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Title: Validation of the Drinking Motives Questionnaire (DMQ) in older adults

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Abstract

Drinking motives have been established as an important construct in the prediction of alcohol use and drinking problems among younger adults, but there is little understanding about the drinking motivations of older adults. Although emerging evidence shows the importance of studying older adults' own reasoning for their alcohol consumption, measures that have been used to assess such reasons lack psychometric assessment. This study aims to validate the three-dimensional structure of the Drinking Motives Questionnaire (DMQ) in older adults and to investigate the relationships between drinking motives and alcohol use. A sample of community dwelling older adults ($N = 370$) completed self-report measures assessing drinking behavior and motives for drinking. Using confirmatory factor analysis, the results supported a three-factor model of drinking motives. Multi-group analysis of invariance showed support for configural and metric invariance, and partial support was met for scalar invariance. Social motivations for drinking were the most frequently endorsed, followed by enhancement, and coping motives. Males reported more frequent drinking for each of the three motives. Social motives were consistently related to drinking behaviors and coping had a direct relationship to drinking problems. Overall, the study shows the DMQ has promise as a measure for use with older adults.

Keywords: older adults; drinking motives; alcohol use; confirmatory factor analysis

1. Introduction

1.1 Alcohol use in old age

Alcohol use among individuals aged 60 years or older has received much less attention than its use in both adolescents and adults. Although drinking quantity tends to decline with age, older adults are shown to drink more frequently than younger age groups (Australian Institute of Health and Welfare, 2011) Age-related changes such as increased medication use, an increased risk of falls, and physiological changes (e.g., smaller body mass and lower water content) lead to higher blood alcohol concentrations for a given dose and therefore greater intoxication (Vestal et al., 1977). This means that even modest levels of alcohol can cause harm in older adults. Prevalence rates of problem drinking among older adults range between 1-15% or higher (Adams, 1996; Blow & Barry, 2002; Moore et al., 2006), depending on how problem drinking is measured and the participants sampled. There is also evidence to suggest that recent birth cohorts (i.e., the ageing "baby boomers") consume greater levels of alcohol than earlier cohorts. These trends in alcohol consumption suggest a likely increase in alcohol problems as these people age (Blow, Brockmann, & Barry 2004).

One approach to facilitate an understanding of why older adults drink is to study their reasons for drinking. Investigating the reasons for drinking has offered insight into drinking for self-medication (Aira et al., 2008; Brennan et al., 2005) and social integration (Khan, Wilkinson & Keeling, 2006) among older adults. However, in older adults the reasons for drinking have been investigated by study-specific measures that are not subjected to psychometric evaluation. These unnamed measures can include factors containing non-specific items, for example, *enjoying the taste of alcohol* was subsumed within a "social reasons" dimension in a study by Graham et al. (1996). In contrast, other studies do not

measure factors but employ a list of broad reasons, such as *for social reasons* (Immonen et al., 2010), which limit the level of insight that can be gained. Taken together, these concerns support the need for a valid and reliable measure that allows researchers to compare findings across studies at the endorsement level and in their association with drinking behavior.

1.2. Drinking motives

One measure that has been extensively applied to investigate why younger and middle-aged adults drink alcohol is the drinking motives questionnaire (DMQ; Cooper et al., 1992; Cooper, 1994). Drinking motives originate from the motivational model of alcohol use (Cox & Klinger, 1988). Defined as the actual (self-reported) use of alcohol in order to achieve a desired effect or outcome (Cooper, 1994), drinking motives are conceptualized as the most proximal factor relating to alcohol use. Cooper and colleagues (1992) found support for a three-factor structure of drinking motives based on a distinction of valence (positive or negative) and source (internal or external). This gave rise to: 1) drinking to enhance positive mood or well being such as *because it's fun* (internally generated, positive reinforcement), 2) to obtain social rewards such as drinking *to celebrate a special occasion with a friend* (external, positive reinforcement), 3) to attenuate negative emotions such as drinking *to forget your worries* (negative, internal reinforcement). The three drinking motives were termed enhancement, social and coping, respectively, and are represented by the Drinking Motives Questionnaire (DMQ). This measure assesses the relative frequency of drinking for each motive and was validated using confirmatory factor analysis (CFA) on a large sample of middle-aged adults.

