episodes. The mean eBAC during the drinking episode assessments was .057 ($SD = .071$) and 2,694 moments (23.2%) were categorized as descending eBAC. The comparatively small proportion of records classified as descending is likely due to a tendency to retire to sleep during the descending limb, terminating the diary follow-up sequence.

The top portion of Table 1 shows results from three-level mixed models predicting diary appraisals of drinks from the covariates and the block of motives scales. Consistent with prediction, enhancement motives were uniquely associated with stronger real-time appraisals of drinks as pleasurable. For every one-point increase in enhancement motivation, there was a .18-point increase on the 1-5 scale of EMA-reported drinking pleasure. Also as predicted, coping motives were uniquely predictive of reports that the last drink relieved an unpleasant feeling or symptom. For every one-point increase in coping, there was a .42-point increase on the 1-5 scale rating drinking-contingent relief. Finally, coping motives were associated with modest elevations in EMA-reported drink punishment. The bottom portion of the table shows coefficients for each motive when entered after covariates but without accounting for the remaining DMQ-R scales. Again, enhancement showed the strongest association with drinking pleasure and coping motives showed the strongest relation with drinking relief and punishment. However, the pattern of associations was less clean in these models, such that two or more motives were significantly associated with each appraisal.

Estimated BAC was not related to appraisals of either drink pleasure or drink-contingent relief in the multivariate models (Table 1). We probed this further by evaluating relations between eBAC and appraisals without other covariates in separate three-level mixed models. Consistent with the multivariate findings, eBAC was not significantly related to drinking pleasure ($b = .204, p = .114$) or drink relief ($b = .238, p = .132$) but was related to reports of feeling worse ($b = .851, p < .001$). We also examined the bivariate correlations between

mean intra-episode eBAC and mean drink appraisal ratings. Small but significant correlations were found for drink pleasure ($r = .11, p < .001$) and drink relief ($r = .04, p = .021$) and a marginal correlation was found for reports of feeling worse ($r = .04, p = .051$).

As predicted, drinkers with higher enhancement motives attained higher peak eBAC and consumed more drinks per episode (Table 2). Again, these effects remained but were less specific when each DMQ-R subscale was considered alone.

Discussion

We examined a fundamental question concerning DMQ-R score interpretation by testing whether psychometrically assessed dispositional drinking motives were related to consequences experienced by drinkers in their natural environments. Theoretically, self-focused motives (i.e., enhancement and coping) reflect pursuit of specific, direct effects of alcohol – pleasure and relief, respectively. Thus, we expected these motives to be the most intimately related to ecologically-assessed drink appraisals. Indeed, this is what we found. Moreover, these motives predicted drink appraisals in the manner anticipated by theory. When all motive domains were tested simultaneously, enhancement motives were uniquely associated with reports of pleasure from drinking and coping motives were uniquely associated with reports of drinking-contingent relief. The unique variance in coping motives was also associated with increased punishing effects. This is consistent with the prior evidence suggesting avoidance-motivated drinkers may experience a mix of positive and negative outcomes (Cooper, et al., in press). The externally focused DMQ-R motives (social and conformity) imply drinking in response to situational demands or cues, suggesting that these motives should be less strongly related to immediate appraisals of the experienced reinforcing effects of the last drink. The findings from the multivariate analyses bore out these predictions; unique variance in social and conformity motives was unrelated to the drink appraisals examined in the current study.

Prior studies have demonstrated that enhancement motives are associated with heavy consumption (Cooper, et al, in press; Kuntsche & Cooper, 2010). In the current investigation, enhancement motives predicted both number of drinks consumed and the peak eBAC attained in the drinking episodes. It is important to note that momentary pharmacokinetic estimates and typical alcohol consumption levels were included as covariates in the models predicting drink appraisals. Thus, the effects observed for motives in these models cannot be explained by drinking behaviors per se. This reinforces the conclusion that the drinking motives scores reflect distinctive affective/motivational pathways rather than solely serving as proxies for individual differences in consumption patterns.

