

## Drinking motives in clinical and general populations

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**Abstract**

**Background/Aims:** This paper had three aims: (1) to validate a Spanish adaptation of the Modified Drinking Motives Questionnaire-Revised (M DMQ-R), (2) to explore the relationship of each drinking motive with different patterns of alcohol use, and (3) to compare the drinking motives of moderate drinkers, heavy drinkers, and alcohol abusing/dependent individuals.

**Methods:** Two studies were carried out. In study 1, a sample of 488 participants completed the M DMQ-R and a self-report scale of alcohol consumption in order to study the factor structure and different indices of reliability and validity of the Spanish M DMQ-R. In study 2, we compared the drinking motives of moderate and heavy drinkers from study 1 and an additional sample of 59 clinical drinkers.

**Results:** The M DMQ-R demonstrated sound reliability and validity indices. Coping-anxiety, social, and enhancement motives predicted higher alcohol use on weekends, but only coping-anxiety and social motives were related to consumption on weekdays. Furthermore, moderate drinkers had the lowest scores for all motives, whereas alcohol-dependent participants obtained the highest scores for negative reinforcement drinking motives.

**Conclusion:** The Spanish M DMQ-R is a reliable and valid measure of drinking motives and has potential for assisting with treatment planning for problem drinkers.

**Key Words:** Drinking motives. Psychometrics. General population. Clinical population. Alcohol.

## **Introduction**

Alcohol abuse is a high risk behavior for health and has been shown to be associated with more than 60 illnesses, both physical and mental, as well as numerous social problems [1, 2]. In Spain, 93.7% of the population between 15 and 64 years old have consumed alcohol at least once, while most people drink regularly (76.7% during the last year; 64.6% in the last month, and 14.9% daily in the last month). Moreover, 5.5% of the population has been engaged in high risk levels of alcohol use in the last month [3].

From an integrative perspective, alcohol use and misuse is influenced by a variety of proximal and distal, biological (e.g., the level of response to alcohol [4]), psychological (e.g., expectancies and personality disorders [5, 6]) and social variables (e.g., economic factors [7]) [8].

“Drinking motives” or the reasons why people drink alcohol are among the proximal psychological variables that have been studied in an effort to prevent excessive alcohol consumption. Many such studies have investigated drinking motives from the perspective of learning theory, based on the premise that individuals drink to obtain a desired reinforcement. For example, Farber, Khavari, and Douglass [9] hypothesized and validated the existence of two drinking motives factors that could be labeled as positive reinforcement factors (social motives) and negative reinforcement factors (coping motives), respectively. Cooper, Russell, Skinner, and Windle [10] validated the existence of these two factors (social and coping) and included a third factor, which they called enhancement motives. This latter factor is characteristic of individuals who report consuming alcohol “because it is exciting” or “to get a high”. These three motives were assessed by the Drinking Motives Questionnaire (DMQ) [10].

Cooper [11] was inspired by Cox and Klinger’s [12] theoretical structure for drinking motives to propose a further-revised four-factor model. The four drinking motives in her

revised model involve categorizing the desired consequences of drinking based on (a) the type of reinforcement desired (positive or negative reinforcement), and (b) the source of reinforcement (internal or external). Crossing these two dimensions results in four distinct drinking motives: social (external, positive reinforcement), enhancement (internal, positive reinforcement), conformity (external, negative reinforcement), and coping (internal, negative reinforcement) motives. All four of these motives were evaluated by the Drinking Motives Questionnaire Revised (DMQ-R), when the conformity motives scale was added to the original DMQ.

Social motives (i.e., drinking to facilitate or improve social relationships or to enhance enjoyment of a party) are the most frequently endorsed drinking motives among all age groups [10, 11, 13]. Results show that social motives are related to non-problematic alcohol use [11, 14, 15, 16], and are negatively associated with alcohol-related problems in young adults [17]. A possible explanation could be that moderate alcohol consumption is socially accepted and provides an opportunity to intensify friendships, facilitating the achievement of new relationships [18].

Unlike social motives, enhancement motives have been consistently related to heavy drinking [19] and to alcohol-related problems among both adolescents and adults [10, 11, 17, 20, 21]. However, when heavy drinking is statistically controlled, enhancement motives do not predict alcohol-related problems [10, 11, 22, 23, 24]; suggesting that heavy drinking mediates the relationship between enhancement motives and alcohol problems.

The relationship between conformity motives and alcohol use variables has been studied mainly among adolescents [25, 26]. Although conformity motives may hypothetically be positively related to alcohol use [11], some studies have found a negative association with drinking levels, but a positive association with alcohol-related problems [11, 27, 28]. It is therefore possible that the role of conformity motives may vary across different alcohol-

related behaviors, environments, or stages of drinking history. For instance, they may be important in adolescents, probably in an interaction with specific contexts, such as drinking at parties [11], or drinking to fit into a peer group that acts violently [28]. They may also be quite important in causing relapses among recovering alcoholics, since clinical patients have reported relapses due to social pressure to resume alcohol consumption [29, 30]. The evidence derived from clinical practice therefore shows that training in drink refusal skills can be useful in helping prevent relapses among treated alcoholics [31, 32]. This suggests that conformity motives should receive increased attention in the adult alcohol use literature.