Research has demonstrated that despite the high inter-correlations between drinking motives, they are each considered *psychologically distinct* with specific antecedents and alcohol-related consequences. Enhancement motives include items such as "How often do

you drink because you like the feeling?" and are associated with frequent heavy drinking and are indirectly related to drinking problems (via alcohol consumption). In contrast, social motives include items such as "How often do you drink because it makes a social gathering more enjoyable", which relate to moderate, non-problematic alcohol consumption. Coping motives refer to items such as "How often do you drink to forget your worries?" and predict drinking problems both directly and indirectly through alcohol consumption.

Whilst there is extensive empirical support for the factorial and concurrent validity of the DMQ, very little work has been done with the DMQ on adults aged $\geq$60 years. This is despite the DMQ containing suitable items for an older age group e.g. "drinking to be sociable" and that are consistent with existing knowledge of why older adults drink alcohol (Immonen et al., 2010). The concise size of the 15-item 3-factor DMQ further suggests that this measure could advance the current methods of investigating why older adults drink alcohol.

1.3. The current study

The focus of this study is the measurement of the Drinking Motive Questionnaire (DMQ) among older adults, and whether it represents psychometrically-valid and reliable measurement tool for use within an older age group (>60 years). The first aim was to confirm the factorial validity and internal consistency of the DMQ in a sample of older adult drinkers. Measurement invariance was also tested across gender. A second aim was to investigate the concurrent validity of the DMQ by assessing the relationships between drinking motives and measures of alcohol use and drinking problems. This was also to determine whether distinct aspects of alcohol use were predicted by each drinking motive. It was hypothesized that positive reinforcement motives (both social and enhancement) would be strongly related to alcohol use and only indirectly related to drinking problems (through

alcohol use). In contrast, negative reinforcement motives (coping) would be less strongly related to alcohol use and directly related to drinking problems (even after controlling for alcohol use).

2. Method

2.1 Participants and procedure

A pilot study was first performed on a small sample ($N = 10$) of older adults to examine whether any items on the DMQ were perceived as difficult. For the main study, data was collected by postal questionnaire between May and September 2011. A total of 1682 participants, randomly selected from the electoral rolls of Victoria and New South Wales, were contacted to join this study. These participants were part of a larger, longitudinal study on mental health and well-being in rural areas of Australia ($N = 7,615$; Murray et al., 2004). There were no exclusion criteria.

Valid consent and questionnaire responses were received from 527 participants, who had a mean age of 71 years (SD = 7.89), and the majority were of Australian background (93%), married (65.6%) and economically inactive (72%). Participants who had missing data on a measure of alcohol consumption, the AUDIT-C ($n = 15$) or indicated they had not consumed alcohol in the previous 12 months ($n = 142$) were excluded from the analyses. This left 370 participants for the current study. Seventy-eight participants did not report age or gender, these were included in the initial confirmatory factor analysis but excluded from the invariance testing and concurrent validity analyses. Of the 370 participants, 93% (344) were Australian born, 65.6% (242) were married, 18.2% (71) were single/separated or widowed, 82.4% (305) belonged to a religious group, 28% (103) were employed and 57.6% (212) were

retired. Data on financial status showed 85.6% (298) had adequate to sufficient financial

status, and 11.2% (39) reported more than sufficient financial status.

2.2 Measures

2.2.1 Drinking motives

The DMQ (Cooper et al., 1992) is a 15-item scale that assesses the relative frequency

of drinking for three conceptually and empirically distinct motive dimensions (enhancement,

social and coping). Each dimension consists of five items such as: *How often do you drink to*

forget your worries? (e.g., a coping motive) that are rated on a 4-point frequency scale: 1 =

almost never/never to 4 = *almost always*. This measure has been used to assess drinking

motives in adult samples and is considered suitable for the current study because it includes

items that are consistent with the reasons older adults provide for their drinking. However,

the pilot study showed that one enhancement motive item: *drinking because it is exciting* was

confusing and perceived as irrelevant by participants*;* therefore this item was removed from

the study. Consequently, a 14-item DMQ was used in the current study. The three motive

subscales demonstrated good to excellent reliability, alphas were acceptably high: .92

(social), .86 (coping), and .86 (enhancement).

