Original Research Article

A Reexamination of Drinking Motives in Young Adults: The Development and Initial Validation of the Young Adult Alcohol Motives Scale

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Abstract

This study reexamined the factor structure of drinking motives using 205 unique items from 18 drinking motives scales with the inclusion of social tension reduction motives, which have been largely neglected in the literature. A new scale was created and compared with the Drinking Motives Questionnaire-Revised (DMQ-R) to predict alcohol use/problems. Young adults ($N = 1,049$) completed questionnaires assessing drinking motives and alcohol use/problems. A subset ($N = 368$) of participants completed a 6-month follow-up. Hierarchical factor analyses informed the creation of a four-factor (i.e., coping, social, enhancement, and social tension reduction) scale (i.e., the Young Adult Alcohol Motives Scale [YAAMS]). In general, the YAAMS performed similarly to the DMQ-R in predicting concurrent and prospective alcohol consumption (i.e., typical drinking quantity and frequency) and alcohol problems (i.e., Alcohol Use Disorder Identification Test [AUDIT] and Brief Young Adult Alcohol Consequences Questionnaire [B-YAACQ] scores), but there were some notable differences, including that the novel social tension reduction scale of the YAAMS was particularly relevant in predicting drinking frequency in those with social anxiety. Results suggest that drinking motives can be described by multiple factor structures and predict alcohol-related outcomes.

Keywords

young adults, drinking motives, alcohol use, alcohol problems, scale development, tension reduction

Alcohol use disorders (AUDs) are among the most prevalent mental health disorders in America, with an estimated lifetime prevalence rate of 29.1% (Grant et al., 2017). Those aged 18 to 29 have been shown to be most at risk of developing an AUD (Grant et al., 2017), due in part to their engagement in risky patterns of alcohol use (e.g., binge drinking) more frequently than any other age cohort (~47%; Kanny et al., 2018). Furthermore, such risky and excessive alcohol use represents a pressing a public health crisis (Centers for Disease Control [CDC], 2020) that contributed to 2.8 million years of potential life lost from 2011 to 2015 (Esser et al., 2020) and an economic impact of US$191.9 billion (Sacks et al., 2015). These statistics highlight the importance of investigating factors that contribute to unhealthy drinking among young adults in the hopes of identifying intervention targets to prevent problematic alcohol use.

An understanding of the purposes that drinking serves will likely be useful in identifying alternative reinforcement options to target in prevention and treatment programs (Creswell et al., 2020). According to motivational models of alcohol use (Cooper, 1994; Cox & Klinger, 1988),

individuals choose to drink alcohol to attain certain valued outcomes (Cooper et al., 2016; Kuntsche et al., 2005). These reasons for using alcohol, or drinking motives, are particularly important in shaping drinking behavior among young adults (Hasking et al., 2011; Read et al., 2003), and strongly predict alcohol use shortly after alcohol initiation (Smit et al., 2022). Traditionally classified based on the perceived valence and locus of the outcomes, four possible motives to drink have been widely investigated: social (positive-external), conformity (negative-external), enhancement (positive-internal), and coping (negative-internal) (Cooper,

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1994; Cooper et al., 2016; Cox & Klinger, 1988). A large body of research has shown drinking motives to be the most proximal antecedents to alcohol use and predictive of alcohol use and alcohol-related consequences (Kuntsche et al., 2007), making them a compelling target of investigation for better understanding young adult alcohol use and patterns of risky drinking.

Over the years, a variety of measurement tools have been developed to assess drinking motives, and a review by Kuntsche and colleagues (2005) found that there was significant heterogeneity in drinking motive scales. Across the 54 studies identified, 25 unique instruments were used to assess drinking motives, with between 10 and 40 items per scale. Notably, Kuntsche et al. (2005) found that specific scale items used to indicate different drinking motive factors (i.e., coping, enhancement, conformity, and social) varied across studies, and this variation was directly related to conclusions that were drawn. For instance, while evidence linking enhancement motives to alcohol use is generally consistent, a closer inspection of the data reveals that these links are dependent on scale items subsumed in specific measures of drinking motives. Indeed, when enhancement motives contain items related to drinking for intoxication or to get drunk, they appear to be strongly linked to heavier drinking; if they contain items for improving mood or enjoyment of gatherings, then they are more closely linked to moderate drinking (Kuntsche et al., 2005). Taken together, these data suggest that criterion contamination may exist across drinking motive factors that deserves further scrutiny.

It is important to acknowledge that while such inconsistencies do exist, motives as conceptualized by the Drinking Motives Questionnaire-Revised (DMQ-R; Cooper, 1994) are more consistently linked to unique outcomes. In particular, drinking to cope (e.g., drinking to reduce negative affect) has emerged as a vital target in understanding the development of problematic alcohol use. Coping motives have repeatedly been shown to be directly and robustly associated with alcohol-related problems and consequences cross-sectionally (e.g., Carey & Correia, 1997; Merrill & Read, 2010; Read et al., 2003) and longitudinally (e.g., Creswell et al., 2020; Merrill et al., 2014; Waddell et al., 2022). Notably, through heavier alcohol use, coping motives have been independently linked to the experience of injuries and academic problems (Wicki et al., 2017), global alcohol-related problems (Carey & Correia, 1997), and AUD symptomology (Mohr et al., 2018). Coping motives have also been shown to mediate the pathway between distal risk factors and alcohol use and problems including solitary drinking (Creswell, 2021; Waddell et al., 2021), insecure attachment (McNally et al., 2003), drinking identity (DiBello et al., 2018), and neuroticism (Kuntsche et al., 2008), and have also been found to be particularly relevant in at-risk populations such as student athletes (Hall et al., 2022).

Strong evidence also exists linking DMQ-R (Cooper, 1994) enhancement motives (e.g., drinking because it gives you a pleasant feeling) to alcohol outcomes. For instance, Cooper (1994) found that while coping, social, and enhancement motives were all predictive of both drinking frequency and quantity, enhancement motives were the strongest predictor of both, a finding that has since been replicated by meta-analyses and reviews (Bresin & Mekawi, 2021; Cooper et al., 2016). Several other studies have demonstrated an association between enhancement motives and negative alcohol-related consequences, although this association is typically mediated through alcohol use (Merrill & Read, 2010; Merrill et al., 2014; Read et al., 2003). Indeed, several studies have documented an association between enhancement motives and heavier alcohol consumption using both cross-sectional and longitudinal designs (Allen et al., 2020; Martins et al., 2018; Read et al., 2003; Sjödin et al., 2021; Tragesser et al., 2007).

In contrast, findings associated with social and conformity motives on the DMQ-R (Cooper, 1994) have been mixed. Several studies have found few direct associations between social or conformity motives and drinking patterns or alcohol-related consequences (Crutzen et al., 2013; Merrill & Read, 2010; Merrill et al., 2014; Patrick et al., 2011; Read et al., 2003), whereas other research has shown that social motives are a strong predictor of alcohol use within certain contexts (Grant et al., 2007), mediate the association between social norms and drinking patterns (Halim et al., 2012), and moderate the efficacy of motivational-enhancement interventions (LaBrie et al., 2009). In a comprehensive review of substance use motives, Cooper et al. (2016) found that conformity motives exert the weakest influence on typical alcohol consumption, heavy/binge drinking frequency, and drinking-related problems. This pattern of evidence suggests that social motives retain value in the investigation of alcohol-related behaviors, while conformity motives may not represent particularly relevant motivations to consume alcohol, especially in young adult populations.

Though the DMQ-R (Cooper, 1994) has greatly contributed to our understanding of alcohol use and misuse, there may be other important drinking motives beyond the four captured by this scale. In particular, social tension reduction drinking motives, which are not included in the DMQ-R (Cooper, 1994) and other drinking motives scales (e.g., the Inventory of Drinking Situations-Short Form, Annis, 1984), might also drive contemporary alcohol use. In previous measures of drinking motives, social motives have typically tapped into the enhancement of social experiences (e.g., "because it makes a party more fun"), but generally fail to ask about the use of alcohol to alleviate social discomfort or anxiety. One exception is the Pregaming Motives Measure, which asks the extent to which people pregame "to feel less anxious at an event" and "to make an awkward event easier

to deal with" (Bachrach et al., 2012). Such a pattern of alcohol use may represent a particularly important motive to assess given recent evidence that social drinking eases threats to oneself and lessens fear of social rejection, thus reinforcing alcohol use (e.g., Fairbairn & Sayette, 2014). Therefore, additional assessment of social tension reduction drinking motives may be important in understanding problematic alcohol use in young adults. Furthermore, while the DMQ-R (Cooper, 1994) represents the most highly cited tool for assessing drinking motives and has greatly contributed to our understanding of how drinking motives drive alcohol use/problems, it was developed over 30 years ago and it is unclear whether young adult drinking motives have changed. Given increases in high-risk alcohol use among young adults since the DMQ-R was first validated (e.g., binge drinking; Grant et al., 2017; pregaming, Zamboanga & Olthuis, 2016; high-intensity drinking, Patrick et al., 2017; 21st birthday drinking, Neighbors et al., 2014), a reexamination of the DMQ-R using a contemporary sample of young adults is warranted. Indeed, such a reexamination has recently been published examining drinking motives, finding that in an older sample (M_{age} = 51.4), a unique five-factor solution including novel confidence and taste dimensions best describes reasons older individuals may have for drinking. (D'Aquino et al., 2022). Thus, it is likely that such a reexamination in a contemporary sample of younger adults may reveal similarly novel factors.

