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An Exploration of the Four-Factor Structure of the Drinking Motives Questionnaire-Revised Among Undergraduate Students in China

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Abstract

Background—College drinking has become a significant health issue in China; the current study addressed the gap that no prior research has investigated drinking motives among Chinese undergraduate students.

Objectives—This study aimed to replicate the four-factor structure of the Drinking Motives Questionnaire-Revised (DMQ-R) reported for Western populations. Additionally, the relationships between drinking motives and alcohol use were investigated.

Methods—In 2012, 436 participants (mean age = 20.49 and SD = 1.49; 50% male) recruited from a college in China completed a self-administered survey in their classroom setting. Drinking motives were measured by the Chinese version of the DMQ-R; three indicators of alcohol use were assessed. Factor analysis was conducted to examine the factor structure of the DMQ-R, followed by regression analysis to investigate the associations between drinking motives and alcohol-related outcomes.

Results—Confirmatory factor analysis failed to replicate the measurement model tested, but exploratory factor analysis identified a similar four-dimensional factor structure. Reliability and convergent and discriminant validity of the four factors were acceptable. The results also showed that social motives were related to alcohol use and heavy drinking; conformity motives were related to alcohol use and alcohol-related problems. Enhancement motives were the strongest correlates of alcohol use; coping motives were the strongest correlates of heavy drinking and alcohol-related problems.

Conclusions/Importance—The DMQ-R was a reliable and valid scale measuring four types of drinking motives among Chinese college students. Findings suggested that the motivational model of alcohol use may apply to studying college drinking in China.

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DECLARATION OF INTEREST

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

Keywords

drinking motives; alcohol use; Chinese; college students

INTRODUCTION

Alcohol use and misuse among college students are associated with a range of negative consequences such as injuries, academic impairment, and sexual aggression (Perkins, 2002; Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994). Worldwide, alcohol use among college populations has become a significant public health concern (Karam, Kypri, & Salamoun, 2007; World Health Organization, 2001). Though collegiate drinking has been extensively studied in the United States and a few other developed countries (e.g., Kuo et al., 2002; Gill, 2002; Wechsler et al., 1994; Wicki, Kuntsche, & Gmel, 2010), little is known about college students' drinking behaviors and associated psychosocial correlates in the vast majority of developing countries. The current study sought to address this gap by investigating the relationships between drinking motives and alcohol use among undergraduate students in China. Recent national epidemiological research has shown that drinking and heavy drinking have been prevalent among Chinese college students (Ji, Hu, & Song, 2012). Unfortunately, research on alcohol use among this college population is still scant.

Drinking motives have been recognized as significant correlates of alcohol use among college students in North America (see Baer, 2002; Ham & Hope, 2003, for reviews). The motivational model of alcohol use (Cox & Klinger, 1988) proposes that people are motivated to drink to achieve affective changes, and motives for drinking are the final common pathways to alcohol use. Due to the global convergence of drinking patterns among younger populations (World Health Organization, 2001), the conceptualization of drinking motives may be applicable to adolescents and young adults in diverse cultures. For example, the Drinking Motives Questionnaire-Revised (DMQ-R; Cooper, 1994) and its short-form (DMQ-R SF; Kuntsche & Kuntsche, 2009) have been successfully applied to adolescents and college students in the United States (Cooper, 1994; MacLean & Lecci, 2000), college students in Brazil (Hauck-Filho, Teixeira, & Cooper, 2012), Hungary, and Spain (Németh et al., 2011), and adolescents in Canada, Switzerland, and Italy (Kuntsche, Knibbe, Gmel, & Engels, 2006; Kuntsche, Stewart, & Cooper, 2008; Mazzardis, Vieno, Kuntsche, & Santinello, 2010).