2.2.2 Alcohol use

A sub-measure of the Alcohol Use Disorders Identification Test (AUDIT), namely the

AUDIT-Consumption Questions (AUDIT-C; Bush et al., 1998) has been used to identify

hazardous drinking across a range of different samples. The AUDIT-C consists of three items

pertaining to the typical alcohol consumption frequency, quantity and binge drinking over the past 12 months. The total AUDIT-C score is a summation of all three subscales (quantity/ frequency, and binge drinking) with a possible score range of 0-12; higher scores are indicative of greater levels of alcohol consumption.

2.2.3 Drinking problems

The Drinking Problems Index (DPI; Finney et al., 1991) is a 17-item self-report measure that assesses the adverse consequences of drinking. Drinking problems are assessed by summing the frequency of responses on a four-point scale: 0 = never to 4 = often. The DPI has been used in a large number of middle-older aged adults and has high internal consistency (alpha = 0.94) and good construct and predictive validity (Finney et al., 1991; Bamberger et al., 2006). In the current study, the internal consistency of the DPI was excellent (alpha = .91).

2.3. Overview of analyses

To examine the construct validity of the DMQ a CFA was conducted in AMOS (v.19). The maximum likelihood estimation procedure was selected to estimate the parameters of the three-factor model. To evaluate model fit, the Comparative Fit Index (CFI; Bentler, 1990), Root Mean Square Error of Approximation (RMSEA) and the Standardized Root Mean Square Residual (SRMR) were used. Hu and Bentler (1999) recommend the following cut-offs to indicate excellent fit: close to .95 (or higher) on the CFI, close to .6 (or lower) for RMSEA and close to .08 (or lower) for SRMR. Given the Chi-Square value is highly influenced and dependent on sample size, the ratio of chi-square relative to the degrees

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of freedom (χ^2/df) is recommended (Hu & Bentler, 1999). A value of 2 is an acceptable ratio for the χ^2/df ratio (Tabachnick & Fidell, 2007). Multi-group CFA was also performed to examine measurement invariance of the DMQ across males and females. Gender differences in the mean levels of drinking motivation were subsequently tested and to confirm the concurrent validity of the DMQ, a number of multiple regression analyses were carried out.

3. Results

3.1 Missing data

Nine participants had ≤ 2 DMQ items missing and were replaced by the subscale mean that the missing value fell within. This method is considered appropriate for cross-sectional missing data when 50% or more of the questionnaire has been filled out (Downey & King, 1998). The subscale mean was used as opposed to the mean for the overall scale because each drinking motive is considered to be theoretically distinct. Eight participants had >2 items missing and were excluded, this provided a sample of $n = 362$ with complete data on the DMQ for the CFA.

3.2 Descriptive analysis

In terms of drinking frequency (AUDIT-C Q1) on a weekly basis, 54% drank less than weekly whilst 19.1% drank 2-3 times a week and 26.9% of participants consumed alcohol four or more times a week. For typical drinking quantity (AUDIT-C Q2) 71.2% reported consuming 1-2 drinks and 21.9% reported 3-4 drinks per drinking occasion. Although the majority of participants (75.6%) did not binge drink (AUDIT-C Q3), 5.8% engaged in weekly

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binge drinking and 3.9% did this monthly. Data on drinking problems showed that 25.4% experienced one or more drinking problems in the previous 12 months.

3.3 Confirmatory factor analysis

Prior to conducting the CFA, multivariate normality was judged by Mardia's (1970) coefficient of multivariate kurtosis. This was 237.86 and the associated critical ratio was 106.90, the magnitude of this value suggested that the data was multivariate non-normal (Ullman, 2006), which can lead to standard error biases (Bentler & Wu, 2002). To address non-normality, the DMQ was additionally evaluated using bootstrapping (500 bootstrap samples). This is a non-parametric re-sampling procedure that repeatedly draws random samples from the original data set to provide a more accurate estimation of the sampling distribution, including standard error and confidence intervals. The procedure offers the Bollen-Stine bootstrap test statistic, which is a measure of absolute fit not subjected to normal theory constraints (Bollen and Stine, 1992). A non-significant Bollen-Stine *p*-value is indicative of excellent global fit and was used in conjunction with the other model fit indices i.e., χ^2/df ratio, CFI, SRMR, and RMSEA. Outliers were checked using Mahalanobis' Distance (D^2). The case with the highest D^2 showed a value that was distinct from others. Further examination of this particular case showed each drinking motive item had a maximum score, whilst the participant had reported to drink very infrequently. This case was deleted and the CFA was performed on 361 participants. The total number of estimated parameters was 27, which meant the number of observations per parameter were adequate to prevent biased estimates (Bentler, 1989; Schreiber et al., 2006). Raw data were used for the CFA and the metric of the latent factors was defined by setting factor variances to 1.