The current study aimed to develop an updated and possibly more comprehensive measure of drinking motives in a large sample of young adults (N = 1,049), a portion of which participated in a 6-month follow-up survey (N = 368). Thus, we aimed to empirically winnow down the conceptual space of drinking motives in a contemporary sample of young adult drinkers. Specifically, we sought to reexamine the factor structure of drinking motives using over 200 conceptually unique items from 18 published psychometric tools designed to measure drinking motives, including the DMQ-R (Cooper, 1994) (reviewed in Cooper et al., 2016; Kuntsche et al., 2005), and sought to expand our understanding of drinking motives by specifically including items designed to assess reasons to drink related to the amelioration of social stress. Our inclusion of novel items assessing motives to drink to reduce social stress reflects growing awareness of the possible role of these motives in driving alcohol use and misuse (e.g., Bachrach et al., 2012; Fairbairn & Sayette, 2014; Fairbairn et al., 2022). The role of such motives may be particularly salient for certain individuals such as those with different forms of psychopathology (e.g., social anxiety or depression). Coping and enhancement drinking motives have previously been found to be particularly relevant in the explanation of alcohol use in socially anxious adolescents and young adults (e.g., Buckner et al., 2006; Ham et al., 2007). Thus, the current study also examined the extent of which motives related to alleviating social tension interacted with symptoms of social anxiety in the prediction of relevant alcohol-related outcomes.

We hypothesized that a new factor structure would emerge that would closely mirror the established four-factor model (Cooper, 1994; Cox & Klinger, 1988) but would also be a more holistic representation of the latent variables that define drinking motives in young adults. As such, we directly compared the drinking motives scale that emerged from our factor analyses (i.e., the Young Adult Alcohol Motives Scale; YAAMS) to the most commonly used scale in the literature (i.e., the DMQ-R; Cooper, 1994) to assess both scales' utility in predicting drinking behaviors and negative alcohol-related consequences cross-sectionally at baseline, in addition to their ability to predict changes in alcohol use and consequences across a 6-month follow-up period in a subset of participants. To do this, we examined the discriminant validity of this new scale by directly comparing the model fit of both scales in the current sample to a model in which both scales were subsumed onto one global factor per domain. These analyses were designed to test whether the YAAMS and its corresponding factor structure were capturing distinct motives to consume alcohol when compared with domains captured by the DMQ-R (Cooper, 1994). Furthermore, the current study tested interactions between levels of social anxiety and motives to relieve social tension to determine if novel items added to the YAAMS were particularly relevant for individuals with higher social anxiety levels.

Method

We report how we determined our sample size, all data exclusions, all manipulations, and all measures in the study. Supplementary Materials can be found at the study's pre-registration page on the Open Science Framework (https://osf.io/wdkqa/).

Participants

This study was approved by the Carnegie Mellon University Institutional Review Board, with all participants providing informed consent. The study design, hypotheses, and data analytic plan were pre-registered on the Open Science Framework (https://osf.io/wdkqa/). Participants were recruited through a Qualtrics Panel, a survey platform that uses multiple sources (e.g., Amazon Mechanical Turk) to recruit survey participants. Reliable and valid substance use data can be obtained through online samples (Boynton & Richman, 2014; Kim & Hodgins, 2017; Strickland & Stoops, 2019). The panel service administered a pre-specified screening questionnaire with eligibility questions included alongside general health questions to ensure that participants were unaware of our target eligibility criteria and to increase the likelihood that participants responded honestly. Ineligible participants were unable to reenter the survey. The median response time to complete the survey was 34 min.

Compensation was based on a panel currency system. Participants were given points that they could pool and later redeem for items (e.g., gift cards, SkyMiles, online game credit).

Baseline Survey

Participants ($N = 1,487$) were eligible if they were 18 to 30 years of age, currently resided in the United States, and reported recent (i.e., past week) alcohol consumption. By design, 50% of the participants were female. To control for careless responding, two attention check questions were randomly embedded in the survey (e.g., "If you're reading this, please select option 2"). Participants who failed to correctly respond to either of these two attention checks ($N = 370$) were omitted by Qualtrics before sending us the dataset. In addition, participants who completed the survey in less than 17 min ($N = 68$) were removed for failing to respond thoughtfully to the items. This resulted in a final dataset of 1,049 participants (50% female, $M_{age} = 26.26$, $SD_{age} = 2.95$). Forty-six participants, or 8.2% of the sample, were underaged (i.e., aged 18–21 years old). Most of the sample identified as White (76.6%), while 8.0% identified as African American, 7.8% as multiracial, 6.3% as Asian, 0.9% as American Indian or Alaska Native, and 0.4% as Native Hawaiian or other Pacific Islander; 14% of the sample identified as Hispanic/Latinx. These data roughly align with current estimations of U.S. demographics: 76.3% White (compared with 71% nationally); 13.4% Black or African American (compared with 14.2%); 2.8% multiracial; 5.9% Asian (compared with 7.2%); 1.3% American Indian or Alaska Native (compared with 2.9%); 0.2% Native Hawaiian or other Pacific Islander (compared with 0.2%; U.S. Census Bureau). While our estimates are approximate to 2020 Census results, our final sample did slightly over sample those who self-identify as White and under sample other racial identities. The sample was generally well educated; 10.3% of the sample completed some high school up to 12th grade, 67.4% completed at least 1 year of college, and the remaining 22.3% reported completing at least 1 year of graduate school.

Follow-Up Survey. Participants were recontacted approximately 6 months from their initial survey completion date. In total, 368[1] (58% female, $M = 27.50$, $SD = 2.85$) participants completed the follow-up survey, which represents an approximate retention rate of 35%.[2] The follow-up sample was older, $t(655.90) = -7.10, p < .001$, and more educated, $t(624.87) = -2.38, p = .02$, than the initial baseline sample. Participants who completed the follow-up surveys (compared with those who did not) were also more likely to be female, $\chi^2(1) = 7.996, p = .01$, and White, $\chi^2(5) = 14.03$, $p = .02$, but no difference was observed for Hispanic/Latinx identification, $\chi^2(1) = 1.85, p = .17$.

Measures

In addition to the items described below, participants completed a measure of drinking refusal self-efficacy (Drinking Refusal Self-Efficacy Questionnaire-Revised [DRSEQ-R]; Oei et al., 2005), two assessments of personality (NEO Five Factor Inventory [NEO-FFI], Costa & McCrae, 1992; Personality Inventory for DSM-5-Brief Form [PID-5-BF], Krueger et al., 2013), and assessments of general anxiety (General Anxiety Disorder-7 [GAD-7]; Spitzer et al., 2006), depression (Patient Health Questionnaire-9 [PHQ-9]; Kroenke et al., 2001), and social anxiety (Social Interaction Anxiety Scale [SIAS]; Mattick & Clarke, 1998). The full questionnaire battery with relevant citations can be found at the study's pre-registration page (https://osf.io/wdkqa/). It was decided that the DRSEQ-R, the NEO-FFI, and the PID-5-BF were not relevant to the current study and thus were not included. As the YAAMS was developed with the deliberate inclusion of items related to social tension, we decided that examining relations between drinking motives and SIAS scores was warranted in favor of the PHQ-9 or GAD-7. We explain the decision to assess quantity and frequency as separate constructs below.

Drinking Motives. Items from 18 of the 25 instruments cited by the Kuntsche et al. review (2005) were compiled, totaling 345 items. Seven instruments were excluded due to our inability to locate/identify the specific items that were included in these scales. After removing redundant or highly similar items (e.g., five different scales included "to feel better about yourself"), 197 semantically unique items were retained in the item pool. Due to the goals of the current study, all 20 items from the DMQ-R (Cooper, 1994) were included in the item pool. An additional eight items were adapted from the Brief Fear of Negative Evaluation Scale (BFNE; Leary, 1983; Rodebaugh et al., 2004) to assess motives related to drinking to ameliorate stress from social rejection (Bachrach et al., 2012; Fairbairn & Sayette, 2014). Items were reworded to represent a reason for drinking. For example, "I am afraid that people will find fault with me" was reworded to "You drink because it helps you feel less afraid that people will find fault with you." In total, the item pool contained 205 items (individual items are included in Supplemental Table S1 of the Supplementary Material).

Participants were presented with instructions identical to the DMQ-R (Cooper, 1994) before completing the items: "Listed below are reasons people might be inclined to drink alcoholic beverages. Using the five-point scale below, decide how frequently your own drinking is motivated by each of the reasons listed." The wording of all items was modified to fit the root "You drink. . ." to be consistent with the items retained from the DMQ-*R* (Cooper, 1994). Relative frequency of drinking in response to each item was rated on a 5-point Likert-type scale (1 = *almost never/never*, 2 = *some*

of the time, 3 = *half of the time*, 4 = *most of the time*, 5 = *almost always/always*). To ensure that response biases and fatigue did not affect our analyses, items were randomized in their presentation. Participants completed these drinking motives items at baseline and 6-month follow-up.