Based on the motivational model of alcohol use (Cox & Klinger, 1988), the current study aimed to replicate the four-factor structure of the DMQ-R reported for Western younger populations (e.g., Cooper, 1994; Kuntsche et al., 2008) with a Chinese undergraduate student sample. Additionally, the effects of drinking motives on alcohol use among Chinese college students were investigated. Research has suggested that the factorial structure of the DMQ-R may be invariant across cultures (Hauck-Filho et al., 2012; Kuntsche et al., 2008). There has also been some evidence suggesting that drinking motives are useful constructs for studying alcohol use among Asian peoples (Kim & Jeon, 2012). Thus, we expected that the four-factor structure of the DMQ-R (Cooper, 1994) may be replicated and then tested a series of

hypotheses about the relationships between drinking motives and indicators of alcohol use. Based on research findings obtained from Western societies (Cooper, 1994; Kuntsche, Knibbe, Gmel, & Engels, 2005; Kuntsche et al., 2006), we hypothesized that social, enhancement, and coping motives would be positively associated with alcohol use, whereas conformity motives would be negatively associated with alcohol use. Enhancement motives were hypothesized to be positively related to heavy drinking. Considering that heavy drinking is often perceived as a normal behavior during social drinking in China (Martinic & Measham, 2008), we also hypothesized that social motives would be positively associated with heavy drinking. Finally, we hypothesized that after controlling for usual alcohol use, coping motives would be positively associated with alcohol-related problems, while social motives would not be associated with alcohol-related problems.

METHOD

Participants and Procedure

Data were collected at Chengdu Medical College in the Sichuan province of China in the fall of 2012. Undergraduate students who were aged 18 years or older and had had at least one standard drink (14 g of pure alcohol) in the past 6 months were recruited, resulting in a total of 436 participants (218 males and 218 females). The mean age of this sample was 20.49 years ($SD = 1.49$). Most participants were of Han ethnicity (95.64%), and lived in the dormitories on campus (99.08%). Participants took a self-administered paper-and-pencil survey in classroom settings in groups of about 30 people. The average time to complete a survey questionnaire was about 40 min. This study was approved by the Institutional Review Board of Emory University in the United States and the authority of Chengdu Medical College in China.

Measures

Drinking Motives—The DMQ-R (Cooper, 1994) was translated into Chinese and then back-translated into English by two independent researchers. Feedback from Chinese undergraduate students prior to the survey supported the comprehensibility of the Chinese version of the DMQ-R. The scale consists of 20 five-point items; response options range from 1 (*almost never/never*) to 5 (*almost always/always*). Participants were asked to think of all the times they drink and choose how often they drink for each of the 20 items.

Alcohol Use—Alcohol use was assessed by the quantity-frequency method (Dawson, 2003). Participants were asked to report their overall frequency of beer, spirits, and wine consumption in the past 30 days and in the past 6 months. Response options ranged from 0 days to everyday. They were also asked to report the usual quantity of beer, spirits, and wine they consumed on days when they drank. Response options ranged from zero to a maximum quantity to be provided. Quantity questions were phrased consistent with the measurement units used in China (i.e., 50 and 500 g, and 500 ml). Alcohol use was computed by summing consumption of the three alcoholic beverages in grams of pure alcohol. Following the convention for this computation (Cochrane, Chen, Conigrave, & Hao, 2003), the pure alcohol contents by volume of beer, spirits, and wine were specified as 4, 52, and 12%, respectively.

Heavy Drinking—Participants were asked to report whether or not they consumed five or more drinks (male), or four or more drinks (female), in about 2 h (National Institute of Alcohol Abuse and Alcoholism, 2004) in the past 30 days and in the past 6 months. The quantity of five or four drinks was phrased consistent with the measurement units used in China.

Alcohol-related Problems—Twenty, five-point items from the College Alcohol Study (Wechsler et al., 1994) were translated into Chinese and used to assess alcohol-related problems. Response options ranged from “none” to “10 times or more.” Due to the low-response rates for higher frequency responses for alcohol-related problems, each item was dichotomized as either having or not having a certain problem in the past 12 months. Alcohol-related problems were computed by summing all problems reported, with a possible range of 0–20.