3.2.1. Model estimation and assessment of model fit

All motive items demonstrated high factor loadings; only two items had loadings < .60 on their respective factors, squared multiple correlations were substantially lower for these items (.34: to relax, and .32: to get high). Fit statistics suggested the model had substandard fit (χ^2/df = 4.6; CFI = .91, RMSEA = .10 [95% CI = .09-.11], and SRMR = .09). The Bollen-Stine p-value for the chi-square test was statistically significant (p = .002), suggesting poor model fit. Post-hoc model modifications were conducted to improve the fit of the model. To avoid capitalizing on chance (MacCallum et al., 1992) any subsequent model changes were ensured to make both statistical and theoretical sense

3.2.2 Model modification

Examination of the modification indices (MI) showed a highly elevated modification index (MI) between the social motive item *drinking to relax* and the social motive factor (MI = 61.79). This was accompanied by a high value for the parameter change estimate (.14); a parameter change estimate of >.1 is considered large enough to justify model modification. Multiple large standardized residual covariances ranged from 4.0 to 7.49 were also observed between this item and social motive items. This indicated a problem in how item six was specified on the coping factor and suggested cross-loading onto social motives. This would reduce the discriminant validity of the DMQ and is considered a less parsimonious approach within a CFA framework, which assumes indicator variables measure distinctively different concepts (Yoo & Donthu, 2001). Theoretically, it seems logical that drinking to relax can refer to both drinking for enjoyment in social contexts and drinking to escape negative emotion. Inter-item correlations between the item *drinking to relax* and items from the other motive factors were explored to further understand how participants may have perceived this motivation for drinking. Very strong correlations were apparent between *drinking to relax*

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and *drinking makes social gatherings more enjoyable* (r = .66), and to *what most of your friends do when together* (r = .51). This supported a strong social component behind *drinking to relax* in older adults and suggested the item reflected a positively reinforcing motivation. This latter point is further supported by the strong correlations with two enhancement items: *drinking makes you feel good* (r = .54) and *because you like the feeling* (r = .58). Correlations between *drinking to relax* and other coping motive items were moderately high, ranging from r = .40 to .44; this underscores the secondary nature of the item as a coping motivation. Overall, these data suggest that *drinking to relax* represents a motivation that is not distinct; in order to keep the motives as distinct constructs, *drinking to relax* was dropped from the model. Model fit was reassessed, this showed substantial improvement (χ^2/df = 2.8; CFI = .96, RMSEA = .07 [95% CI = .06–.09], and SRMR = .05). The Bollen-Stine adjusted *p*-value also indicated good overall fit (p = .038).

Although model fit was substantially improved, another item, *to get high* (an enhancement motive) was further examined given the low endorsement on this item, suggesting it was of low relevance to an older sample. Furthermore, *to get high* had the lowest factor loading (.56) and differed in its distributional properties (highly skewed and kurtotic) compared with the other enhancement items. This suggested this item was not perceived in the same way as other enhancement items. Results on the MI's showed the item had the second largest value (27.35) following *drinking to relax* and multiple large standardized residuals were evident. These results supported the removal of *to get high* from the model and were consistent with the decision of the pilot study to not use the enhancement item *because it is exciting.* This revised model showed excellent fit ($\chi^{2/}$df = 2.5; CFI = .97, RMSEA = .06 [95% CI= .05 – .08], and SRMR = .04). The Bollen-Stine adjusted *p*-value also indicated good overall fit (p = 0.46). Modification indices did not indicate any further areas of localized strain. The final model was compared to the originally hypothesized DMQ

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model using Akaike's Information Criterion (AIC; Akaike, 1987); the AIC has no conventional cut-off, rather, smaller AIC values indicate better fit and are a good choice when comparing non-nested models (Kline, 2005). The AIC for the revised model was considerably smaller compared that of the original DMQ model.