Alcohol Consumption. Typical past month alcohol use quantity (standard drinks/occasion) and frequency (days/month) were assessed using the National Institute of Alcohol Abuse and Alcoholism's (NIAAA, 2014) alcohol consumption question set at baseline and 6-month follow-up. Example items from the NIAAA question set include "During the past month, how often did you usually have any kind of drink containing alcohol?" and "During the past month, how many alcoholic drinks did you have on a typical day when you drank alcohol?" (NIAAA, 2014). Responses were re-scored such that higher values represented greater drinking quantity and more frequent consumption. We examined quantity and frequency of alcohol use separately for three reasons. First, prior studies that have examined relations between drinking motives and independent indices of quantity and frequency have found that relations between quantity and frequency and motives differ depending on the domain of motives assessed (e.g., Mohr et al., 2018; Sohn & Jang, 2022). Second, prior work has shown that differing domains of alcohol expectancies, which are also a proximal antecedent to alcohol use (Kuntsche et al., 2008), also share differing associations with drinking quantity and frequency across expectancy domains (Carey, 1995). Finally, quantity and frequency have been found to be independently related to specific public health crises (Breslow & Graubard, 2008). Thus, we decided to assess quantity and frequency as independent domains.

Alcohol-Related Problems. Alcohol-related problems were assessed with two questionnaires at baseline and 6-month follow-up. The first was the Alcohol Use Disorder Identification Test (AUDIT; Saunders et al., 1993), which is designed to assess problematic alcohol use and related behavior. The second was the Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ; Kahler et al., 2005), which assesses negative consequences associated with alcohol use and was developed specifically for young adult drinkers. As prior work has shown that the AUDIT can best be described via a 2-factor model (Peng et al., 2012; Reinert & Allen, 2007), the AUDIT contains items pertaining to both alcohol use (Questions 1–3) and alcohol problems (Questions 4–10). Thus, AUDIT scores were calculated by summing items after excluding Items 1 to 3, whereas B-YAACQ scores were calculated by summing all items. Higher scores for both measures reflect more severe-alcohol related problems (Babor et al., 2001; Kahler et al., 2005). Internal reliability for the AUDIT and B-YAACQ ranged from good to excellent at baseline (α = .74 and .90,

respectively). Participants were asked about their experiences over the past year at baseline and over the past 6 months at 6-month follow-up.

Social Anxiety. Social anxiety was assessed at both baseline and follow-up using the Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1988). The SIAS is a 20-item scale that asks participants to rate the extent items (e.g., "I have difficulty making eye contact with others"; "I worry about expressing myself in case I appear awkward") are characteristic or true of themselves. Responses are rated on a 5-point scale ranging from 0 = not at all characteristic or true of me to 4 = extremely characteristic or true of me.

Drinking Motives Data Cleaning

We first assessed response patterns on our pool of 205 drinking motives items for overall quality. A total of 14 items that correlated with one or more items at higher than 0.65 were identified and removed (see Crowe et al., 2019 for a similar method). Items from the DMQ-R and the modified BFNE were given priority for retention if they correlated highly with other items. An additional 44 items were removed due to ≥80% of participants choosing "Almost Never/Never" for each item. These items, including motives such as "[You drink] because you are driving" and "[You drink] to hurt your parents or someone else," were deemed unrepresentative of reasons why individuals consume alcohol. Two items from the DMQ-R, "[You drink] to get high" and "[You drink] so others won't kid you about not drinking," were removed due to this classification. Finally, 20 items that asked about specific drinking contexts (e.g., "[You drink] because you are at a bar," "[You drink] because you are at a party") rather than motivations for consuming alcohol (the purpose of this study) were removed. In total, 127 unique items were included in data analyses.

Data Analytic Plan

Scale Creation. Factor solutions were identified using a Principal Axis factoring method in SPSS 26.0. A single, unrotated factor was initially extracted, and then obliquely rotated solutions of an increasing number of factors were extracted. Horn's Parallel Analyses were run prior to running subsequent factor models to guide the maximum number of factors to consider in a model. All rotated solutions utilized a Direct Oblimin rotation. After each model was extracted, the factor scores were saved so that the factor models could be correlated to create a hierarchical model (see Goldberg, 2006). Factor analyses included all 1,049 participants who responded at baseline.[3] Eigenvalues, scree plots, factor size, and interpretability were all considered when selecting the factor structure that best described the data.

In each of the extracted factors, both the content of the items within each factor, and the discriminative ability of each item, were considered to determine the ideal model to retain. Items with loadings lower than 0.45 were excluded as loadings below 0.45 represent items with <20% of the shared latent variance, which is a common cut-off point for low factor loadings (Tabachnick & Fidell, 2001). After removing items with low loadings, items with cross-loadings above 0.32 were removed, as such loadings indicate 10% overlapping variance across factors, and this cutoff is commonly used as a threshold for item removal (Comrey & Lee, 1992; Tabachnick & Fidell, 2001).

Preliminary Analyses. We first examined the distributions of residuals for the drinking motives factors and the alcohol consumption and alcohol-related problem variables. AUDIT and typical drinking quantity data were log-transformed due to the residuals of raw scores being non-normally distributed. The transformed variables resulted in residuals that were not significantly different from a normal distribution. Bivariate correlations were run to assess the associations among study variables.

Regression Models Testing the Predictive Utility of Drinking Motives. Multiple linear regression models were run to test the utility of our YAAMS subscales (vs. the ability of the DMQ-R subscales) in predicting alcohol consumption and alcohol-related problems at baseline and 6-month follow-up. At baseline, separate models were run to predict each of the four outcome variables, i.e., past-month drinking frequency (in days), past-month average quantity of standard drinks/occasion, AUDIT scores, and B-YAACQ scores, from our YAAMS subscales, as well as the DMQ-R subscales. Demographic variables (i.e., age, sex, education, and race) were included as covariates. At 6-month follow-up, models were run to predict changes in alcohol consumption and alcohol-related problems from our YAAMS subscales and the DMQ-R subscales. In these models, we controlled for demographic variables, attention-check accuracy (i.e., a dummy-coded variable representing the number of attention checks accurately responded to), and baseline alcohol consumption and alcohol-related problems.[4] Linear regression models were run to predict AUDIT scores and past-month average quantity of standard drinks/occasion, while negative binomial regressions were run to predict B-YAACQ and past-month frequency. Both the B-YAACQ and past-month frequency exhibited a large amount of zero responses and were positively skewed, and negative binomial models have been shown to deal well with count distributions that deviate from a basic Poisson (Atkins & Gallop, 2007; Cameron & Trivedi, 1998; Creswell et al., 2016; Long, 1997; Wright et al., 2012).

Post-Hoc Validity Analyses. Validity analyses were conducted in Mplus version 8.4 using the full sample at baseline (N = 1,049). Discriminant validity between the YAAMS and the DMQ-R was tested by comparing model fit of (a) a measurement model that estimated global factors containing all items from the YAAMS and the DMQ-R (e.g., YAAMS-coping and DMQ-R coping) to (b) a model where unique items from the YAAMS and the DMQ-R were specified as indicators of unique latent factors representing each motive construct from their respective scales. Satora–Bentler Chi-Square difference testing was used to assess model fit across the two models, while accounting for the scaling correction factor for Maximum Likelihood with Robust Standard Errors (MLR) estimation. A significant chi-square difference test would suggest that the two constructs (e.g., YAAMS coping motives vs. DMQ-R coping motives) are best conceptualized as unique factors rather than one global motive factors.

Post-Hoc Validity Analyses

To test the moderating role of social anxiety on relations between YAAMS factors and alcohol-related outcomes, multiple regressions were run in Mplus 8.4. All exogenous variables were allowed to freely covary. We estimated a series of models in which each of the previous outcomes was regressed onto each of the eight unique factors from the two motives measures, SIAS scores, and SIAS scores' interaction with the YAAMS social tension reduction factor. All analyses were conducted using data from the baseline assessment and included identical covariates to previously described models.

Results

Descriptive statistics for study variables at baseline and 6-month follow-up are presented in Table 1. At both waves, participants drank between 1 and 2 days per week, although follow-up participants were significantly lighter drinkers. Average quantity consumed per occasion remained stable at approximately two to three standard drinks across baseline and follow-up samples. Average AUDIT scores in both waves fell below 8 (i.e., potentially hazardous, or harmful drinking patterns) and did not differ significantly from each other. Hazardous drinking was captured at both waves in some participants, however, with 27% of participants at baseline and 17% of participants at follow-up scoring an 8 or higher on the AUDIT. Similarly, both waves had relatively low levels of alcohol-related consequences on the B-YAACQ ($M_{baseline}$ = 4.75, $M_{follow-up}$ = 3.03), but 15% of participants at baseline and 10.3% of participants at follow-up scored higher than 8, indicating increased risk for hazardous drinking (Read et al., 2016). Drinking motives were reported at higher levels for the baseline sample across all four domains, and enhancement and social motives were the most highly endorsed across both waves. Bivariate correlations among study variables can be found in Table 2.