Analytical Strategy

First, a confirmatory factor analysis (CFA) was conducted to replicate the factorial structure of the DMQ-R reported for Western populations (e.g., Cooper, 1994). The sample size of 436 roughly met the criterion of 10 subjects per free parameter estimate for CFA (Schreibera, Norab, Stagec, Barlowb, & Kinga, 2006; Worthington & Whittaker, 2006). The robust diagonally weighted least squares method (Jöreskog & Sörbom, 1996) was used for parameter estimation, as this method helps to yield accurate estimates for ordinal data analyses even when the sample size is not very large and the normality assumption is moderately violated (Flora & Curran, 2004). The overall model fit was evaluated by chi-square test statistic, root mean square error of approximation (RMSEA), comparative fit index (CFI), and standardized root mean square residual (SRMR; Kline, 2005). An acceptable model-data fit was indicated by nonsignificant chi-square test statistic, RM-SEA below .08 (Marsh, Hau, & Wen, 2004; Thompson, 2004), CFI above .95 (Schreibera et al., 2006), and SRMR below .08 (Schreibera et al., 2006). In addition, the ratio of chi-square statistic to degrees of freedom (χ^2/df) was computed, and a value below 3 indicated good model fit (Munro, 2005; Schreibera et al., 2006). Three alternative models derived from theory (Cox & Klinger, 1988) were fitted and compared with the four-factor model, including a one-factor model and two two-factor models (external vs. internal; and positive vs. negative). Chi-square difference tests were used for model comparisons.

Second, if the four-factor model tested did not fit the data well, an exploratory factor analysis (EFA) was conducted to explore the factor structure of the DMQ-R. The sample size of 436 met the criterion of 10 subjects per variable for EFA (Costello & Osborne, 2005). To account for the ordinal data, a polychoric correlation matrix was used in the EFA (Holgado-Tello, Chacón-Moscoso, Barbero-García, & Vila-Abad, 2010). Promax rotation was used to obtain an optimal solution. Problematic items were identified and deleted, if they had low communalities (below .30; Costello & Osborne, 2005), had factor loadings below the recommended minimum loading of .32 (Tabachnick & Fidell, 2001), or had cross-loadings with the discrepancy between the primary and secondary loadings below .20. Problematic items were deleted one at a time.

Third, reliability and validity of the DMQ-R were evaluated. To assess the reliability of the factors, Cronbach's alpha and composite factor reliability (Fornell & Larker, 1981) were computed. Acceptable reliability was indicated by Cronbach's alpha above .70 (Nunnally & Bernstein, 1994) and composite factor reliability above .70 (Segars, 1997). To assess convergent and discriminant validity of the factors, average variance extracted (AVE; Fornell & Larker, 1981) was computed. AVE indicates the amount of variance captured by a latent factor in relation to the amount of variance due to measurement error, and a value above .50 suggests convergent validity (Fornell & Larker, 1981). Discriminant validity was evaluated by comparing squared interfactor correlations with AVEs. If squared interfactor correlations are smaller than individual AVEs, it suggests that factors are more internally correlated than they are with other factors, and indicates discriminant validity (Ping, 2004).

Finally, hypothesis testing was conducted if the four-factor structure of the DMQ-R was supported. Logistic regression analyses were conducted for heavy drinking; hierarchical multiple regression analyses were conducted for alcohol use and alcohol-related problems. Covariates (gender and age) were entered on the first step; drinking motives were entered on the second step. The usual alcohol use (past 6-month alcohol use) was also included as a covariate in the regression analysis on alcohol-related problems. A logarithmic transformation was applied to alcohol use and alcohol-related problems to account for skewness of these variables. Before taking the logarithms, constants of 10 and 2 were added to past 30-day alcohol use and alcohol-related problems, respectively, because there were some zero values for the two variables. Lisrel9.1 (Jöreskog & Sörbom, 2012) was used for CFA and EFA; SPSS19.0 (IBM Corp, 2010) was used for regression analysis.