[INSERT TABLE 1 HERE]

3.2.3. Factor correlations, internal consistency, and item endorsement

There were significant correlations among the three factors (see Table 2). The highest interfactor correlations were between enhancement and coping factors ($r = .71$). The subscale internal consistencies (Cronbach's alpha) were .86 or higher indicating good reliability. Table 2 displays the percentage of participants who endorsed at least 2 (*some of the time*) on the drinking motive items. This information is provided because it shows a more detailed view of the types of motivation older adults have for drinking. Greatest endorsement was shown for celebratory and sociability motives, but not because participants believed drinking *makes social gatherings more enjoyable*. There was substantial endorsement in enhancement motives, suggesting that drinking was considered an enjoyable pastime by participants in the sample. In contrast, coping motives were infrequently endorsed with *to cheer up when you're in a bad mood* showing the greater endorsement than other coping items. Overall at least 10% of the sample responded that they drank for the each reason specified at least *some of the time.*

[INSERT TABLE 2 HERE]

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3.2.2. Measurement invariance across gender

Before measurement invariance testing the three factor DMQ model was estimated separately in male and females. The 78 participants who did not report gender data were excluded from these analyses. For men, model fit was adequate to excellent (X^2/d.f ratio = 1.96, CFI = .93, SRMR = .05, and RMSEA = .08). For women, the model fit was excellent (X^2/df ratio = 1.96, CFI = .96, SRMR = .05, and RMSEA = .07). All items loaded significantly on their intended factors within each of the subgroups. Measurement invariance was tested in the form of configural, metric and scalar invariance. A hierarchical approach was taken by successively constraining model parameters and comparing changes in model fit (Byrne, Shavelson & Muthen, 1989; Steenkamp & Baumgartner, 1998). Three models, configural, metric and scalar were estimated and are considered prerequisites for meaningful across-group comparisons based on factor scales. Fit indices of RMSEA, CFI and changes in X^2 (X^2_{diff}) are recommended to decide whether the fit of a model deteriorated significantly (Chen, 2007; Cieciuch & Davidov, 2012). A significant change in X^2 value, a CFI difference of larger than 0.01 and a change larger than .015 in RMSEA is indicative of non-invariance.

A configural model was first established as a baseline model, all parameters were freely estimated (unconstrained) across gender. Fit indices showed this model had adequate fit for the data (X^2 (102) = 207.307, CFI = .938, SRMR = .06, and RMSEA = .06 [90% CI: 0.05 – 0.07] suggesting that the factor structure is similar across groups. A subsequent metric model that tested for invariance of all factor loadings was established. All item loadings related to each factor were constrained to equality. Fit statistics showed this model (compared to the configural model) did not result in a significant degradation of fit (X^2_{diff} (9) = 13.41, p >0.05) suggesting that the three factor DMQ assesses similar underlying factors across males and females. Scalar invariance was tested by constraining the intercept of each item whilst maintaining constraints on the factor loadings (Vandenberg & Lance, 2000). The X^2_{diff} was

significant, indicating a deterioration of fit that did not support invariance. Table 3 shows the model fit statistics for each of the models. To identify those indicators whose intercepts are not invariant, the strategy by Bryne (2004) was followed. This involved testing for invariance of intercepts relative to each factor separately (i.e. constrain the intercepts on one factor to equality whilst other factors are freely estimated). On finding evidence of non-invariance at this level, each item with the subscale is then tested to locate the non-invariance. This process is conducted to test partial scalar invariance, which is considered adequate for performing comparisons of drinking motive means (Byrne, Shavelson, & Methuen, 1989; Steenkamp & Baumgartner, 1988). Results showed that whilst coping and enhancement motives were invariant, social motives were non-invariant. When the constraints for items *what most of your friends do when together* and *social gatherings are more enjoyable* were relaxed, substantial improvement in fit compared to the full scalar model was observed. Although the X^2_{diff} (7) = 12.94 was significant indicating worse fit compared to the metric model, other fit indices showed that the CFI and RMSEA were basically the same ($CFI_{diff} = 0.006$) as the metric model and the B-S *p*-value was non-significant. Furthermore, the three other social items remained invariant, therefore the requirements for partial scalar invariance were met (Bryne, 2004).