Table 1. Descriptive Statistics for Alcohol Use, DMQ-R, YAAMS, AUDIT, and B-YAACQ.

| | Mean (SD)/% | | | | |
Variable	Baseline (N = 1,049)	Follow-up (N = 368)	F/χ^2	η^2/ϕ	P
Drinking frequency			22.93	.148	.002
Never	1.1%	2.3%			
<1x/week	25.5%	23.3%			
1–2x/week	50.0%	54.1%			
3–4x/week	18.1%	16.2%			
5–6x/week	3.9%	3.1%			
Daily	1.4%	.09%			
Drinks per occasion	2.70 (1.97)	2.57 (1.88)	.24	.00	.63
AUDIT	6.09 (4.29)	5.26 (4.33)	1.43	.00	.23
DMQ-R					
Enhancement	2.39 (.90)	2.17 (.87)	6.69	.02	.01
Social	2.88 (1.01)	2.48 (.94)	34.87	.10	<.001
Coping	1.87 (.94)	1.65 (.81)	81.79	.20	<.001
Conformity	1.48 (.70)	1.32 (.57)	18.19	.05	<.001
YAAMS					
Social	2.83 (1.06)	2.44 (.96)	26.53	.08	<.001
Enhancement	2.80 (1.02)	2.40 (.95)	46.08	.12	<.001
Coping	1.83 (1.00)	1.63 (.81)	8.54	.03	<.01
Social tension reduction	1.78 (.90)	1.59 (.78)	5.15	.02	.03
B-YAACQ	4.38 (4.75)	3.03 (4.55)	2.91	.009	.089

Note. DMQ-R = Drinking Motives Questionnaire-Revised; YAAMS = Young Adult Alcohol Motives Scale; AUDIT = Alcohol Use Disorders Identification Test; BYAACQ = Brief Young Adult Alcohol Consequences Questionnaire.

Table 2. Bivariate Correlations Between Study Variables.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. DMQR social	1															
2. DMQR coping	.39*	1														
3. DMQR enhancement	.64*	.60*	1													
4. DMQR conformity	.49*	.51*	.43*	1												
5. YAAMS social	.95*	.38*	.63*	.49*	1											
6. YAAMS coping	.33*	.94*	.56*	.46*	.31*	1										
7. YAAMS social tension reduction	.54*	.68*	.55*	.64*	.54*	.61*	1									
8. YAAMS enhancement	.56*	.55*	.83*	.33*	.54*	.52*	.46*	1								
9. Baseline drinking frequency	.11*	.16*	.23*	.07*	.12*	.16*	.12*	.21*	1							
10. Follow-up drinking frequency	.06	.12*	.13*	.05	.08	.11*	.13*	.16*	.53*	1						
11. Baseline drinking quantity	.23*	.21*	.30*	.16*	.22*	.19*	.16*	.21*	.14*	.18	1					
12. Follow-up drinking quantity	.13*	.13*	.13*	.10	.12*	.15*	.07	.10	.14*	.09	.56*	1				
13. Baseline AUDIT	.31*	.46*	43*	.33*	.32*	.44*	.36*	.35*	.38*	.27*	.48*	.43*	1			
14. Follow-up AUDIT	.24*	.29*	.30*	.23*	.23*	.30*	.22*	.26*	.36*	.39*	.42*	.51*	.63*	1		
15. Baseline B-YAACQ	.31*	.44*	.36*	.31*	.32*	.41*	.35*	.31*	.19*	.19*	.27*	.22*	.60*	.30*	1	
16. Follow-up B-YAACQ	.16*	.34*	.25*	.18*	.15*	.34*	.21*	.20*	.10	.14*	.14*	.28*	.39*	.43*	.43*	1

Note. DMQ-R = Drinking Motives Questionnaire-Revised; YAAMS = Young Adult Alcohol Motives Scale; AUDIT = Alcohol Use Disorders Identification Test; B-YAACQ = Brief Young Adult Alcohol Consequences Questionnaire.
*p < .05.

Factor Structure

The first unrotated factor accounted for 36% of the total variance. The first 10 eigenvalues were as follows: 45.72, 9.68, 4.90, 3.05, 2.63, 2.12, 1.89, 1.85, 1.60, and 1.42. After the initial one-factor model was estimated, a series of successive models with an increasing number of factors were estimated.
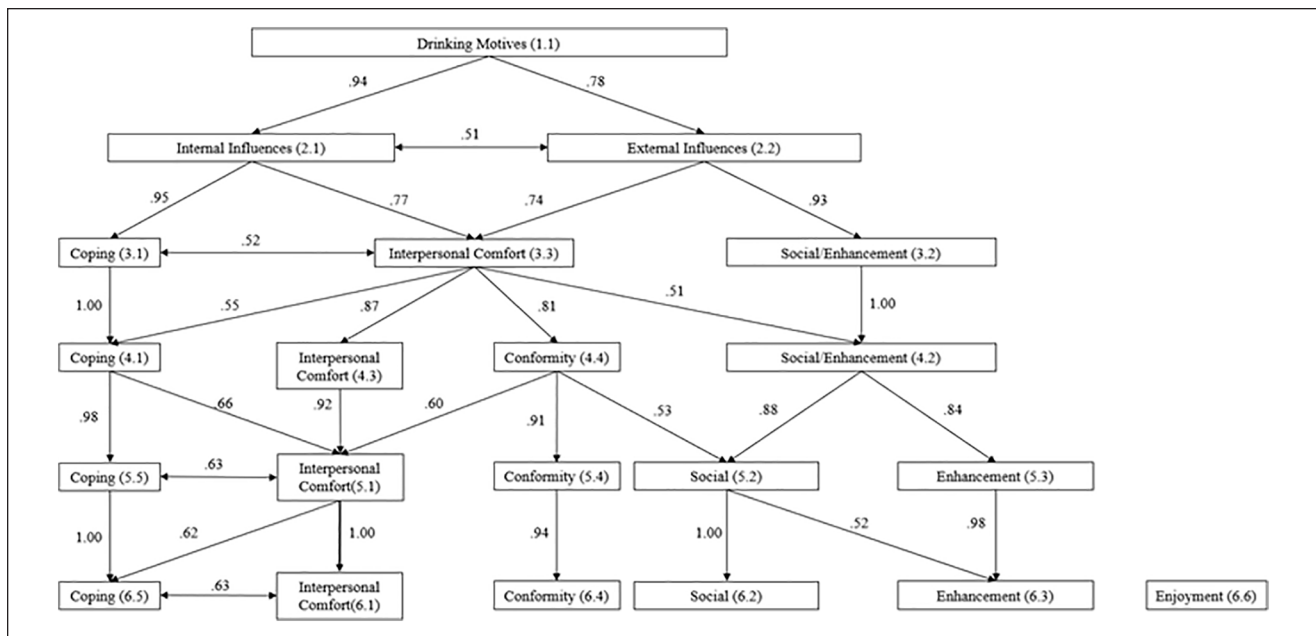
Figure 1. Hierarchical Model of Drinking Motives.
Note. Only direct correlations between factor levels are shown. For clarity, only correlations ≥.5 are shown.

The primary aim of the factor analysis conducted was to examine the underlying factor structure of drinking motives across many levels, but the optimal number of factors to extract was first determined. Optimal implementation of parallel analysis (Timmerman & Lorenzo-Seva, 2011) suggested up to six factors. This suggestion was confirmed by the seven-factor solution having no items with their highest loading on the seventh factor. As such, the six-factor model was the largest model given consideration.

In the six-factor model, there was one factor that contained only two items: "Because you are in an especially good mood" and "To add to the enjoyment of a meal." The six-factor solution was excluded from consideration due to these items contributing to such a narrow factor, and due to significant cross-loadings for these two items. In both the four- and five-factor solutions, the content of the items in each factor was meaningful, and high discriminatory loadings were observed for many items in each factor. As such, the five-factor solution was retained as the most parsimonious model where each factor represented a reasonably interpretable construct.

Hierarchical Model

The final hierarchical model from one to six factors of drinking motives is shown in Figure 1. Individual loadings for all items on each factor are provided in Supplemental Table S2 of the Supplementary Material. To create the hierarchical model, factor scores from each model were retained and correlated with the factor scores from the preceding solution.

The first identified factor (F1.1) was labeled Drinking Motivation, as it represented the most overarching theme between all items. All items included in the solution loaded positively onto the single factor and, as such, all items were retained for future iterations. The two-factor solution revealed two correlated ($r = 0.51$) factors that were best conceptualized as External and Internal Influences. The highest loading items onto the External Influences factor (F2.1) included items that primarily related to the environment outside of the individual (e.g., "Because it improves parties and celebrations"; "Because it's something your friends do when you get together"), while the Internal Influences factor (F2.2) contained items that typically centered around the self (e.g., "To solve some of your personal problems"; "Because you want to feel less lonely").

At the three-factor level, a Coping factor (F3.1; e.g., "Because it helps you when you feel depressed or nervous") separated from the Internal Influences (F2.1) factor and was highly correlated with Internal Influences from the step above ($r = .95$). A second factor, conceptualized as Social/Enhancement (F3.2; e.g., "Because it's fun," "Because it makes social gatherings more fun") emerged and was highly correlated with the External Influences factor ($r = .93$). The third factor, best defined as Social tension reduction (F3.3; e.g., "To feel more comfortable with others," "Because it helps you worry less about what other people think of you") contained content from both the Internal and External Influences factors and was significantly related to both ($r = .77, r = .74$, respectively). All three factors were intercorrelated with each other with values ranging from $r = 0.31$ (3.1 and 3.2) to $r = 0.51$ (3.1 and 3.3).