Missing Data Treatment

Eleven participants (2.52% of the whole sample) did not answer three or fewer items of the DMQ-R; missing data were imputed by the Markov chains Monte Carlo method (Schafer, 1997) in Lisrel. Nineteen participants (4.36% of the whole sample) did not answer four or fewer items of alcohol-related problems; missing values were imputed as the medians of the relevant items in SPSS. There were 6, 15, and 19 missing values for past 30-day alcohol use, past 30-day heavy drinking, and past 6-month heavy drinking, respectively. Subjects with missing outcomes were excluded from the regression analyses. Less than 5% of subjects were excluded from any single regression analysis.

RESULTS

The Four-factor Structure of the DMQ-R

Fit indices of the measurement model tested suggested that the model did not fit the data well [$\chi^2(164, N = 436) = 637.233, p < .001$; RMSEA = .093, with 90% CI being (.087, .100); CFI = .957; SRMSR = .094]. Additionally, the standardized factor loading of Item 2 was only .27, and the variance in this item explained by its corresponding factor (conformity motives) was only .07. Therefore, a model modification was conducted by fixing the factor loading of Item 2 to 0. However, the overall fit of this modified model was still unacceptable (Table 1). Due to a lack of support from theory and prior research, no further modifications were made by adding error covariance between certain pairs of indicators as suggested by

the modification indices. The three alternative models were also fitted by fixing the factor loadings of Item 2 to 0. As Table 1 shows, fit indices of the modified measurement model were better than those of the alternative models. Also, the modified four-factor model fit significantly better than the one-factor model [$\chi^2_{\text{diff}} (6, N = 436) = 608.98, p < .001$], the two-factor model (external vs. internal) [$\chi^2_{\text{diff}} (5, N = 436) = 242.72, p < .001$], and the second two-factor model (positive vs. negative) [$\chi^2_{\text{diff}} (5, N = 436) = 448.60, p < .001$].

Given the unacceptable fit of the modified four-factor model in CFA, an EFA was conducted. Treating the data as continuous, a preliminary analysis supported the appropriateness of factor analysis for the DMQ-R. The Kaiser-Meyer-Olkin measure of sampling adequacy was .88, and Bartlett's test of sphericity was significant [$\chi^2 (190) = 3636.33, p < .001$]. Both the scree plot and the Kaiser rule (i.e., retaining factors whose eigenvalues are greater than 1.0; Costello & Osborne, 2005) suggested that four factors should be extracted. Therefore, an EFA on ordinal data was conducted, and the number of factors was specified as four. The results showed that the communality of Item 2 was only .20 and factor loadings of this item ranged from .01 to .28. By deleting Item 2, a second EFA was conducted. Item 15 was identified as another problematic item, with factor loadings ranging from .26 to .30. After deleting Item 2 and Item 15, a third EFA yielded a satisfactory solution. Table 2 shows the final four-factor structure of the DMQ-R via EFA. The average communality across items was .63. All items had factor loadings above .50 except one item. None of the 18 items retained had significant cross-loadings.

Reliability, Convergent, and Discriminant Validity

A computation of the mean average item scores of the four factors showed that social motives were the most often reported, followed by coping, enhancement, and conformity motives (Table 3). Social and conformity motives had the highest interfactor correlation, followed by coping and enhancement motives. Reliabilities of the four factors were acceptable. There was reasonable evidence for convergent validity of the four factors, as the smallest AVE (.49) was close to the recommended threshold of .50 (Fornell & Larker, 1981). The largest squared interfactor correlation was .27, smaller than any individual AVE, suggesting discriminant validity of the four factors.

Drinking Motives and Alcohol-Related Outcomes

The medians for past 6-month and past 30-day alcohol use were 278.59 and 57.64 g of pure alcohol, respectively. There were 68.59 and 48.46% of participants who reported having ever engaged in heavy drinking in the past 6 months and in the past 30 days, respectively. The median number of alcohol-related problems was 3.