Coping motives have been associated with both heavy drinking [17, 20, 33] and alcohol-related problems in young drinkers [14, 34, 35, 36], adult drinkers [10], and in alcohol-dependent adults [37, 38, 39]. Recent studies [23] suggest that it is important to differentiate between two subtypes of coping motives based on findings that there appear to be two distinct internal negative reinforcement pathways to alcohol dependence [40].

Thus, the DMQ-R [11] was further modified, resulting in the creation of a questionnaire with 28 items and a theoretical five-factor structure: the Modified Drinking Motives Questionnaire Revised (M DMQ-R) [41]. This measure divides the original coping motive factor into two distinct motives: coping-with-anxiety and coping-with-depression [see 23]. Grant et al. [23] showed empirically that the five factor model fit the M DMQ-R data better than a four-factor model that is conceptually equivalent to that of Cooper [11]. Moreover, each coping motive appears to be differentially related to drinking outcomes. In a concurrent prediction of alcohol use among Canadian undergraduates, enhancement and social drinking motives predicted drinking frequency, while enhancement, social, and coping-with-depression motives predicted drinking quantity. In prospective analyses, only coping-with-depression motives predicted alcohol-related problems. However, when drinking levels

were controlled, only coping-with-anxiety predicted alcohol-related problems prospectively [23].

To date, the psychometric properties of the M DMQ-R have only been evaluated in samples of English-speaking undergraduates [23]. The purpose of this study was to explore the psychometric properties of the M DMQ-R in a middle-aged Spanish sample drawn from the general population, and to compare the scores obtained with those of patients diagnosed with alcohol abuse/dependence.

### **Study 1: Psychometric evaluation of the M DMQ-R in a general population**

#### **Spanish sample**

##### **Methods**

##### *Sample*

The sample was obtained using the "snowball" method where participants in turn contacted new participants. Initial participants were assessed in several public institutions (i.e., city halls, universities), health services (i.e., waiting rooms of primary care services) and private companies (i.e., tile factories) in Castellón province. All participants completed the questionnaires anonymously.

The initial sample was made up of 575 participants. Those indicating that they did not drink alcohol ( $N = 77$ ), or who did drink, but gave no information about the quantity of alcohol consumption ( $N = 9$ ), or did not complete the M DMQ-R correctly ( $N = 1$ ) were excluded from the analysis, leaving a final sample of 488 (51.5% women) participants with a mean age of 39.8 years ( $SD = 13.2$ ). In terms of their educational background, 2.2% of the participants had not completed elementary school, 13.0% had only completed elementary school, 32.2% had only completed high school, and 52.6% had completed a university education.

After three months, 51 participants completed the questionnaires again. Those indicating that they did not drink alcohol ( $N = 9$ ) or did not complete the M DMQ-R correctly ( $N = 2$ ) were excluded from the analysis, leaving 40 participants (60.0% women) with a mean age of 37.8 years ( $SD = 14.6$ ) in the re-test sample. In terms of education, 10.5% had only completed elementary school, 26.3% had only completed high school, and 63.2% had completed a university education.

#### *Materials and procedure*

First, subject matter experts translated the Modified Drinking Motives Questionnaire-Revised (M DMQ-R) [23] from English to Spanish. A back-translation was then carried out to compare this second version to the original questionnaire. This process resulted in a Spanish version that could be considered comparable to the original English version.

The respondents provided socio-demographic data (gender, age, educational level), drinking motives on the M DMQ-R, and alcohol use measures on the Alcohol Intake Scale (AIS) [42]. Three months later, 51 volunteer participants completed the questionnaires again in order to examine the test-retest reliability of the M DMQ-R.

The M DMQ-R consists of 28 items, each contributing to one of five subscales: social, coping-with-anxiety, coping-with-depression, enhancement, or conformity. Taking into consideration all the occasions on which they drink, participants indicate how often they drink for the reason specified in each item on a 5-point Likert scale ranging from 1 (almost never/never) to 5 (almost always/always).

The AIS taps alcohol use during the week and on weekends based on a set of 5-point Likert scales. With respect to frequency of alcohol use during the week, participants are asked four separate questions about drinking beer, wine, cocktails, and hard liquor, respectively, on a scale of *never or hardly ever* (0) to *daily* (4). With regard to using these beverages on the weekend, consumption frequency is again measured by four separate



questions using a scale ranging from *never or hardly ever* (0) to *four or more weekends in a month* (4). Composite frequency per week and per weekend variables were created by adding alcohol-use frequency scores from each of the beverages to obtain a total score from 0 to 16. Units consumed during the week and on the weekend are evaluated through two semi-structured questions, which enable researchers to determine the number of standard drinks consumed per participant. In Spain, a standard drink is considered equivalent to 10g of alcohol [43].

### **Analysis**

First, we conducted descriptive analyses to characterize the sample in terms of typical drinking quantity and frequency. Second, we conducted a confirmatory factor analysis of the M DMQ-R to examine the internal structure of the questionnaire and to compare the adequacy of the five-factor model with a model conceptually similar to Cooper's four-factor model (with coping-anxiety and coping-depression items constrained to load on a single generic coping factor) [see 23].

Confirmatory multi-group analyses were performed to determine the factorial invariance of the questionnaire across men and women and across different age groups. We calculated Cronbach's alpha to test the internal consistency of the M DMQ-R scales. In addition, we used intraclass correlations to examine the test-retest reliability of the scales. Finally, hierarchical regression analyses were performed to test concurrent validity of the measure. In this case we controlled for gender and age, the predictor variables were the different drinking motives from the M DMQ-R, and the criterion variables were drinking frequency and drinking quantity during the week and on the weekend, from the AIS.