The four-factor model closely resembled the traditional four-factor model initially proposed by Cox and Klinger (1988) and Cooper (1994), although several notable differences emerged. Specifically, both the Coping and Social/Enhancement factors remained intact with almost entirely identical factors when compared with the three-factor solution (Coping, 4.1, $r = 1.00$; Social/Enhancement, 4.2, $r = 1.00$). The previously identified Social tension reduction factor, however, broke into both a mostly similar Social tension reduction factor (4.3, $r = 0.87$) and a Conformity factor (4.4; e.g., "Because it's the polite thing to do," $r = 0.81$). Only 8 items loaded onto Conformity, though, and only three items had a loading of above 0.4. It is also important to note that significant cross loadings existed for several items, and while most items aligned with the conceptualization of Conformity, several items also seemed to be outliers in terms of content (e.g., "To experiment"; "Because you want to prove to yourself that you can take a few drinks without becoming drunk"). All four factors at this level were again interrelated to each other, with correlations ranging from $r = 0.35$ (4.1 and 4.2) to $r = 0.43$ (4.3 and 4.4).

The five-factor model uncovered three factors (Coping, 5.5; Social tension reduction, 5.1; & Conformity, 5.4) that were again highly consistent with their corresponding scales from the four-factor level. Inter-factor relationships ranged from $r = 0.12$ (5.3 and 5.4) to $r = 0.63$ (5.1 and 5.5). At this level, the Social/Enhancement factor diverged into two unique factors such that a Social factor (5.2; e.g., "To celebrate social occasions," "Because it makes social gatherings more fun") and an Enhancement factor (5.3; e.g., "Because you enjoy it," "To feel good") emerged.

Creation of the YAAMS

In the four-factor model, one factor consisted of items that appeared to represent both social and enhancement motives. These items represent conceptually different motives and are typically found to influence differing patterns of outcomes (Merrill et al., 2014). As such, the five-factor solution, which consisted of items from both the Social and Enhancement factors, was used to develop our item pool. In addition, at the five-factor level, the Conformity (5.4) factor was relatively small with only eight items and was also quite inconsistent in both item content and factor loadings. Several items appeared to not represent the construct of drinking to conform (e.g., "To experiment"), and significant cross-loadings between other factors existed for several of the higher loading items. Consequently, while items were drawn from the five-factor model, items from the Conformity factor (5.4) were excluded from the item pool, leading to a total of four subscales (i.e., coping, social, enhancement, social tension reduction) being considered for the final scale development. This reasoning is further justified by the established pattern of inconsistent and non-significant findings when conformity motives are used to predict alcohol-related constructs in young adults (Cooper et al., 2016).

We selected items from each of the four retained factors looking for both construct validity and discriminatory ability across factor loadings. Discriminative ability of items was determined based on a combination of rational decision-making by the authors and consideration of factor loadings in line with suggestions by Tabachnick and Fidell (2001). To create an easily administered measure that reduces participant burden as much as possible, four items were selected from each factor resulting in a 16-item scale. Descriptive statistics from each of the four YAAMS subscales at baseline and follow-up are reported in Table 1. Individual items included in the YAAMS as well as standardized and unstandardized factor loadings can be found in Table 3.

Items were selected with authors blind to which motives questionnaire they came from and were included once a consensus was reached among all authors. As such, some overlap exists between items from the DMQ-R and the YAAMS. Specifically, of the 16 items agreed upon, six items were retained from the DMQ-R (i.e., two items from DMQ-R coping, three items from DMQ-R social, and one item from DMQ-R enhancement). Once all 16 items were agreed upon, a confirmatory factor analysis (CFA) was run using the *lavaan* package in R. Parameters in the CFA were estimated using Maximum-Likelihood estimation. Latent variables were allowed to correlate with each other, but cross-factor item correlations were not allowed. Fit statistics for the YAAMS scale suggested that the model had acceptable fit, $\chi^2(98) = 556.92$, $p < .001$, comparative fit index (CFI) = 0.95, root mean square error of approximation (RMSEA) = 0.07 (90% confidence interval [CI] = .065, .075), standardized root mean square residual (SRMR) = 0.05, in line with guidelines originally proposed by Hu and Bentler (1999).

Drinking Quantity

Results from multiple linear regressions predicting past month drinking quantity at baseline and at 6-month follow-up are shown in Table 4. At baseline, both the DMQ-R, $\Delta R^2 = .10$; $\Delta F(4, 1028) = 30.14$, $p < .001$, and the YAAMS, $\Delta R^2 = .09$; $\Delta F(4, 1028) = 25.34$, $p < .001$, accounted for a small, but significant proportion of the total variance observed in average past month drinking quantity when included alongside demographic covariates. Of the four DMQ-R motive subscales, social ($\beta = .15$, $SE = .04$, $p < .001$) and enhancement ($\beta = .17$, $SE = .05$, $p < .001$) motives emerged as unique concurrent predictors of past month drinking quantity at baseline. In the YAAMS, coping ($\beta = .12$, $SE = .04$, $p = .002$) and social ($\beta = .23$, $SE = .04$, $p < .001$) motives emerged as unique concurrent predictors of past month drinking quantity.

Table 3. Results of a Confirmatory Factor Analysis (Standardized Item Loadings/Standard Error) and Internal Consistencies.

You Drink. . .	Factor			
	Interpersonal comfort	Coping	Social	Enhancement
Because it helps you feel less afraid that others will not approve of you.	.63			
Because it helps you worry less about what other people think of you.	.73/.08			
To feel more comfortable with others.	.83/.08			
To feel less nervous with strangers.	.80/.08			
To forget about your problems.*		.86		
To find some peace of mind.		.78/.03		
Because it helps you when you feel depressed or nervous.*		.78/.03		
To get away from things; escape.		.86/.03		
Because it improves parties and celebrations.*			.80	
Because it makes social gatherings more fun.*			.84/.04	
Because you are out with friends and want to increase your enjoyment.			.77/.04	
To be sociable.*			.70/.04	
Because you like the feeling.*				.82
To feel good.				.86/.04
Because you are in an especially good mood.				.59/.03
Because you enjoy it.				.62/.04
Internal consistency				
Cronbach's α	.84	.89	.86	.72

Note. Items that were retained from the DMQ-R are indicated by an asterisk.

At 6-month follow-up, both models containing the DMQ-R, $\Delta R^2 = .003$; $\Delta F(4, 322) = .34$, $p > .05$, and the YAAMS, $\Delta R^2 = .01$; $\Delta F(4, 322) = .73$, $p > .05$, predicted small, non-significant amounts of the total variance observed in changes in typical drinking quantity when included alongside demographic covariates and baseline drinking. No motive subscales from either measure were predictive of changes in typical drinking quantity at 6-month follow-up.

Drinking Frequency

Results (including relative risks; RRs) from negative binomial regression models for the prediction of past month drinking frequency at baseline and at 6-month follow-up are shown in Table 5. Of the four DMQ-R subscales, only enhancement motives showed a unique concurrent association with past month drinking frequency at baseline ($\beta = .06$, $SE = .02$, $p < .001$). Similarly, only enhancement motives from the YAAMS were uniquely associated with concurrent past month drinking frequency ($\beta = .05$, $SE = .01$, $p = .001$). Across both measures, drinking motives did not predict significant changes in typical drinking frequency at 6-month follow-up.

Alcohol-Related Problems

Alcohol Use Disorder Identification Test. Results from multiple linear regressions predicting AUDIT scores at baseline and at 6-month follow-up are shown in Table 4. Both the model containing the DMQ-R, $\Delta R^2 = .24$; $\Delta F(4, 1037) = 84.13$, $p < .001$, and the YAAMS, $\Delta R^2 = .22$; $\Delta F(4, 1037) = 76.34$, $p < .001$, accounted for a significant amount of the total observed variance in AUDIT scores at baseline when included alongside demographic covariates. DMQ-R conformity ($\beta = .11$, $SE = .03$, $p < .001$), coping ($\beta = .32$, $SE = .04$, $p < .001$), and enhancement ($\beta = .14$, $SE = .04$, $p < .001$) motives were unique concurrent predictors of AUDIT scores at baseline. The YAAMS performed similarly, with social ($\beta = .13$, $SE = .04$, $p < .001$) and coping ($\beta = .36$, $SE = .04$, $p < .001$) motives showing unique concurrent associations with AUDIT scores.

Concerning the prediction of changes in AUDIT scores at 6-month follow-up, the DMQ-R as a whole predicted a significant amount of variance, $\Delta R^2 = .02$; $\Delta F(4, 326) = 2.55$, $p = .04$, when included alongside demographic covariates and baseline scores. No DMQ-R motives predicted changes in AUDIT scores. The YAAMS predicted a similar, but non-significant level of total variance, $\Delta R^2 = $

Table 4. Linear Regression Results for the Prediction of Alcohol Quantity and AUDIT Scores at Baseline and 6-Month Follow-Up.