As Tables 4 and 5 show, the hypothesized associations between drinking motives and alcohol-related outcomes were supported. For alcohol use, all four drinking motives were associated with past 6-month alcohol use, but only social and enhancement motives were related to past 30-day alcohol use. The directions of these associations were as hypothesized, and the association between enhancement motives and alcohol use was the strongest. For heavy drinking, coping motives were the strongest correlates; social motives were related to both past 6-month and past 30-day heavy drinking, while enhancement motives were related

to past 30-day heavy drinking only. For alcohol-related problems, coping motives were the strongest correlates, and conformity motives were also positive correlates. As hypothesized, social motives were not associated with alcohol-related problems after controlling for usual alcohol use.

DISCUSSION

The current study identified a four-factor structure of the Chinese version of the DMQ-R. Although the factorial structure tested was not fully replicated in this study, the four-factor structure identified by EFA is very similar to that reported for Western populations (e.g., Cooper, 1994; Kuntsche et al., 2008). The most notable difference between findings of this study and those of previous research was in social motives. The results showed that social motives included an indicator of conformity motives (Cooper, 1994), i.e., Item 12 (“To fit in with a group you like”). This difference may be caused by different cultural environments. Because alcohol consumption is generally a socializing activity in China (Cochrane et al., 2003; Martinic & Measham, 2008), Chinese college students may perceive that “To fit in with a group you like” is a reason for social drinking, rather than a reason for drinking to conform to some external pressure. Additionally, CFA and EFA identified two items that may be of little relevance to Chinese college students, i.e., Item 2 (“Because your friends pressure you to drink”) and Item 15 (“Because you feel more self-confident and sure of yourself”). Because alcohol use mainly functions as a social lubricant among Chinese (Cochrane et al., 2003), Chinese college students may voluntarily participate in drinking with little peer pressure. As a result, Item 2 may not be a good indicator of drinking motives of these students. Despite these differences from previous reports, this study is the first to reveal a four-dimensional factor structure of the DMQ-R with a Chinese undergraduate student sample. The findings suggested that the classification of the four types of drinking motives measured by the DMQ-R may be stable across cultures, and the DMQ-R may apply to study drinking motives among Chinese college students in the future. Further research is needed to replicate this four-factor structure of the DMQ-R identified in this study. Additionally, the present findings also suggested that, to measure drinking motives of Chinese college students, the DMQ-R may work better than its short-form (DMQ-R SF; Kuntsche & Kuntsche, 2009). As Table 2 shows, the indicators of social motives and rankings of loadings of the indicators of the four factors were somewhat different from those reported for Western populations (Cooper, 1994; Kuntsche et al., 2006). Therefore, the DMQ-R with all 20 indicators retained can help to capture the most salient aspects of the four drinking motives of Chinese college students (i.e., items with the highest loadings on the four factors).

The results further supported the reliability and validity of the four factors identified, and demonstrated that the four drinking motives were distinct constructs associated with different patterns of alcohol-related outcomes. Social motives stood out as the most often endorsed drinking motives, replicating findings reported on adolescents and young adults in Western countries (Kuntsche et al., 2005). Consistent with previous research (e.g., Cooper, 1994; Kuntsche et al., 2006), social motives were related to alcohol use, but not alcohol-related problems after controlling for usual alcohol use. As hypothesized, social motives

were also positively associated with heavy drinking, and this result may be caused by the particular drinking norms in China (Martinic & Measham, 2008).

Consistent with findings obtained from Western countries (Cooper, 1994; Kuntsche et al., 2006, 2008; Mazzardis et al., 2010), the association between enhancement motives and alcohol use was the strongest. However, contrary to previous research (Cooper, 1994; Kuntsche et al., 2006, 2008), enhancement motives were not the strongest correlates of heavy drinking, which were positively related to past 30-day heavy drinking only. The association between coping motives and heavy drinking was shown to be the strongest. These results suggest that, while participants mainly consume alcohol to enhance internal positive affect, they mainly engage in heavy drinking for coping reasons.