### **Results**

#### *Descriptive analysis*

Mean alcohol use in the total sample was 3.69 ( $SD = 5.25$ ) standard drinks [44] during the week and 7.35 ( $SD = 7.26$ ) standard drinks on the weekend. The mean drinking frequency score was 2.26 ( $SD = 2.30$ ) during the week and 5.05 ( $SD = 3.33$ ) on the weekend (total drinking frequency score from 0 to 16).

Mean alcohol use in the re-test sample was 3.72 ( $SD = 4.72$ ) standard drinks during the week and 7.18 ( $SD = 6.28$ ) standard drinks on the weekend. The mean drinking frequency was 2.48 ( $SD = 2.30$ ) during the week and 4.98 ( $SD = 3.38$ ) on the weekend.

#### *Confirmatory factor analysis (CFA)*

EQS (Version 6.1) software was used to perform all CFAs [45]. First, the data were screened to determine the appropriate model estimation method. For the M DMQ-R scores, the normalized estimate of Mardia's coefficient of multivariate kurtosis [46] indicated significant non-normality in the data [47]. Accordingly, the Satorra-Bentler robust method was used [45]. The variance–covariance matrix was the basis of the analysis, and the metric of the latent factors was defined by setting factor variances to 1.0.

Overall, the hypothesized correlated five-factor model of drinking motives provided an adequate to excellent fit for the data [see 23] [ $\chi^2(340, N = 488) = 722.44, p < .001$ ; RMSEA = .05 (90% confidence interval [CI = .043, .053]; CFI = .94; IFI = .94].

Moreover, the standardized loadings of the indicator variables on their hypothesized factors were all salient (i.e.,  $\geq .30$ ) [48] (see Table 1), with the exception of Item 18 on the conformity factor. We decided to maintain this item to allow for comparability with other studies that also use the M DMQ R. Nevertheless, the multivariate Lagrange multiplier (LM) tests for adding parameters suggested cross-loadings of Item 13 on the enhancement motives factor, Item 7 on the coping-with-anxiety motives factor, and Item 8 on the social motives factor. Given the generally good fit of the model, the statistical significance of all unstandardized factor loadings, the salience of the vast majority of the standardized factor

loadings, and the absence of a substantive basis for making changes implied by the LM tests, we did not make any *post hoc* modifications to the hypothesized model [48, 49].

Finally, when we compared the goodness-of-fit indexes of the five-factor model with a model of four-factors conceptually similar to Cooper's model [11] ( $\chi^2(344, N = 488) = 751.83, p < .001$ ; RMSEA = .05 (90% confidence interval [CI] = .044, .054); CFI = .93; IFI = .93), the  $\chi^2$  difference test revealed a significant decrement in model fit from the five- to the four-factor model ( $\chi^2 \text{diff}(4) = 21.39, p < .001$ ) as was seen in the analysis of the original version of the M DMQ-R [23]. In the same way, the Akaike Information Criterion (AIC; [50]) showed that the five-factor model (AIC = 42.44) provided a better fit to the data than the four-factor model (AIC = 63.83) [48].

[INSERT TABLE 1 ABOUT HERE]

#### *Testing factorial invariance across gender*

Factorial invariance of the M DMQ-R was tested across gender using hierarchical, cumulative steps [49]. In this case, the sample was 482 because we excluded 6 respondents who did not report their gender. First, we tested the model separately in each gender group. The fit indices were adequate for men: [ $\chi^2(340, N = 234) = 533.52, p < .001$ ; RMSEA = .05 (90% confidence interval [CI] = .041, .057); CFI = .93; IFI = .93.] and excellent for women: [ $\chi^2(340, N = 248) = 486.33, p < .001$ ; RMSEA = .04 (90% confidence interval [CI] = .033, .050); CFI = .96; IFI = .96.]. We then tested for configural invariance across gender. Marker indicator variables were used to set the metric of the latent factors for tests of factorial invariance across gender. For each factor, the indicator variable with the smallest difference between the unstandardized factor loading for men and for women was selected as the marker indicator (i.e., Item 10 for social, Item 8 for coping-with-anxiety, Item 16 for coping-with-

depression, Item 26 for enhancement, and Item 24 for conformity). Fit indexes showed an adequate fit for the data:  $\chi^2(680, N = 482) = 1024.30, p < .001$ ; RMSEA = .05 (90% confidence interval [CI] = .040, .051); CFI = .94; IFI = .94]. The addition of cross-gender equivalence constraints for factor loading did not result in a significant degradation in fit (compared to the configural model),  $\chi^2 diff(23) = 17.79, p > .50$ , suggesting invariance. Additionally, constraining factor variance to be equivalent across gender did not result in a significant decrease in fit,  $\chi^2 diff(5) = 2.7, p > .50$ , again suggesting invariance. Finally, adding the factor covariance constraints across gender also failed to result in a significant decrease in fit,  $\chi^2 diff(10) = 15.77, p > .10$ .

