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Validity and usefulness of the Short Form of the Drinking Motives

Questionnaire Revised (DMQ-R SF) among patients with schizophrenia

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ABSTRACT

Objective: Drinking motives are considered to be major predictors of alcohol consumption and alcohol-related problems. However, these motives have been poorly investigated in patients with schizophrenia. The aim of the present study among patients with schizophrenia was twofold: 1) assess the validity of the short form of the Drinking Motives Questionnaire-Revised (DMQ-R SF); and 2) investigate the relationship between drinking motives and comorbid alcohol use disorder (AUD).

Method: A total of 179 patients with schizophrenia were approached to participate in the study. DSM-5 criteria were used to identify patients with comorbid AUD (AUD+; $n = 42$) and non-abstainers patients without comorbid AUD (AUD-; $n = 71$).

Results: A confirmatory factor analysis conducted on items of the DMQ-R SF for the whole sample revealed adequate goodness-of-fit values, while internal consistency indices were globally satisfactory. Group comparisons revealed higher use of alcohol and other substances, as well as stronger drinking motives among AUD+ patients, while groups were comparable concerning clinical features of schizophrenia, including psychotic symptom dimensions and severity. Regression analysis showed that the Alcohol Use Disorder Identification Test score was significantly associated with two internal drinking motives: enhancement and coping.

Conclusions: Findings suggest that the DMQ-R SF is a reliable tool for assessing drinking motives among patients with schizophrenia. Enhancement and coping motives seem to play a major role in comorbid AUD among these patients. Community-based and clinical treatment programs should take the drinking motives of dual-diagnosis patients into consideration, in order to improve their outcomes.

Keywords: schizophrenia, alcohol use disorder, dual diagnosis, drinking motives, enhancement motive, coping motive

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1. Introduction

AUD comorbidity is highly prevalent among patients with schizophrenia. According to a meta-analysis conducted among 123 epidemiological or individual studies, this comorbidity concerns nearly one in four patients, with no differences between lifetime and present or past year AUD (Hunt et al., 2018). Moreover, this meta-analysis emphasizes that a wide range of patients go undiagnosed or fail to seek treatment for substance use.

AUD comorbidity among patients with schizophrenia has been associated with a set of complications, including somatic diseases (Batki et al., 2009), decreased compliance to treatment and concomitantly an increasing frequency of hospitalization (Haywood et al., 1995 ; Hunt et al., 2002), as well as an increased risk of suicide (Ries et a., 2009). Other studies have also highlighted the negative role of alcohol on brain and cognitive functions among these patients (Bahoric et al., 2014; Thoma et al., 2006), which could be associated with difficulties in stopping drinking alcohol, as already shown among AUD patients (Le Berre et al., 2012).

Beyond the investigation of the deleterious impact of alcohol consumption among these patients, it is important to achieve a better understanding of comorbid AUD in order to improve its treatment. In this context, the investigation of motives for alcohol use, which has been widely undertaken in addiction research, could be relevant both for establishing causal relationship and providing better care guidance.

Drinking motives refer to the value placed on the particular effects that individuals seek to achieve when drinking alcohol (Cox and Klinger, 2011). They play a prominent role in alcohol decision-making (Cooper et al., 1992). Four distinct drinking motives have been identified and can be assessed with the Drinking Motives Questionnaire (Cooper, 1994): social, enhancement,

coping, and conformity. These motives can be classified according to two dimensions: valence (positive vs. negative) and source (internal vs. external). According to the *valence* dimension, social and enhancement motives represent positive reinforcement, as they refer to the consumption of alcohol to obtain positive social rewards and enhance mood. By contrast, coping and conformity are negative reinforcement motives, as coping involves drinking to reduce negative affects, while conformity involves drinking to avoid social censure or disapproval (Miller et al., 2014). According to the *source* dimension, individuals consume alcohol either to obtain internal rewards (manipulation of their own state: enhancement and coping motives) or to gain an external reward (e.g., social approval: social and conformity motives).

Several studies have investigated drinking motives in clinical samples, including patients with posttraumatic stress disorder (McDevitt-Murphy et al., 2017), anxiety and mood disorders (Miller et al., 2014; Nehlin et al., 2018). Very few have been conducted among patients with schizophrenia. Mueser et al. (1995) found that a sample of patients with schizophrenia and schizoaffective disorders (27% of the sample) with past or recent alcohol abuse expressed greater social, coping and enhancement motives than patients with no alcohol abuse. More recently, Thornton et al. (2012) investigated drug use motives in a large sample of patients with bipolar disorder, schizophrenia, schizoaffective disorder, and other psychotic disorders. Results showed that alcohol was primarily used for coping. Albeit interesting, the results of these two studies provided no information specific to schizophrenia (mixed samples), and no detailed information on either the validity of using drinking or drug motives questionnaires among patients with schizophrenia or the relationship between substance use, motives, and clinical features. To the best of our knowledge, only one study (Öster et al., 2017) has investigated the validity of drinking motives questionnaires in a large sample of patients with mental disorders. However, due to the specialization of the department, patients with schizophrenia could not be enrolled in the study, restricting the possibility to extend the results to this disease.

The aim of the present study was twofold. First, we sought to examine the psychometric validity and reliability of the short form of the Drinking Motives Questionnaire-Revised (DMQ-R SF; Kuntsche and Kuntsche, 2009) in a sample of non-abstainers patients with schizophrenia. Second, we sought to compare patients with schizophrenia with and without comorbid AUD on drinking motives, taking clinical features into account. We hypothesized that patients with comorbid AUD would display higher drinking motives.