[INSERT TABLE 3 HERE]

3.4 Mean differences in drinking motives across gender

The mean frequency score for each drinking motive and their standard deviations were: coping motives: *M* = 1.15 (*SD:* 0.38), social motives: *M* = 2.04 (*SD:* 0.71) and enhancement motives: *M* = 1.40 (*SD:* 0.62). These results suggest participants frequently drank for social purposes, followed by enhancement and coping motives. This mean is consistent with existing literature on younger adults (Cooper, 1994; Stewart et al., 1996). Turning to the

gender known subsample ($n = 284$), the drinking motive dimensions were examined across men and women. An independent-samples t-test was conducted to compare drinking motives in men and women. There was a significant difference in the scores for coping motives across men (M=1.19, SD=0.40) and women (M=1.09, SD=0.24); t (186.67) =2.29, p <0.05. Significant differences were also found for social motives between men (M=2.19, SD=0.74) and women (M=1.86, SD=0.61); t (231.68) =3.99, p <.001. Finally, significant differences were observed on enhancement motives between men (M=1.51, SD=0.64) and women (M=1.28, SD=0.50); t (223.66) =3.28, p < .001 across gender. These significant differences showed moderate effect sizes for social and enhancement motives (Cohen's d: 0.52, 0.44).

3.5 Concurrent validity

Multiple hierarchical regression analyses were performed to determine the concurrent validity of the DMQ in older adults. The criterion variables were the alcohol consumption variables taken from the AUDIT-C (frequency, quantity and binge drinking) and a measure of drinking problems, and the predictor variables were the three drinking motives as confirmed by the CFA. Gender was statistically controlled by entering this in the first step of the regression equation and the unique effects of drinking motives were examined in the second step. To account for the non-normality bootstrapping was carried out, bootstrap samples of 1000 cases were generated by the SPSS Bootstrapping add-on package.

The results indicated that drinking motives accounted for similar proportions of variance in drinking frequency (25%) and drinking quantity (23%), with less variance explained in binge drinking (20%). Social and enhancement motives were significant predictors of frequency, but enhancement motives did not predict drinking quantity. Coping motives were the strongest predictors of drinking quantity followed by social motives. Only

social motives were the strong predictors of binge drinking. Social and coping motives were significant predictors of drinking problems, however, but to control for the confound between drinking problems and the amount of alcohol consumed, the analyses were re-estimated adding the total AUDIT-C score in the second step. Results showed that only coping motives remained significant ($B = 1.56$, $p < 0.01$). These results indicate that the effect of social motives on drinking problems was entirely due to its association with alcohol use, whereas coping motives both directly and indirectly predicted drinking problems.

[INSERT TABLE 4 HERE]

4. Discussion

The study used CFA to confirm the validity of the drinking motives construct in older adults. Results showed support for a three-factor structure in older adults, with the exception of two items (*to get high* and *because it is exciting*) from the enhancement factor and one item from the coping factor (*to relax*). The resultant 12-item DMQ showed excellent fit and each dimension had good internal consistency. The study assessed the configural, metric and scalar invariance of the DMQ across gender using multigroup analysis. Full configural and metric invariance was supported and partial scalar invariance was obtained. Consequently, the three-factor 12-item scale could be used to make comparisons across gender because the factor loading pattern and factor loadings appeared equivalent. Mean differences were significant and men reported more frequent drinking for each of the three motives. This result is consistent with previous research showing that males typically consume greater levels of alcohol than women (Cooper et al., 1992). Furthermore the study had a predominantly female sample and who were low-risk drinkers.