#### *Testing factorial invariance across age groups*

The same process used to test factorial invariance across gender groups was used to test factorial invariance across age groups (i.e., between younger adults (N = 249, age range from 17 to 37) and older adults (N = 239, age range from 38 to 81)), which were created using a median split method. First, we tested the model separately in each age group. The fit indices were adequate for younger adults:  $\chi^2(340, N = 249) = 582.32, p < .001$ ; RMSEA = .05 (90% confidence interval [CI] = .046, .061); CFI = .94; IFI = .94] and excellent for older adults:  $\chi^2(340, N = 239) = 431.61, p < .001$ ; RMSEA = .03 (90% confidence interval [CI] = .023, .043); CFI = .96; IFI = .96]. In this case, the marker indicator variables used to set the metric of the latent factors for tests of factorial invariance across age groups were items 1 (social), 2 (coping-with-anxiety), 3 (enhancement), 22 (coping-with-depression), and 28 (conformity). Fit indexes showed an adequate fit for the data when we tested the configural invariance across age groups:  $\chi^2(680, N = 488) = 1004.63, p < .001$ ; RMSEA = .04 (90% confidence interval [CI] = .038, .050); CFI = .94; IFI = .94]. The addition of cross-group equivalence constraints for factor loading did not result in a significant degradation in fit (compared to the configural model),  $\chi^2 diff(22) = 20.65, p > .50$ , suggesting invariance.

Additionally, constraining factor variance to be equivalent across groups resulted in a significant decrease in fit,  $\chi^2_{diff}(5) = 24.39, p < .001$ . According to the LM test, only the enhancement factor variance varied across age groups (younger adults > older adults).

Moreover, adding the factor covariance constraints across age groups also failed to result in a significant decrease in fit,  $\chi^2_{diff}(10) = 15.50, p > .10$ .

#### *Mean differences in drinking motives across gender*

The M DMQ-R demonstrated invariance across gender. Meaningful cross-gender comparisons of levels of drinking motives were therefore possible. To explore the differences between genders, we used a between-groups (gender) multivariate analysis of variance (MANOVA) with each of the five drinking motive scores serving as dependent measures. We did not find an overall multivariate effect of gender. Furthermore, we did not find significant differences across gender in any of the drinking motive scales at the univariate level. In addition, both gender groups reported social > enhancement > coping-with-anxiety > coping-with-depression > conformity motives. In both groups, a set of dependent-sample t-tests showed that all of these differences between drinking motives were significant at  $p < .001$ , apart from coping-with-depression and conformity drinking motives (men:  $t = .79, p = .43$ ; women:  $t = 1.61, p = .11$ ).

#### *Mean differences in drinking motives across age groups*

As we found factorial invariance between age groups, we proceed to compare drinking motives endorsement between younger and older adults performing a MANOVA. The results showed differences between age groups across motives ( $F(5, 482) = 8.42, p < .001$ ). Univariate statistics showed that younger adults scored higher than older adults in enhancement ( $F(1) = 35.50, p < .001$ ), social ( $F(1) = 13.59, p < .001$ ), and coping-with-anxiety ( $F(1) = 4.567, p < .05$ ) drinking motives. Moreover both age groups scored higher in social drinking motives following by enhancement, coping-with-anxiety, coping-with-

depression and conformity drinking motives, respectively. A set of dependent-sample t-test in each group showed that the differences between each pair of drinking motives were significant at  $p < .001$  apart from coping-with-depression and conformity drinking motives (younger adults:  $t = 2.23, p < .05$ ; older adults:  $t = .27, p = .789$ ).

#### *Factor inter-correlations and internal consistency*

As expected, there were significant inter-correlations between scales (see Table 2). The highest correlation was found between coping-with-anxiety and coping-with-depression motives (.74). If compared with Cooper's [11] four-factor model of drinking motives, similar results are apparent. The highest correlation was found between social and enhancement drinking motives (.60) (external, positive reinforcement vs. internal, positive reinforcement), and the lowest correlation was found between enhancement and conformity drinking motives (.35) (internal, positive reinforcement vs. external, negative reinforcement).

Internal consistency on the scales ranged from  $\alpha = .63$  (coping-with-anxiety) to  $\alpha = .88$  (coping-with-depression). Though the coping-with-anxiety subscale's internal consistency is below the widely accepted .70 cutoff, it is acceptable by Loewenthal's [51] standard, which indicates that a Cronbach's  $\alpha \geq .60$  is adequate for short scales (i.e., scales with fewer than 10 items).

[INSERT TABLE 2 ABOUT HERE]

#### *Test-retest reliability*

The M DMQ-R subscale means and standard deviations for the re-test are presented in Table 2, at each timepoint for the subset of participants who completed the two assessments.

The intraclass correlation coefficients (ICCs) between the corresponding subscales at Time 1 and Time 2 were all significant ( $p < .05$ ; see Table 2). ICC for the coping-with-

depression, enhancement, and social motives scales were in the excellent range, for conformity they were in the good range, and for coping-with-anxiety they were in the fair range [52]. A series of paired-samples t tests revealed no significant differences in scores across the two testing times, again suggesting stability of motives scores.

### *Concurrent validity*

In order to determine the concurrent validity of the M DMQ-R, hierarchical regression analyses were performed controlling both age and gender. In this case, the criterion variables were the four alcohol-use variables from the AIS (i.e., drinking frequency during the week, drinking frequency on the weekend, standard drinks consumed during the week, and standard drinks consumed on the weekend), and the predictor variables were the five different drinking motives from the M DMQ-R (see Table 3).