Variable	Typical drinking quantity						AUDIT scores					
	Baseline			Follow-up			Baseline			Follow-up		
DMQ-R	b	SE	[95% CI]	b	SE	[95% CI]	b	SE	[95% CI]	b	SE	[95% CI]
Constant	.20*	.08	[.05, .35]	.47*	.14	[.21, .74]	−1.62	.97	[−3.51, .27]	3.30	.14	[−.33, 6.93]
Age	−.001	.003	[−.01, .004]	−.01*	.01	[−.02, −.001]	−.01	.03	[−.08, .05]	−.14*	.06	[−.26, −.02]
Sex	−.07*	.01	[−.10, −.04]	−.02	.02	[−.07, .02]	−.47*	.20	[−.85, −.09]	.09	.32	[−.54, .72]
Education	−.01*	.003	[−.01, −.001]	−.01	.01	[−.02, .001]	.06	.04	[−.02, .14]	−.05	.07	[−.18, .09]
Race	.01	.01	[.00, .02]	.002	.01	[−.02, .02]	.16*	.07	[.03, .30]	.03	.13	[−.23, .28]
Social	.04*	.01	[.02, .06]	.01	.02	[−.02, .05]	.02	.13	[−.24, .28]	.26	.22	[−.18, .69]
Coping	.02	.01	[−.001, .04]	−.01	.02	[−.05, .03]	1.20*	.14	[.92, 1.48]	.10	.25	[−.40, .59]
Enhancement	.05*	.01	[.02, .07]	−.004	.02	[−.04, .03]	.54*	.16	[.23, .86]	.15	.27	[−.39, .68]
Conformity	−.01	.01	[−.04, .02]	.01	.02	[−.04, .05]	.59*	.18	[.24, .94]	.21	.32	[−.42, −.83]
Baseline score[a]	—	—	—	.56*	.05	[.46, .65]	—	—	—	.57*	.05	[.48, .67]
Attention check	—	—	—	.03	.02	[−.01, .07]	—	—	—	.94*	.26	[.43, .1.46]
YAAMS	b	SE	[95% CI]	b	SE	[95% CI]	b	SE	[95% CI]	b	SE	[95% CI]
Constant	.25*	.08	[.10, .40]	.47*	.13	[.21, .73]	−.75	.97	[−2.64, 1.14]	3.22	1.80	[−.34, 6.78]
Age	−.002	.003	[−.01, .004]	−.01*	.004	[−.02, .00]	−.03	.04	[−.10, .03]	−.14*	.06	[−.26, −.02]
Sex	−.07*	.02	[−.10, −.04]	−.03	.02	[−.07, .02]	−.51*	.20	[−.89, −.13]	.07	.32	[−.56, .69]
Education	−.01*	.003	[−.02, −.002]	−.01	.01	[−.02, .001]	.07	.04	[−.01, .15]	−.03	.07	[−.16, .10]
Race	.01*	.01	[.00, .02]	.002	.01	[−.02, .02]	.148	.07	[.003, .27]	.02	.13	[−.23, .28]
Social	.06*	.01	[.04, .08]	.02	.01	[−.01, .05]	.44*	.12	[.20, .68]	.27	.20	[−.12, .65]
Coping	.03*	.01	[.01, .05]	.01	.02	[−.02, .05]	1.29*	.13	[1.02, 1.56]	.37	.24	[−.09, .83]
Social tension reduction	−.01	.01	[−.04, .01]	−.02	.02	[−.06, .02]	.24	.15	[−.07, .54]	−.16	.26	[−.68, .35]
Enhancement	.01	.01	[−.01, .03]	−.01	.02	[−.04, .02]	.06	.13	[−.19, .31]	.17	.21	[−.24, .59]
Baseline score[a]	—	—	—	.55*	.05	[.46, .64]	—	—	—	.57*	.05	[.48, .66]
Attention check	—	—	—	.03	.02	[−.01, .07]	—	—	—	.99*	.26	[.48, 1.50]

Note. b = unstandardized beta; SE = standard error; 95% CI = 95% confidence interval for unstandardized beta. AUDIT = Alcohol Use Disorders Identification Test; DMQ-R = Drinking Motives Questionnaire-Revised; YAAMS = Young Adult Alcohol Motives Scale.
[a]Baseline scores indicate the inclusion of baseline scores for typical quantity and AUDIT as predictors in respective models. Baseline quantity was included as a predictor in quantity models while baseline AUDIT scores were included as a predictor in AUDIT-related models.
*$p < .05$.

.01; $\Delta F(4, 326) = 1.66$, $p > .05$, but no motive subscales emerged as significant predictors of changes in AUDIT scores.

B-YAACQ. Results (including RRs) from negative binomial regression models predicting B-YAACQ scores at baseline and at 6-month follow-up are shown in Table 4. As can be seen, DMQ-R social ($\beta = 15$, $SE = .03$, $p < .001$), coping ($\beta = .30$, $SE = .04$, $p < .001$), and enhancement ($\beta = .10$, $SE = .04$, $p < .05$) motives were uniquely related to concurrent B-YAACQ scores at baseline. In the YAAMS, social ($\beta = .21$, $SE = .03$, $p < .001$) and coping ($\beta = .30$, $SE = .04$, $p < .001$) motives showed unique associations with concurrent B-YAACQ scores. In the prediction of changes in B-YAACQ scores, coping motives in both the DMQ-R ($\beta = .06$, $SE = .02$, $p = .003$) and the YAAMS ($\beta = .08$, $SE = .02$, $p < .001$) significantly and positively predicted an increase in B-YAACQ scores over the 6-month follow-up period.

Post-Hoc Validity Analysis. As substantial overlap exists between items from the YAAMS and the DMQ-R, discriminant validity between the two measures was examined by conducting nested model comparisons. Models compared YAAMS personal enhancement to DMQ-R enhancement, YAAMS social enhancement to DMQ-R social, YAAMS coping to DMQ-R coping, and YAAMS social tension reduction to DMQ-R conformity. Models that separated enhancement motives, $\Delta CFI = 0.10$, $\Delta RMSEA = 0.0$; $\Delta\chi^2(2) = 29.88$, $p < .001$, conformity/ease motives, $\Delta CFI = 0.10$, $\Delta RMSEA = 0.04$; $\Delta\chi^2(2) = 211.584$, $p < .001$, and coping motives, $\Delta CFI = 0.003$, $\Delta RMSEA = 0.01$; $\Delta\chi^2(3) = 10.45$, $p = .015$, all fit significantly better than models combining items from both measures.

Table 5. Negative Binomial Regression Results for the Prediction of Past Month Frequency and B-YAACQ Scores at Baseline and at 6-Month Follow-Up.

| Variable | Past month drinking frequency | | | | | | B-YAACQ | | | | | |
| | Baseline | | | Follow-up | | | Baseline | | | Follow-up | | |
DMQ-R	b	SE	RR	b	SE	RR	b	SE	RR	b	SE	RR
Constant	1.07*	.14	2.99	.87*	.31	2.39	1.39*	.28	4.03	.07	.82	1.07
Age	.02*	.01	1.02	.001	.01	1.00	−.01	.01	.99	−.02	.03	.98
Sex	−.03	.03	.98	−.06	.05	.95	.03	.06	1.03	.12	.15	1.13
Education	.01	.01	1.01	.01	.01	1.01	.01	.01	1.01	.01	.03	1.01
Race	−.02	.01	.98	−.01	.02	.99	.05	.02	1.05	−.11	.07	.89
Social	−.02	.02	.98	−.02	.04	.98	.16*	.04	1.18	.02	.11	1.02
Coping	.03	.02	1.03	.04	.04	1.04	.31*	.04	1.37	.34*	.11	1.40
Enhancement	.08*	.02	1.08	.003	.04	1.00	.01*	.05	1.10	.17	.13	1.18
Conformity	−.01	.02	.99	−.01	.05	.99	.05	.05	1.06	−.04	.15	.96
Baseline scores[a]	—	—	—	.12*	.02	1.13	—	—	—	.13*	.02	1.14
Attention check accuracy	—	—	—	.01	.04	1.01	—	—	—	−.29	.15	.75
YAAMS										B	SE	RR
Constant	1.09*	.13	2.97	.84*	.31	2.31	1.50*	.28	4.47	.05	.82	1.05
Age	.01*	.01	1.01	.001	.01	.96	−01	.01	.99	−.02	.03	.98
Sex	−.02	.03	.98	−.05	.05	.95	.03	.06	1.03	.13	.15	1.14
Education	.01	.01	1.01	.01	.01	1.01	.01	.01	1.01	.02	.03	1.02
Race	−.02	.01	.98	−.01	.02	.99	.04*	.02	1.04	−.12	.07	.89
Social	−.004	.02	1.00	−.02	.03	.98	.24*	.04	1.27	.06	.09	1.06
Coping	.03	.02	1.03	.01	.04	1.01	.29*	.04	1.33	.40*	.11	1.49
Social tension reduction	−.003	.02	1.00	.03	.04	1.04	.05	.04	1.05	−.07	.12	.93
Enhancement	.06*	.02	1.07	.02	.04	1.02	.03	.04	1.03	.08	.10	1.09
Baseline scores[a]	—	—	—	.12*	.02	1.13	—	—	—	.13*	.02	1.14
Attention check accuracy	—	—	—	.004	.04	1.00	—	—	—	−.28	.15	.76