For descriptive purposes, we explored how each DMQ-R scale was related to the outcomes when considered in isolation from the others. As would be expected given the positive intercorrelations among the motives scales, these analyses showed a less specific pattern of effects than was seen in the multivariate models. This indicates that inferences about motive scores in terms of underlying functional processes will be on the firmest footing when based upon the unique variance associated with each scale, as the shared variance presumably

reflects a general motivation to drink. Nonetheless, predicted effects for enhancement and coping motives were clearly evident in both univariate and multivariate analyses. Thus, considering these subscale scores in isolation may be sufficient for practical or clinical applications where the goal is to forecast theoretically congruent outcomes.

The analyses cannot determine the extent to which drink appraisal ratings are attributable to pharmacologic effects of alcohol vs. expectancies. In theory, alcohol effects observed under natural conditions are likely to represent a mixture of these influences (Martin & Sayette, 1993). We found limited evidence that eBAC levels were related to drink appraisals. It is unlikely this absence of association is fully explained by excessive error in the eBAC estimates because we have previously observed strong contemporaneous associations between the eBAC index and other rated experiences (e.g., buzz, dizziness) in this sample (Piasecki, Wood, et al., 2012). The absence of strong eBAC effects could indicate that diary-measured appraisals are strongly influenced by the activation of alcohol outcome expectancies. If so, our findings might be interpreted as a novel demonstration of the more general, well-known linkage between drinking motives and expectancies (Kuntsche, et al., 2010). However, the absence of strong associations between drink appraisals and eBAC level does not rule out a contribution of pharmacological effects to the findings. It is conceivable, for example, that individual drinkers simply differ with respect to their hedonic experience or evaluation of the same pharmacologic effect. Additionally, a given dose of alcohol may have discrepant effects depending upon the condition of the drinker or the environmental context at the time of consumption (Sher, et al, 2005). For example, experiencing some form of distress at the time of drinking is likely to be a prerequisite for reporting drink-contingent relief. Drink appraisals may also reflect heterogeneous rating targets with differing relations to blood alcohol level. For instance, some reports of drink pleasure could have been made with reference to orosensory attributes of the beverage whereas others could refer to subjective intoxication effects. Ultimately, laboratory challenge work using placebo controls is necessary to evaluate their relative contributions of pharmacological and cognitive contributions to appraised drinking effects¹. Although desirable, it is not certain that findings from such laboratory-based research would generalize to drinking observed in natural settings.

A number of additional limitations must be acknowledged. To ensure we would observe adequate drinking events, enrollment was limited to individuals who reported drinking at least 4 times in the past month and we oversampled current smokers. Typical drinking heaviness and smoking status were covaried in our analyses, but it is possible results will not generalize to dissimilar samples. Concern about the potential for assessment burden led to the use of brief diary assessments and may not have exhaustively covered the targeted domains. In future work, it could be useful to incorporate brief, validated measures offering more complete coverage of stimulant and sedative responses to alcohol (e.g., Rueger & King, 2013). We also did not assess outcomes or appraisals (e.g., social belongingness, peer pressure relief) that should be theoretically related to externally-focused motives. Our eBAC and descending limb estimates rely on a number of assumptions and idealizations, and must

¹Because laboratory investigations would be confined to participants 21 years of age or older, we conducted a second series of analyses excluding data from the 173 participants (44%) ages 18-20. Findings were essentially unchanged.

not be considered to be as precise as objectively-measured BAC readings. Finally, it should be noted that the magnitudes of the unique fixed effects associated with the motives were typically modest relative to the 5-point appraisal response scale and random effects estimates (not tabled) indicated that our models left substantial between-persons and between-episodes variation in post-drinking states and appraisals unaccounted for.

The current study represents an initial investigation focused on the experienced aftereffects of drinking. The contextual and affective antecedents of alcohol use have received considerable attention in process-oriented EMA research on drinking motives, with complex findings (e.g., Armeli, Conner, Cullum & Tennen, 2010; Grant, Stewart, & Mohr, 2009). Future work should consider the interplay among dispositional motives, contextual setting events, situational motives for drinking, and appraised alcohol effects in greater detail.