[INSERT TABLE 3 ABOUT HERE]

Social motives and coping-with-anxiety motives were related to alcohol-use variables, both on weekdays and on weekends. Generally speaking, (except for drinking frequency on the weekend), coping-with-anxiety motives showed stronger associations with the drinking criterion variables than did social motives. By contrast, enhancement motives were only related to alcohol-use variables on the weekend. Of all the drinking motives variables, enhancement motives showed the strongest relation with the quantity consumed on the weekend. Conformity motives were negatively related to drinking frequency both on weekdays and on weekends, and to standard drinks consumed on the weekend. Nevertheless, low positive correlations found across conformity motives and drinking frequency on the weekdays ( $.12, p < .05$ ), drinking frequency on weekend ( $.11, p < .05$ ), standard drinks on the

weekdays (.18,  $p < .05$ ) and standard drinks on the weekend (.14,  $p < .05$ ) in the bivariate correlations suggest that this negative association in the multiple regressions was due to a suppressor effect [see 53].

## **Study 2: Comparison of drinking motives in a Spanish general population sample with a sample of patients diagnosed with alcohol abuse/dependence**

### **Method**

#### *Sample*

The patient sample consisted of 59 individuals (84.7% men), with a mean age of 47.8 ( $SD = 8.3$ ) years old. Of the total patient sample, 3.4% had not completed elementary school, 57.6% had only completed elementary school, 28.8% had only completed high school, and 10.2% had completed university education. They were all diagnosed with alcohol abuse/dependence by clinicians (psychiatrists and psychologists) according to DSM-IV-TR criteria [54]. The clinicians also ruled out any other diagnosis of substance abuse/dependence according to DSM-IV-TR diagnostic criteria. All of the patients were receiving treatment at the San Agustín Addictive Behavior Unit (ABU) in Castelló.

The control sample used was the same as in the Study 1 sample, apart from six participants who did not provide information on their gender. In order to determine whether drinking motives vary across various stages of drinking history, we differentiated moderate drinkers (men  $< 28$  standard drinks / week, women  $< 17$  standard drinks / week) ( $N = 433$ ) from heavy drinkers (men  $\geq 28$  standard drinks / week, women  $\geq 17$  standard drinks / week) ( $N = 49$ ) in the general population sample [2].

We first tested whether the three groups of drinkers were equivalent in demographic characteristics (age and gender). We did not find significant differences in age ( $t = 1.25$ ,  $p = .21$ ) or gender [ $\chi^2(1) = .29$ ,  $p = .59$ ] between moderate and heavy drinkers. However, we



found significant differences in age between outpatients and moderate drinkers ( $t = 4.49, p < .001$ ), and between outpatients and heavy drinkers ( $t = 5.07, p < .001$ ), with the outpatients proving significantly older in each case. Moreover, we found a higher proportion of men in the outpatient sample when compared with both the moderate drinkers sample [ $\chi^2(1) = 26.66, p < .001$ ] and the heavy drinkers sample [ $\chi^2(1) = 18.95, p < .001$ ].

### *Materials and procedure*

The screening was performed in the San Agustín ABU in Castelló by expert clinicians. Patients were informed that participation was voluntary, they were evaluated in individual sessions, and they provided written informed consent. The Structured Clinical Interview for DSM Axis I disorders [SCID-I, 55] was used to determine alcohol abuse/dependence diagnoses. In addition, participants completed the M DMQ-R and the substance use scales. The participants received thirty euros as compensation for participating in the research.

### **Analysis**

A Multivariate Analysis of Covariance (MANCOVA) was performed, in which the dependent variables were the five different drinking motives, and the independent variable was alcohol use group (moderate drinkers, heavy drinkers, and clinical drinkers). We included age and gender as covariates to control for demographic differences between the groups of drinkers. Moreover, in the case of each significant main effect of alcohol use group, we performed Bonferroni *post hoc* tests to determine where the significant group differences lay.

### **Results**

Table 4 shows the mean and standard deviation for each of the alcohol-use groups on the M DMQ-R scales. The MANCOVA showed a significant multivariate main effect of alcohol use group [ $F(10, 1066) = 45.66, p < .001$ ]. Univariate main effects of alcohol use

group were seen for each of the five drinking motives scales (see Table 4 for F-statistics and effect size information).

[INSERT TABLE 4 ABOUT HERE]

Bonferroni *post hoc* tests showed that moderate drinkers scored significantly lower for all five drinking motives compared to both heavy drinkers and alcohol abusing/dependent outpatients (see Table 4). We found no significant differences between heavy drinkers and alcohol abusing/dependent outpatients on either the social or enhancement motives subscales (i.e., positive reinforcement motives) (see Table 4). Alcohol abusing/dependent outpatients scored significantly higher than heavy drinkers on coping-with-anxiety, coping-with-depression, and conformity motives subscales (i.e., negative reinforcement motives) (see Table 4).

In terms of within-group effects, heavy drinkers scored highest on social motives, followed by enhancement, coping-with-anxiety, coping-with-depression, and conformity motives. The same rank ordering of the five alcohol use motives was found in moderate drinkers as in heavy drinkers. The only exception was that coping-with-depression and conformity motives scores failed to differ among the moderate drinkers. In contrast to the other two groups of drinkers, outpatients indicated highest scores on coping-with-anxiety motives, followed by social, enhancement, coping-with-depression, and conformity motives, respectively.

### **Discussion**

This study examined the psychometric properties of the M DMQ-R in a Spanish sample drawn from the general population. In Study 1, the CFAs indicated that the five-factor model provided a good fit to the M DMQ-R scores of Spanish drinkers.