Note. b = unstandardized beta; SE = standard error; 95% CI = 95% confidence interval for unstandardized beta; RR = Rate Ratio. B-YAACQ = Brief-Young Adult Alcohol Consequences Questionnaire; DMQR = Drinking Motives Questionnaire-Revised; YAAMS = Young Adult Alcohol Motives Scale.
[a]Baseline scores indicate the inclusion of baseline scores for typical frequency and B-YAACQ as predictors in respective models. Baseline frequency was included as a predictor in frequency models while baseline B-YAACQ scores were included as a predictor in B-YAACQ models.
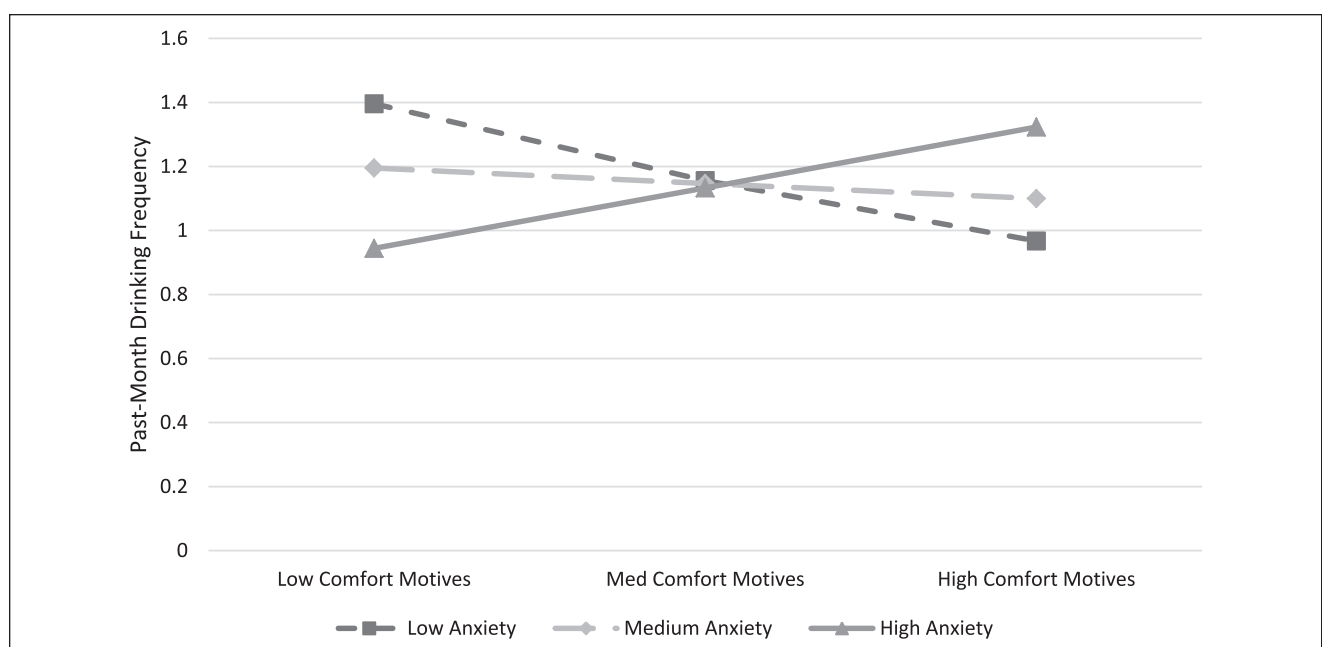*$p < .05$.

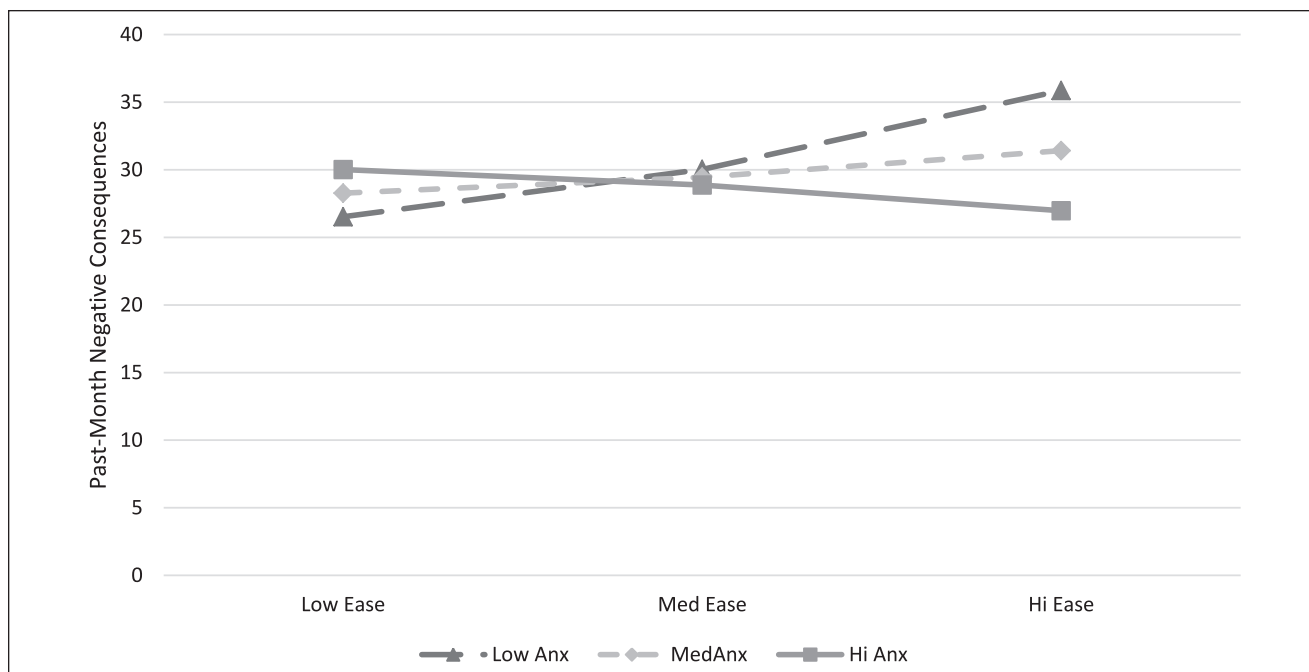**Figure 2.** Social Tension Reduction Interaction Predicting Past-Month Frequency of Alcohol Use.

Figure 3. Social Tension Reduction Interaction Predicting Past-Month Negative Consequences.

Post-Hoc Exploratory Analyses. The identification of the social tension reduction factor suggested that there may be a populations for whom drinking to avoid negative social experiences may be particularly relevant. Thus, we examined the moderating role of social anxiety on relations between the YAAMS social tension reduction scale and the study outcomes in a series of post hoc analyses not originally described in the preregistration. Results indicated that social tension reduction scores and social anxiety scores interacted to significantly predict alcohol use frequency ($b = .01$, $SE = .04$, $p = .001$) and B-YAACQ scores ($b = -0.10$, $SE = .01$, $p < .001$). Plotting of these interactions at values ± 1 SD around the mean showed that for those with high levels of social anxiety, drinking frequency was higher among those with higher social tension reduction motives (Figure 2). Conversely, results indicated that for those with low and moderate levels of social anxiety, at higher levels of social tension reduction, larger numbers of consequences occur as well, whereas higher social tension reduction motives are protective against negative consequences for those with high levels of social anxiety (Figure 3).

Discussion

Drinking motives are thought to be the most proximal determinant of alcohol use, making them an important target for understanding risky drinking and alcohol-related consequences (e.g., Cooper et al., 1994, 2016, Kuntsche et al., 2005; Merrill et al., 2014). Significant heterogeneity exists across drinking motives scales, though, and drinking to reduce social tension, which is a key factor in contemporary models of alcohol use (Fairbairn & Sayette, 2014), has been

largely neglected in the drinking motives literature. Here, we reexamined the underlying hierarchical factor structure of drinking motives in young adult drinkers by administering over 200 unique items from 18 drinking motives scales with additional items assessing social tension reduction motives. We then directly compared the ability of our newly created drinking motives scale that emerged from the data (i.e., the YAAMS) to the most commonly used scale in the literature (i.e., the DMQ-R) in predicting alcohol use and problems both concurrently at baseline and prospectively at 6-month follow-up. We also compared the discriminant validity of the YAAMS when compared with the DMQ-R, demonstrating that the YAAMS represented domains of drinking motives distinct from the DMQ-R.

Results of EFAs revealed a five-factor structure for drinking motives, which partially replicated previous four-factor conceptualizations of drinking motives and expanded our understanding of why people drink. The emergence of a robust coping factor alongside both social and enhancement factors reinforces previous findings that these motives represent some of the most important reasons that people drink alcohol (e.g., Cooper, 1994; Merrill et al., 2014; Stevenson et al., 2019). Importantly, although the YAAMS does share several items with the DMQ-R, discriminant validity analyses demonstrated that three of the four factors identified in the YAAMS (i.e., coping, enhancement, and social tension reduction) were quantitatively unique.