To our knowledge, the current analyses represent the first tests of the basic assertion that self-reported drinking motives are linked to distinct, short-term subjective appraisals of the consequences of alcohol use. Thus, the findings provide a significant extension of the existing evidence for the validity of the DMQ-R motive scores. More generally, the findings corroborate the notions that alcohol use serves divergent functions for different drinkers. Knowing that drinking motives measures forecast theoretically congruent drinking outcomes should permit more confident use of motives scales in the design and delivery of interventions and prevention efforts. Drinking outcomes have been comparatively neglected in motives research. Future work is needed to build upon this initial investigation, enriching our understanding of the constructs assessed by the scales and reinforcing our confidence in interpreting motive scores in terms of the functional role that alcohol plays in drinkers' daily lives.

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Table 1

Results from three-level mixed models predicting drink appraisals from dispositional motives and covariates.

Motives Entered Simultaneously	Dependent Measure											
	Drink Pleasurable				Drink Relieved				Drink Felt Worse			
	b	S.E.	p	b	S.E.	p	b	S.E.	p	b	S.E.	p
Intercept	3.395	.160	--	1.020	.235	--	1.046	.083	--			
Weekend	.016	.025	.512	-.030	.031	.340	.004	.016	.818			
Male	-.086	.067	.204	.049	.099	.619	.098	.035	.005			
Alcohol Q/F	-.001	.009	.900	-.012	.013	.341	-.009	.005	.040			
Daily Smoker	.029	.071	.690	.079	.105	.454	-.036	.037	.329			
Nondaily Smoker	.128	.090	.157	.145	.133	.274	-.026	.047	.581			
eBAC	.147	.132	.265	.179	.160	.264	.861	.094	<.001			
Descending	-.176	.090	.052	-.083	.110	.451	.131	.065	.044			
eBAC × Descending	-1.31	1.81	.470	-1.190	2.197	.588	-1.182	1.330	.374			
DMQ-R Social	-.035	.046	.447	.032	.068	.638	-.027	.024	.257			
DMQ-R Enhancement	.182	.045	<.001	.053	.067	.428	.002	.023	.920			
DMQ-R Coping	.046	.044	.295	.420	.065	<.001	.080	.023	<.001			
DMQ-R Conformity	-.010	.051	.849	.038	.075	.610	.048	.026	.069			
Motives Entered Individually (After Covariates)												
DMQ-R Social	.064	.038	.092	.164	.058	.005	.008	.020	.698			
DMQ-R Enhancement	.173	.038	<.001	.182	.059	.002	.018	.020	.373			
DMQ-R Coping	.086	.042	.041	.455	.060	<.001	.088	.021	<.001			
DMQ-R Conformity	.045	.046	.962	.229	.070	.001	.065	.024	.007			

Note: Tabled fixed effects coefficients are unstandardized. No p-value is given for intercept parameters because test evaluates the difference from zero but the response scale did not contain a zero point.

Table 2

Results from two-level generalized linear mixed models predicting consumption indices from dispositional motives and covariates.

Motives Entered Simultaneously	Peak Intra-Episode eBAC			Total Number of Drinks		
	b	S.E.	p	b	S.E.	p
Intercept	-3.663	.163	<.001	.440	.137	.001
Weekend	.172	.030	<.001	.157	.019	<.001
Male	-.196	.067	.004	.231	.056	<.001
Daily Smoker	-.151	.074	.041	-.007	.061	.913
Nondaily Smoker	-.193	.093	.038	-.064	.077	.408
DMQ-R Social	.089	.047	.058	.063	.039	.110
DMQ-R Enhancement	.240	.048	<.001	.178	.038	<.001
DMQ-R Coping	-.026	.048	.571	-.030	.038	.428
DMQ-R Conformity	-.012	.053	.827	-.007	.043	.872
Motives Entered Individually (After Covariates)						
DMQ-R Social	.220	.037	<.001	.157	.031	<.001
DMQ-R Enhancement	.283	.036	<.001	.205	.030	<.001
DMQ-R Coping	.083	.044	.061	.048	.036	.185
DMQ-R Conformity	.101	.050	.042	.067	.040	.094

Note: Models predicting eBAC used a gamma distribution and a log link function and models predicting total number of drinks used a Poisson distribution and log link function. The coefficients are unstandardized and expressed on the log scale.