When we compared the five-factor model to a model conceptually equivalent to Cooper's four-factor model [11], we found a superior fit to the data of the five-factor solution, similar to previous findings with Canadian undergraduates [23]. Moreover, we found factorial invariance of the M DMQ-R across gender. We consequently compared the drinking motives across gender groups we found no significant drinking motive differences across gender groups. These results are unlike those of Grant et al. [23] who found higher social motives in Canadian undergraduate males than in undergraduate females using the M DMQ-R, and Cooper et al. [10] who found higher social as well as enhancement and (generic) coping motives in men than in women in an American general population sample using the three-factor DMQ. These discrepancies could reflect developmental differences between undergraduate students and adults, differences in power between the current study and Cooper et al. [10], or cross-cultural differences in drinking motives [see 27].

In addition, the M DMQ-R showed factorial invariance across two age groups of younger versus older adults. However, when we compared drinking motives endorsement between younger and older adults we found that the younger adults showed significantly higher enhancement, social, and coping-with-anxiety drinking motives, in line with previous studies which assessed social, enhancement and (generic) coping drinking motives in young adults vs. middle age samples (i.e., [10] vs. [13]).

All scales were acceptable in terms of internal consistency for scales of this length [51]. Test-retest reliability over three months was good to excellent for all scales, except for the coping-with-anxiety scale where the stability was only fair. The relatively lower stability of this scale may have been due to the influence of participants' actual state anxiety levels when answering the coping-with-anxiety motives scale.

When we tested the concurrent validity of the M DMQ-R in a general population Spanish sample, after controlling gender and age, we found that different drinking motives

predicted several alcohol-use variables. We found that enhancement motives predict higher alcohol-use (frequency and quantity) on the weekend – the times when heavier consumption is more likely [3]-, which is in line with Kuntsche and Cooper's [57] findings in adolescents. Nonetheless, social and coping-with-anxiety motives predicted higher alcohol-use both on weekdays and on weekends, with coping-with-anxiety motives proving the stronger predictor in all cases except for frequency of consumption on weekends. These findings highlight the importance of considering drinking context (in this case time of the week: weekday vs. weekend) when examining the drinking behavior correlates of the various drinking motives. Moreover, these findings suggest that it is important to separate coping-with-anxiety and coping-with-depression motives, in that only the former but not the latter were concurrently associated with increased consumption in our sample. However, coping-with-anxiety and coping-with-depression were not strongly related to drinking frequency and drinking quantity in a previous study with Canadian undergraduates [23]. This difference between the two studies in the correlates of coping-with-anxiety motives may be due to age and/or cultural differences. When we compare our results with samples of a similar age, undifferentiated coping drinking motives predicted higher alcohol-use in an American sample from the general population [10]. However, Cooper et al.'s [10] study used the DMQ, which does not differentiate between coping-with-anxiety and coping-with-depression motives. Taken together, these results suggest that although coping drinking motives may not be strongly related to alcohol use in young people, they may be more relevant to drinking among middle-aged adults, particularly coping-with-anxiety motives. This raises the possibility that drinking to deal with stress and to manage unpleasant feelings of tension and worry may become more relevant in predicting quantity and frequency of drinking throughout the week during the transition from young adulthood to middle age, as drinkers gain more experience with the anxiety-reducing effects of alcohol use.

When we compared alcohol-use motives between moderate drinkers, heavy drinkers, and alcohol abusing/dependent outpatients, we found that scores for all drinking motives were significantly lower in moderate consumers than in either heavy drinkers or alcohol abusing/dependent outpatients. Outpatients scored significantly higher than heavy drinkers in negative reinforcement drinking motives (coping-anxiety, coping-depression, and conformity), but we found no significant differences between the latter two drinker groups in positive reinforcement drinking motives (social and enhancement). Moreover, even though positive reinforcement motives (social and enhancement) were the most strongly endorsed by moderate drinkers and heavy drinkers, followed by negative reinforcement motives (coping-with-anxiety, coping-with-depression, and conformity drinking motives), the pattern of relative endorsement was different in the outpatients sample (i.e., coping-anxiety > social > enhancement > coping-depression > conformity). Coping-with-anxiety motives were endorsed as strongly as social motives and coping-with-depression motives were endorsed as strongly as enhancement motives in the outpatients sample.

These findings could indicate that the relative weight of each drinking motive varies at different stages of an individual's alcohol-use history. Negative reinforcement motives would therefore be more salient when an alcohol abuse or dependence pattern is developed, while positive reinforcement motives have a salient role in initial and heavy drinking stages. Another possible explanation is that some drinking motives could facilitate the development of heavy drinking and/or alcohol disorders. Higher scores in coping-with-anxiety, coping-with-depression, and conformity drinking motives could be risky drinking motives for the development of alcohol abuse/dependence. These findings are consistent with the results of previous studies, in which coping and conformity motives predicted drinking problems regardless of heavy consumption [11, 23]. In addition, we found no differences for enhancement motives between heavy drinkers and alcohol abusers/dependents. However, as

expected, heavy drinkers did score higher than moderate drinkers on a variety of motives, with the strongest between-group difference on enhancement motives. This pattern of results is consistent with previous findings that enhancement motives are most strongly connected with heavy drinking, and negative reinforcement motives with alcohol problems [11, 23].