The study showed drinking motives explained similar levels of variance in both quantity (25%) and frequency (23%) of alcohol consumption, with less variance explained in binge drinking (20%). Enhancement and social motives were strongly related to frequency of alcohol use, which is similar to findings from the younger adult literature (Mazzardis et al., 2010; Hauck-Filho et al., 2012). However, only social and coping motives predicted drinking quantity, suggesting enhancement motivation is not indicative of "heavier" styles of drinking as reported in younger age groups (Cooper, 1994; Kuntsche et al., 2006). Furthermore, social motives were stronger predictors of binge drinking and drinking problems compared to enhancement motives. One explanation for the stronger motivational consequences associated with social motives may lie in their frequent endorsement relative to other motives in both men and women. That is, if participants drank predominantly in social contexts or for social reward it may have led to drinking larger amounts within these social occasions and consequently drinking problems were more likely to occur. Coping motives held strong direct associations with drinking problems, which contrasted with social motives that were indirectly predictive of drinking problems. This supports previous research on younger age groups that has shown coping motives are a robust predictor of alcohol-related problems and this motivation exerts a direct effect on drinking problems independent of the amount of alcohol consumed (Cooper et al., 1988; Cooper et al., 1992; Cooper et al., 1995). It remains unknown why people who endorse higher levels of drinking to cope have a greater number of drinking problems, but not necessarily a higher level of alcohol consumption. One suggestion posited by Cooper et al. (1988; 1992) was that individuals who drink to cope lack volitional control over their drinking and also have poor methods of coping in general, which make them vulnerable to developing drinking problems despite not drinking large amounts.

The result that enhancement motives were moderately-frequently endorsed suggests that drinking to enhance positive feelings is relevant to older adults' decision to drink

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alcohol. Other sub-types of enhancement motivation that have been examined outside the DMQ include *epicurean* types of enhancement such as drinking to accompany food. This is a commonly cited reason for drinking among older adults and is associated with light, non-problematic consumption among younger and older adults. Given these drinking consequences were observed with the modified enhancement motive in the current study, it may suggest that without the inclusion of items *drinking to get high* and *because it is exciting* the enhancement factor may capture a different type of enhancement motivation than that originally specified by the DMQ and is associated with heavier consumption. More research using the DMQ on older adults is required to test the theoretical nature of enhancement motives and whether the enhancement motive needs to be broadened for this age group. Similarly, the coping motive item *to relax* requires further investigation; the results of the CFA implied this item had both a social and coping element. Given the importance of social motivation for drinking in older adults, further work could examine whether further description such as *drinking to relax when I am with friends* versus d*rinking to relax when I am feel nervous or moody*, may aid the distinction of this item.

3.6 Limitations

A number of limitations of the current study need to be acknowledged. Firstly, the study relied exclusively on the use of self-report data. Participants may have felt reluctant to report their alcohol consumption and endorse particular drinking motives for fear of stigma and social desirability reasons. Recall bias is also likely because of the retrospective nature of alcohol consumption questions. A second limitation is that the sample was drawn from rural regions of Australia, and that women constituted a large proportion of the participants. Confirmation of the results is needed using more diverse and representative samples before

generalizations can be made beyond a rural sample. Finally, owing to the small sample size of older drinkers with gender information ($n = 370$) it is important that future research seeks to strengthen results on both the confirmatory factor analysis and its subsequent invariance testing. The latter analysis requires a large sample because the parameters of the model are tested twice; therefore this type of testing needs to be further carried out in future research.

3.7 Conclusions

The study is the first to examine the role of drinking motives in older adults' drinking behavior and addresses the lack of empirically-established measures to assess the reasons for drinking in this population. The present results indicate that the DMQ is a valid measure for use on older adults when three items from the original measure are omitted. Support was found for distinct alcohol-related consequences associated with drinking motives, although these slightly differed from the findings on younger adults. The results provide an initial psychometric foundation for future studies to examine the DMQ on larger samples of older adults and suggest that the DMQ can advance current understanding of why older adults drink alcohol.

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Author Disclosure

Table 1

Summary of Fit Indices for the DMQ Confirmatory Factor Analyses ($n = 361$)

Model	X^2/d.f)	B-S p-value	CFI	RMSEA (90% CI)	SRMR	AIC
Model 1: Hypothesized	4.6	.002**	.91	.10	.09	
Model 2: Relax removed	2.8	.038*	.96	.07	.05	236.568
Model 3: Final revised	2.5	.046*	.97	.06	.04	182.769

Note. CFI, comparative fit index; RMSEA, the root mean square error of approximation; SRMR, the standardised root mean square residual; AIC, Akaike Information Criterion. B-S, Bollen-Stine *p < .05. **p < .01.