Our analyses also uncovered a unique social tension reduction motive to consume alcohol, which helps align drinking motives research with recent models of alcohol consumption that focus on alcohol's ability to reduce concerns about social rejection (e.g., Fairbairn & Sayette,

2014), This social tension reduction factor, which contained items such as "To feel more comfortable with others" and "Because it helps you worry less about what other people think of you," represents a divergence from the original internal/negative factor of conformity in that it represents an explicit desire to avoid social rejection and socially induced anxiety rather than a desire to fit in with a group. In support, the current study demonstrated that this social tension reduction factor demonstrated discriminant validity when compared with DMQ-R conformity motives. Furthermore, we found that levels of social anxiety moderated relations between social tension reduction motives and clinically relevant alcohol-related outcomes. Specifically, for those higher in social anxiety, higher social tension reduction motives were related to more frequent alcohol consumption (but not larger quanitities of alcohol consumed) and fewer negative consequences. Those who are high in social anxiety may be motivated to drink when in the presence of others, but not necessarily motivated to drink a larger quantity of drinks. In support of this, prior work has shown that no differences in the amount of alcohol consumed existed between high and low socially anxious groups after a social stress test (Bacon & Thomas, 2013). Such findings may help to explain the mixed results found here for the social anxiety by social tension reduction interactions on alcohol frequency and alcohol quantity. Our finding that higher social tension reduction motives were related to fewer negative consequences for those high in social anxiety is harder to explain. Much prior work demonstrates that social anxiety is positively related to alcohol use and related consequences (e.g., Black et al., 2015; Morris et al., 2005; Schry & White, 2013; Villarosa-Hurlocker & Madson, 2020). Some studies have also shown that the associations between social anxiety and alcohol outcomes are partially explained by one's drinking motives, but prior research has focused on the four-factor structure of the DMQ-R and on coping motives in particular (Ham et al., 2007; Schry & White, 2013). Our findings may serve as a useful launching point for future investigations of the role of social tension reduction drinking motives in predicting alcohol outcomes in those with social anxiety. In general, future research is needed to better understand the associations between social tension reduction motives and alcohol use and problems, as well as mechanisms through which social anxiety and social tension reduction motives interact to predict alcohol use and related outcomes. Such research may inform future intervention efforts.

In general, the YAAMS performed similarly to the DMQ-R in predicting concurrent alcohol consumption (i.e., typical drinking quantity and frequency) and alcohol problems (i.e., AUDIT and B-YAACQ scores) at baseline. Specifically, social motives from both the DMQ-R and the YAAMS showed unique positive associations with concurrent drinking quantity, while enhancement motives from both the DMQ-R and the YAAMS showed unique positive associations with concurrent drinking frequency, replicating prior findings (Halim et al., 2012; Lee et al., 2007; Merrill et al., 2014). Furthermore, coping and enhancement motives from the DMQ-R and the YAAMS were both found to be significant concurrent predictors of alcohol-related problems, also replicating prior work (e.g., Carey & Correia, 1997; Cooper et al., 2016; Kuntsche et al., 2005). Despite these similarities in performance across scales in predicting concurrent alcohol use and problems, there were also some differences. Namely, coping motives from the YAAMS (but not the DMQ-R) showed a unique positive association with concurrent drinking quantity, and enhancement motives from the DMQ-R (but not from the YAAMS) showed a unique positive association with concurrent B-YAACQ scores. Finally, conformity motives from the DMQ-R showed an unexpected association with concurrent AUDIT scores. These results are consistent with one previous study that found that conformity motives were related to some specific negative alcohol-related consequences in young adults (e.g., poor self-care, impaired control; Merrill & Read, 2010), but inconsistent with most of the literature demonstrating that conformity motives are not predictive of alcohol use or problems (Cooper et al., 2016).

There were also similarities across the DMQ-R and the YAAMS in predicting changes in alcohol consumption and alcohol problems at 6-month follow-up. Specifically, none of the drinking motives in either the DMQ-R or the YAAMS uniquely predicted changes in drinking quantity and frequency. Previous studies have found that social drinking motives predict changes in alcohol use (e.g., Labhart et al., 2016) and that concurrent changes in motives are linked to changes in drinking (e.g., White et al., 2016). However, in contrast with our current sample, most prior studies have targeted heavier drinking, college-aged populations, which may have allowed for more variability in natural changes in drinking over time. Coping subscales from both measures predicted significant increases in alcohol-related consequences (i.e., B-YAACQ scores), which is largely in line with prior findings which show strong associations between coping motives and changes in alcohol-related problems (e.g., Labhart et al., 2016; Merrill et al., 2014; Vernig & Orsillo, 2015).

The results of this study must be interpreted considering its limitations. First, although we used an online sample of drinkers, who often report high levels of alcohol use and concurrent problems (e.g., Berinsky et al., 2012; Skrzynski et al., 2018), the participants in our study were not heavy drinkers and generally reported few alcohol problems. This may have influenced our ability to detect significant associations between drinking motives and our outcome variables of interest. In addition, the current study's 6-month follow-up period was chosen due to funding considerations and was based on previous studies which successfully used

a similar timeframe to assess changes in alcohol use and problems (e.g., Cimini et al., 2009; White et al., 2008, 2016). While previous work has reported statistically significant changes in drinking behavior across a 6-month time frame, it is possible that our follow-up window was too short to reliably observe changes. Implementation of a longer follow-up period (e.g., 12 or 18 months; Armeli et al., 2010; Collins et al., 2018) may capture more meaningful changes in drinking behaviors. It is also important to note that due to the nature of using an online panel sample, attrition was substantial (35% retention), and those who completed both surveys differed significantly from those who dropped out on several survey measures including drinking frequency and quantity, which may have influenced results. Furthermore, our sample, while large and collected from a nationally available subject pool, represented an older subset of young adult drinkers. Drinking patterns tend to reduce in intensity and stabilize over time due to changing social roles and the adoption of more adult responsibilities (O'Malley, 2004). Therefore, with a mean age of about 27, it is likely that many of our participants had already entered or begun the "maturing out" process, further reducing the likelihood of observing any meaningful alterations in drinking behaviors. However, previous studies on drinking motives have tended to focus on college students (Cooper et al., 2016), and thus our sample of young adults provides a somewhat novel contribution to the drinking motives literature. It is also important to recognize that this sample consisted of primarily white/non-Hispanic individuals. Although the overall demographic makeup of our sample approximates several national demographic statistics (e.g., ~76.3% White in the current study versus 75.8% nationally; U.S. Census, 2020), we also slightly under sampled for other demographic characteristics, such as self-identification of Hispanic/Latinx ethnicity (e.g., 14% in the current sample versus 18.9% nationally; U.S. Census, 2020). Thus, it is possible that our results do not generalize to minority populations. Finally, this study was not designed to replicate the factor structure of the YAAMS in an independent sample. Future research focused on cross-validation using CFA should seek more diverse samples to better generalize findings to underrepresented groups.

Despite these limitations, this study represents a significant contribution to the drinking motives literature. The sample size was large with a mean age above what has been typically studied in previous drinking motives research. Furthermore, due to the large item pool drawn from previously administered Drinking Motives Questionnaires, this study represents a psychometrically driven evaluation of the underlying factor structure used to describe drinking motives in which we uncovered a previously undescribed social tension reduction factor. This social tension reduction factor did not emerge as predictive of our alcohol outcomes, but was shown to significantly interact with levels of social

anxiety to predict drinking frequency and the experience of negative outcomes. As AUDs are highly comorbid with other psychological disorders such as social anxiety (e.g., Black et al., 2015; Castillo-Carniglia et al., 2019; Hasin & Grant, 2015; Oliveira et al., 2018), future prevention efforts may benefit from considering that individuals with differing psychopathology may drink for reasons unique to their symptomology.

Taken as a whole, our findings illustrate that a substantial pool of potentially important items exist that may perform just as well as the DMQ-R and add some unique information in the prediction of unhealthy drinking and related harms. For instance, YAAMS coping (but not DMQ-R coping) uniquely predicted concurrent drinking quantity. Thus, the YAAMS may provide useful information in future research, particularly in work focused on uncovering the relationship between social anxiety and drinking.

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Data availability

Data for reproducing analyses are permanently and openly accessible at https://osf.io/wdkqa/.

Supplemental Material

Supplemental material for this article is available online.

Notes

1. The sample was 79.6% White, 8.7% Asian, 7.1% African American, and 4.1% indicated more than one race; 12% of the follow-up sample identified as Hispanic/Latinx. Most participants had completed some college (64%), while 27% completed some graduate school and 9% were high school educated or lower.
2. At follow-up, Qualtrics retained data regardless of participants' responses to the two attention check questions. To account for this, we included the number of attention checks responded to correctly as a covariate in all analyses that

included the 6-month follow-up data (see also Skrzynski et al., 2018). We also ran analyses omitting those who got at least one attention check incorrect ($N = 319$) to determine if results changed (they did not; see the "Results" section).

3. A total of 12 participants (~1% of the sample) indicated never having a drink in the past 30 days, despite endorsing drinking alcohol in the past week in the screening questionnaire and thus being eligible to participate in the study. Excluding these individuals did not change the factor structure in either content or organization and as such these participants were retained in analyses.

4. Separate analyses were run in which we excluded careless responders. These analyses yielded no noticeable differences in results, and as such all participants who completed the follow-up survey were retained. Results from these secondary analyses are presented in Supplemental Table S3.

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