The present study has several limitations. First, alcohol use was based on self-report measures, and not assessed using more objective methods, such as blood alcohol level [58]. Second, some of the factor loadings were not as salient as the original version of the questionnaire [see 23], mainly in the case of items from the coping-with-anxiety scale. This fact may be attributed to the adaptation process (i.e. translation and back-translation) or to sociocultural differences between Spain and Canada. To address this issue in future, it would be advisable to perform cross-cultural studies about drinking motives using the M DMQ-R. Third, the relatively lower test-retest reliability of the coping-with-anxiety motives scale suggests that it must be used with caution. Fourth, the low sample size in the re-test sample made it difficult to test the factorial stability in the general population by performing a CFA at time 2. Performing this kind of analysis in future could help tease apart whether the low ICC of the coping-with-anxiety scale is due to the lower alpha coefficients of coping-with-anxiety scale, to issues with the factorial stability of this scale, or to changes in motivation linked to state anxiety changes across time.

Fifth, taking into account that coping motives had been related to alcohol-related problems in previous studies, it would be advisable to assess alcohol-related problems in future studies (e.g., using the Alcohol Use Disorders Identification Test [AUDIT]) [59]. It would help to clarify the different roles of coping-with-anxiety and coping-with-depression drinking motives in predicting not only alcohol use, but also alcohol-related problems in a middle-aged adult population. Sixth, in study 2, the number of participants differed quite dramatically between groups (moderate drinkers = 433, heavy drinkers = 49, and alcohol

dependents = 59). Larger sample sizes of heavy drinkers and alcohol abusing/dependent individuals should be included in future studies. That would also allow for testing of the factorial structure of the measure in alcohol dependent patients, to ensure that alcohol dependent patients drink alcohol for the same set of reasons as those in the general population. Seventh, it is important to point out that outpatients were diagnosed when they began with the treatment. For this reason, it is possible that some patients were free of AUD diagnoses when they participated in the present study, which may have served to minimize between alcohol use group differences in drinking motives. Moreover, since diagnostic assessments were not conducted with the general population sample, it is possible that some individuals with diagnosable AUDs were included in either/both of the two non-AUD groups in Study 2 (i.e., moderate and heavy alcohol users groups). Finally, since this was a cross-sectional study, it would be useful to conduct further prospective studies to clarify whether the “risky” negative reinforcement drinking motives (conformity, coping-with-anxiety, and coping-with-depression) are a cause and/or consequence of alcohol abuse/dependence, and whether elevated enhancement motives are a cause and/or consequence of heavy drinking.

In general, the M DMQ-R appears to be a reliable and valid measure of drinking motives in a Spanish general population sample. The M DMQ-R has potential for assisting with treatment planning for heavy drinkers or those with alcohol abuse/dependence issues. For example, if a clinical patient obtains high scores in conformity motives, planning an assertiveness training treatment [31, 60] or offering social skills training might be most useful. If the patient obtains high scores in coping-with-anxiety motives, for example, relaxation training [61] might be an appropriate treatment component. If a patient obtains a high score on coping-with-depression motives, a behavioral activation treatment might be most appropriate [62].

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**Table 1**

Standardized factor loadings (SL), and standard errors (SE) for the five-factor model of drinking motives

Items	Social		Coping- anxiety		Coping- depression		Enhancement		Conformity	
	SL	SE	SL	SE	SL	SE	SL	SE	SL	SE
1. As a way to celebrate	.61	.05								
4. Because it is what most of my friends do when we get together	.64	.05								
7. To be sociable	.45	.04								
10. Because it is customary on special occasions	.73	.05								
13. Because it makes a social gathering more enjoyable	.77	.05								
2. To relax			.40	.05						
8. Because I feel more self- confident or sure of myself			.63	.06						
11. Because it helps me when I am feeling nervous			.44	.06						
19. To reduce my anxiety			.35	.05						
5. To forget my worries					.72	.05				
14. To cheer me up when I'm in a bad mood					.71	.06				
16. To numb my pain					.49	.04				
17. Because it helps me when I am feeling depressed					.64	.05				
20. To stop me from dwelling on things					.69	.04				
21. To turn off negative thoughts					.63	.04				

about things in my life				
22. To help me feel more positive	.68	.04		
about things in my life				
23. To stop me from feeling so	.62	.03		
hopeless about the future				
27. To forget painful memories	.65	.05		
3. Because I like the feeling			.61	.05
6. Because it is exciting			.71	.05
9. To get a high			.59	.06
12. Because it's fun			.81	.05
26. Because it makes me feel good			.64	.05
15. To be liked				.72 .06
18. So that others won't kid me				.27 .06
about not using				
24. Because my friends pressure				.51 .06
me to use				
25. To fit in with a group I like				.68 .05
28. So I won't feel left out				.66 .06

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*Note.* Adapted from "Psychometric evaluation of the five-factor Modified Drinking Motives Questionnaire-- Revised in undergraduates" by V.V. Grant, S.H. Stewart, R. O'Connor, E. Blackwell, and P.J. Conrod, 2007, *Addictive Behaviors*, 32, p. 2615 by Elsevier.