Coping motives were the second most often reported drinking motives, suggesting that besides the major drinking pattern of social drinking among participants, another important pattern is coping-oriented drinking. Contrary to findings for adolescents and young adults in Western countries (Kuntsche et al., 2005), the endorsement of coping motives among participants was higher than that of enhancement motives. This may be due to the fact that a higher proportion of Chinese are susceptible to pharmaceutical effects of alcohol than other peoples (Cochrane et al., 2003); therefore, drinking for enhancement reasons among Chinese may not be as prevalent as it is among Western populations. Consistent with previous research (Kuntsche et al., 2005), coping motives were particularly important correlate of alcohol-related problems. Additionally, coping motives were found to be the strongest correlates of both past 6-month and past 30-day heavy drinking. These findings suggest that Chinese college students who consume alcohol for coping reasons are at risk for heavy drinking and alcohol-related problems.

Consistent with prior research conducted in Western countries (Cooper, 1994; Kuntsche et al., 2008), the findings showed that conformity motives were the least often reported, negatively associated with past 6-month alcohol use, and positively associated with alcohol-related problems. These results suggest that though there are only a small number of participants who consume alcohol for conformity reasons, these students are at risk for alcohol-related problems.

Thus, findings of this study supported the utility of drinking motives for studying alcohol use among Chinese undergraduate students. Nevertheless, the explanatory power of drinking motives for outcomes was low; only 6%–10% of the variances in alcohol use and in alcohol-related problems, respectively, were explained by drinking motives. There are two possible reasons. First, the associations between drinking motives and alcohol-related outcomes may be attenuated by range restrictions in alcohol use. An examination of the data showed that the median past 6-month alcohol use of males and females was only about 37 and 11 drinks, respectively. It indicates that light or moderate drinkers may be overrepresented in this sample, and variability of alcohol-related outcomes and associated correlates may be reduced. Second, it is also possible that the motivational model of alcohol use may be limited in its application to Chinese college students. However, given that the hypothesized associations between drinking motives and alcohol-related outcomes were supported,

replication research is necessary. Future research may benefit from sampling more experienced drinkers to increase variability of the data.

Several limitations of this study should be acknowledged. First, this study was a cross-sectional study; causal relationships between drinking motives and alcohol-related outcomes cannot be inferred. Second, all alcohol-related outcomes were measured through self-report; no alternative assessments were used. Nonetheless, alcohol research has suggested that self-report data can provide reliable and valid estimates of drinking behaviors if issues such as confidentiality have been carefully addressed (Del Boca & Darkes, 2003; Del Boca & Noll, 2000). Third, data were collected from a single college in China and convenience sampling was used to recruit participants; therefore, generalization of the findings is limited.

Despite these limitations, the current study is the first that has identified a four-dimensional factor structure of the Chinese version of the DMQ-R. Moreover, this study replicated previous research findings obtained mainly from North America, thereby lending support for the utility of the motivational model of alcohol use for studying collegiate drinking in China. The potential application of the DMQ-R among Chinese undergraduate students in the future may help to identify high risk drinkers (e.g., those who mainly drink for coping reasons) for interventions to reduce harmful drinking patterns among this population of 23 million students (Ministry of Education of the People's Republic of China, 2013).

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GLOSSARY

Confirmatory factor analysis	tests whether a specified set of constructs is influencing responses in a predicted way
Conformity motives	reasons for drinking to avoid social censure or rejection
Coping motives	reasons for drinking to reduce or regulate negative emotions
Drinking motives	the needs or psychological functions that alcohol consumption fulfills
Enhancement motives	reasons for drinking to enhance positive mood or well-being
Factor analysis	a collection of statistical methods used to examine how underlying constructs influence the responses on a number of measured variables. Exploratory factor analysis attempts to discover the nature of the constructs influencing a set of responses. Confirmatory factor

analysis tests whether a specified set of constructs is influencing responses in a predicted way

Social motives

reasons for drinking to obtain positive social rewards

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TABLE 1
Goodness-of-fit indices of the modified four-factor model and three alternative models of the DMQ-R (19 indicators retained)

	χ^2 (df)	χ^2 (df)	RMSEA (90% CI)	CFI	SRMR
One-factor model	1184.841(152)	7.795	.111 (.104, .117)	.904	.147
Two-factor model (external vs. internal)	818.583(151)	5.421	.098 (.092, .105)	.938	.113
Two-factor model (positive vs. negative)	1024.456(151)	6.784	.105 (.098, .111)	.919	.141
Four-factor model	575.861(146)	3.944	.085 (.078, .092)	.960	.091

Note: RMSEA, root mean square error of approximation; CFI, comparative fit index; SRMR, standardized root mean square residual. For all models specified, the chi-square likelihood ratio test statistic is significant ($p < .001$).