Table 2

Results of a Confirmatory Factor Analysis (standardized item loadings), Inter-Factor Correlations, Mean Frequencies and Internal Consistencies

How often did you drink…..	Factor			Mean	% Endorsement[a]
	Enh	Cop	Soc		
because it's fun?	.78			1.42	29.9
because it makes you feel good?	.91			1.34	26.6
because you like the feeling?	.80			1.44	33.5
to forget your worries?		.78		1.13	10.8
because you feel more self-confident or sure of		.72		1.15	12.2
because it helps when you feel depressed or nervous?		.84		1.16	11.9
to cheer up when you're in a bad mood?		.79		1.18	15
as a way to celebrate?			.66	2.11	82
because it is what most of your friends do when you			.81	1.92	62
to be sociable?			.78	2.01	71.2
because it is customary on special occasions?			.77	2.20	81.7
because it makes a social gathering more enjoyable?			.84	1.98	25.2
to relax?				1.71	
to get high?				1.09	
Interfactor correlations					
Correlation with the coping factor	.71				
Correlation with the social factor	.65	.41			
Internal consistency					
Cronbach's alpha	.87	.86	.88		

Note: Mean frequency based on a scale of: 1= never, 2 = sometimes, 3 = often, 4 = always. All factor loading are significant (p <.001). [a] % Endorsement for an item represents the percentage of participants who responded at least 2 = some of the time to that item. Enh = Enhancement; Cop = Coping; Soc = Social.

Table 3.

Fit indices for measurement invariance tests

Model	X^2	df	B-S p-value	CFI	RMSEA (90% CI)
Men (n = 123)	100.409	51	.154	.933	.09 (.06 – .12)
Women (n = 161)	106.898	51	.090	.941	.08 (.06 – .11)
Configural invariance	207.307	102	.070	.938	.06 (.05 – .07)
Metric invariance	220.713	111	.116	.935	.06 (.05 – .07)
Scalar invariance	249.004	120	.058	.924	.06 (.05 – .07)
Partial scalar invariance	233.651	118	.096	.932	.06 (.05 - .07)

Note. CFI, comparative fit index; RMSEA, the root mean square error of approximation; SRMR, the standardised root mean square residual; B-S, Bollen-Stine.

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Table 4.

Sequential linear regression analyses predicting concurrent alcohol-use and drinking problems.

Step	Indicator variable(s)	Frequency					Quantity				
		B	SE	BC 95% CI	Adj. R^2	ΔR^2	B	SE	BC 95% CI	Adj. R^2	ΔR^2
1	Gender	-0.49	.15	-.78 - -.21	.04	.04**	--.37	.08	-.53 - -.22	.08	.09***
2	Gender	-1.17	.13	-.43 - .54			-.23***	.07	-.37 - -.09		
	Enhancement	.60***	.13	.35 - .87			.15	.08	-.03 - .29		
	Social	.54***	.10	.34 - .75			.15**	.05	.04 - .26		
	Coping	-.00	.22	-.43 - .55	.28	.25***	.59**	.17	.24 - 93	.30	.23***

Step	Indicator variable(s)	Binge drinking					Drinking problems				
		B	SE^1	BC 95% CI^1	Adj. R^2	ΔR^2	B	SE	BC 95% CI	Adj. R^2	ΔR^2
1	Gender	-0.49	.11	-.70 - -.28	.08	.09**	--.75	.19	-1.18 - - .36	.06	.06***
2	Gender	-0.29	.09	-.48 - -.12			-.39*	.15	-.72 - -.05		
	Enhancement	.27	.14	.02 - .54			.17	.18	-.19 - - .51		
	Social	.30**	.09	.15 - -.47			.45***	.13	.19 - .70		
	Coping	.32	.24	-.14 - .87	.27	.20***	1.80**	.59	.64 – 3.03	.34	.29***

Note. 1= bootstrapped estimates. Bootstrap results based on 1000 bootstrap samples. *$p < .05$. ** $p < .01$. *** $p < .001$*

Highlights

- Confirmatory factor analysis and multi-group analysis of invariance suggested the DMQ is a valid measure for use on older adults
- Specific alcohol-related consequences were associated with each drinking motive
- Social motivations for drinking were the most frequently endorsed
- Males reported more frequent drinking for each of the three motives