**Table 2**

Descriptive statistics for the M DMQ-R, inter-correlations for the subscales. Intraclass correlations (ICCs) measuring subscale test–retest reliabilities over three months, and paired t-tests to determine significance and direction of change in drinking motives

		Full sample (N = 488)							Test-retest (N = 40)						
		M	SD	$\alpha$	Factor correlations					Time 1		Time 2			
DMQ-R	M				1	2	3	4	5	M	SD	M	SD	ICC	t
subscales														<i>ITT</i>	
1. Social		2.35	.84	.78	-	.44	.37	.60	.39	2.45	.84	2.34	.81	.75	-1.24
2. Coping-with-anxiety		1.21	.40	.63		-	.74	.54	.49	1.15	.33	1.18	.30	.51	.50
3. Coping-with-depression		1.14	.33	.88			-	.47	.43	1.14	.29	1.12	.24	.87	-.72
4. Enhancement		1.62	.75	.82				-	.35	1.73	.87	1.59	.81	.76	-1.57
5. Conformity		1.11	.30	.75					-	1.16	.30	1.13	.29	.73	-.88

*Note.* All factor inter-correlations are significant  $p < .01$ . In the test-retest, all ICC values are significant at  $p < .001$ . All t are non-significant at  $p > .05$ .

**Table 3**

Sequential linear regression analysis predicting concurrent alcohol-use criterion variables

Step	Indicator variable(s)	Frequency of drinking during the week					Standard drinks during the week				
		<i>B</i>	SE	$\beta$	Adjusted <i>R</i> <sup>2</sup>	$\Delta$ <i>R</i> <sup>2</sup>	<i>B</i>	SE	$\beta$	Adjusted <i>R</i> <sup>2</sup>	$\Delta$ <i>R</i> <sup>2</sup>
1	(Constant)	2.50‡	.45				4.29‡	1.02			
	Gender	-1.02	.20	-.22‡			-2.40	.45	-.23‡		
	Age	.03	.01	.19‡	.08	.09‡	.08	.02	.19‡	.09	.09‡
2	(Constant)	-.83	.62				-4.81†	1.39			
	Gender	-.90	.19	-.20‡			-2.14	.41	-.21‡		
	Age	.05	.01	.28‡			.11	.02	.28‡		
	Social	.46	.14	.17†			.95	.32	.15†		
	Coping-with- anxiety	1.91	.38	.33‡			3.43	.84	.26‡		
	Coping-with- depression	-.14	.43	-.02			1.66	.96	.10		
	Enhancement	.20	.17	.06			.32	.39	.05		
	Conformity	-.94	.36	-.12*	.23	.16‡	-1.31	.81	-.08	.26	.18‡
Step	Indicator variable(s)	Frequency of drinking on the weekend					Standard drinks on the weekend				
		<i>B</i>	SE	$\beta$	Adjusted <i>R</i> <sup>2</sup>	$\Delta$ <i>R</i> <sup>2</sup>	<i>B</i>	SE	$\beta$	Adjusted <i>R</i> <sup>2</sup>	$\Delta$ <i>R</i> <sup>2</sup>
1	(Constant)	8.79‡	.66				20.40‡	1.36			
	Gender	-1.37	.30	-.21‡			-3.60	.61	-.25‡		
	Age	-.04	.01	-.17‡	.06	.07‡	-.19	.02	-.34‡	.17	.17‡
2	(Constant)	2.30†	.84				7.03‡	1.75			
	Gender	-1.06	.25	-.16‡			-3.04	.52	-.21‡		
	Age	.00	.01	-.00			-.11	.02	-.20‡		
	Social	1.15	.19	.29‡			1.34	.40	.16†		
	Coping-with-	1.61	.50	.19†			3.53	1.05	.19†		

anxiety

Coping-with- .46 .58 .05 2.04 1.21 .09

depression

Enhancement 1.10 .23 .25‡ 2.5 .48 .26‡

Conformity -2.33 .49 -.21‡ .35 .29‡ -3.92 1.02 -.16‡ .40 .24‡

*Note.* \*  $p < .05$ ; †  $p < .01$ ; ‡  $p < .001$ .

**Table 4.**

Means, standard deviations, and differences in drinking motives between moderate drinkers, heavy drinkers, and outpatients.

	a. Moderate drinkers (N = 433)	b. Heavy drinkers (N = 49)	c. Outpatients (N = 59)	d (b-a)	d (c-a)	d (c-b)	F univariate	Partial eta <sup>2</sup>
1. Social	2.27 (.81)	2.92 (.88)	2.88 (.88)	.77‡	.72‡	.05	25.60	.09
2. Enhancement	1.54 (.69)	2.28 (.89)	2.53 (1.02)	.92‡	1.14‡	.26	63.04	.19
3. Coping-with-anxiety	1.16 (.31)	1.59 (.71)	2.90 (1.11)	.78‡	2.14‡	1.41‡	289.99	.52
4. Coping-with-depression	1.09 (.26)	1.44 (.55)	2.49 (1.00)	.81‡	1.92‡	1.30‡	249.78	.48
5. Conformity	1.09 (.27)	1.25 (.47)	1.55 (.59)	.42†	1.00‡	.56‡	46.21	.15

*Note.* Outpatients were diagnosed with alcohol abuse/dependence according to DSM-IV-TR criteria. Means are covariate-adjusted to control for group differences in age and gender. Differences between groups calculated with the Bonferroni test. † p < .01; ‡ p < .001. Cohen's d values of 0.20, 0.50 and 0.80 correspond to small, medium and large effect sizes, respectively [49]. All univariate F (df = 2, 536) values and eta-squared were significant at p < .001.