TABLE 2
Factor loadings and communalities based on exploratory factor analysis on 18 items of the DMQ-R

Item	Factor 1 (social)	Factor 2 (coping)	Factor 3 (enhancement)	Factor 4 (conformity)	Communalities extracted
14. Because it improves parties and celebrations	.85				.70
11. Because it makes social gatherings more fun	.80				.66
16. To celebrate a special occasion with friends	.74				.51
12. To fit in with a group you like	.64				.62
3. Because it helps you enjoy a party	.60				.42
5. To be sociable	.52				.39
1. To forget your worries		.98			.79
4. Because it helps you when you feel depressed or nervous		.78			.66
6. To cheer up when you are in a bad mood		.76			.62
17. To forget about your problems		.66			.62
7. Because you like the feeling			.87		.68
18. Because it's fun			.86		.71
13. Because it gives you a pleasant feeling			.83		.73
10. To get high			.59		.62
9. Because it's exciting			.48		.55
19. To be liked				.93	.85
20. So you won't feel left out				.82	.70
8. So that others won't kid you about not drinking				.63	.46

Note: Factor loadings < .32 were suppressed.

TABLE 3

Means, standard deviation, skewness, kurtosis, inter-factor correlations, reliability and AVEs of the four factors of the DMQ-R

	Social	Coping	Enhancement	Conformity
Mean average item score (SD)	3.28(.97)	1.97(.83)	1.74(.73)	1.62(.78)
Skewness	-.39	1.01	1.25	1.69
Kurtosis	.13	.62	1.49	2.97
Inter-factor correlation				
Coping	.22			
Enhancement	.35	.48		
Conformity	.52	.46	.38	
Cronbach's alpha	.82	.84	.83	.78
Composite factor reliability	.85	.88	.90	.84
AVE	.49	.65	.63	.64

Note: AVE: average variance extracted. All interfactor correlations are significant ($p < .001$).

Multiple regression analysis on the relationships between drinking motives and alcohol use and alcohol-related problems, controlling for gender and age

TABLE 4

Drinking motives	Past 6-month alcohol use		Past 30-day alcohol use		Alcohol-related problems ^d	
	β	R^2	β	R^2	β	R^2
Social	.16**		.12*		.07	
Coping	.11*		.07		.26***	
Enhancement	.19***		.17**		-.08	
Conformity	-.12*	.09***	-.09	.06***	.12*	.10***

Note:

^dThe effect of past 6-month alcohol use was also controlled for.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Logistic regression analysis on the relationships between drinking motives and heavy drinking, controlling for gender and age

TABLE 5

	Past 6-month heavy drinking			Past 30-day heavy drinking		
	<i>B</i>	<i>SE B</i>	<i>OR (95% CI)</i>	<i>B</i>	<i>SE B</i>	<i>OR (95% CI)</i>
Constant	−1.51	1.56	N.A.	−2.94	1.50	N.A.
Social motives	.06 [*]	.03	1.06(1.01, 1.12)	.06 [*]	.03	1.06(1.01, 1.12)
Coping motives	.11 ^{**}	.04	1.12(1.03, 1.21)	.08 [*]	.04	1.08(1.01, 1.16)
Enhancement motives	.05	.04	1.05(.98, 1.13)	.07 [*]	.03	1.08(1.01, 1.15)
Conformity motives	−.08	.06	.924(.83, 1.03)	−.09	.05	.92(.83, 1.01)

Note: N.A.: not applicable.

^{*} $p < .05$.

^{**} $p < .01$.