2. Method

2.1. Procedure and participants

We recruited 179 patients with schizophrenia from mental health services in northern France. Eligible participants were patients with a primary diagnosis of schizophrenia (based on ICD-10 criteria; WHO, 1993) who were aged 18 years or more and in voluntary care. Exclusion criteria included diagnosis of schizoaffective disorder and any other mother-tongue than French. A total of 63 patients who had not consumed alcohol over the previous 12 months were excluded, together with three patients with incomplete or aberrant (outlier) data. The final sample therefore consisted of 113 patients with schizophrenia (mean age: 39.57 years, *SD*: 11.29, range: 18-66; 77% male). Diagnosis of current AUD was made by a trained clinician according to DSM-5 (APA, 2013) criteria: participants who met fewer than two criteria were classified as AUD-, while participants who met two or more criteria were classified as AUD+. The AUD- group was composed of 71 (62.83%) patients, and the AUD+ group was composed of 42 (37.17%) patients (Table 1). This study was approved by the French national regulatory authorities and by the local ethics committee (CPP Nord-Ouest II-France).

Insert Table 1 about here

2.2. Measures

2.2.1 Schizophrenia symptoms

The Positive and Negative Syndrome Scale (PANSS; Kay et al., 1987) was used to assess schizophrenia symptoms. The PANSS is a standardized clinical interview based on 30 items that rates the presence and severity of positive (e.g. delusions, hallucinatory behaviour), negative (e.g. blunted affect, difficulty in abstract thinking), and general psychopathology symptoms (e.g. anxiety, depression, poor impulse control) of patients with schizophrenia according to a 7-point scale (1 = absent; 7 = extreme). Cronbach's alphas for each symptoms scale were in our sample .73, .85 and .77, respectively.

2.2.2 Alcohol and other substances use

The Alcohol Use Disorder Identification Test (AUDIT; Saunders et al., 1993) was used to assess drinking patterns. The AUDIT is a 10-item self-report screening questionnaire. The total score ranges from 0 to 40. Scores of 8-14 suggest hazardous or harmful consumption, and scores of 15 or more suggest moderate to severe AUD (Reinert & Allen, 2007; Saunders et al., 1993).

Cronbach's alpha was .88.

Cannabis use disorder was assessed with the Cannabis Abuse Screening Test (CAST; Legleye et al., 2012). The CAST is a self-report screening test for identifying patterns of cannabis use leading to negative consequences. It is composed of 6 items assessing last 12 months patterns of consumption (e.g. before midday, when alone), harms (including memory disorders) or difficulties to stop consumption. All items are scored on a Likert scale from 0 (Never) to 4 (Very often), with higher scores reflecting higher use. Cronbach's α was .92.

Other SUD including tobacco, cocaine, heroin, were assessed during the clinical interview.

2.2.3 Drinking motives

The short form of the drinking motives questionnaire (DMQ-R SF; Kuntsche and Kuntsche, 2009) was used to assess drinking motives. This 12-item scale measures four distinct drinking motive dimensions: (a) internally generated, positive reinforcement (i.e., enhancement; e.g., drinking to have fun and get drunk); (b) externally generated positive reinforcement (i.e.,

social; e.g., to better enjoy social gatherings); (c) internally generated, negative reinforcement (i.e., coping; e.g., to alleviate personal problems and worries); and (d) externally generated, negative reinforcement (i.e., conformity; e.g., to avoid feeling left out of the group). Participants were asked to consider all the times they had drunk alcohol in the previous 12 months and to indicate the number of occasions they had drunk for each given motive. Three items corresponded to each dimension, and each item was rated on a Likert scale ranging from 1 (Never) to 5 (Almost always). Higher scores represented stronger drinking motivations. Cronbach's alpha are displayed on the result section.

2.3. Statistical analysis

To investigate the factor structure of the DMQ-R SF, we ran a confirmatory factor analysis on the data for the whole sample ($N = 113$) using the Lavaan package (version 0.6-5; Rosseel, 2012) in the R environment (R Core Team, 2020). We used the mean- and variance-adjusted weighted least square procedure to estimate the model's parameters (Rhemtulla et al., 2012). In line with the original version, measurement errors for each of the 12 items were not allowed to correlate. Goodness of fit was evaluated using the comparative fit index (CFI), standardized root mean square residual (SRMR), and root mean square error of approximation (RMSEA). The CFI relates to the total variance accounted for by the model, where values above .90 are acceptable and values above .95 reflect a good fit (Hu and Bentler, 1999). The SRMR and RMSEA relate to the residual variance of the model, where values below .10 are acceptable and values below .05 are good (Schermele-Engel et al., 2003).

Differences between the AUD+ and AUD- groups were tested with Student's t tests, Mann-Whitney U tests, or Pearson χ^2 tests, where appropriate. To investigate the relationships between drinking motives and demographic and clinical features correlation analyses were conducted. Significant level was set at $p < 0.05$ and the Holm-Bonferroni procedure was applied to control for multiple comparisons (Holm, 1979).

Finally, a multiple hierarchical regression analysis was conducted to investigate the relationships between the AUDIT score and drinking motives. Given the known associations between age, sex and AUD, these variables were forced into the multivariate model as follows: sex (0 = male, 1 = female) and age at Step 1; and DMQ-R SF dimension scores at Step 2. To account for the non-normality of the data, bootstrapping was carried out (with 500 samples) and biases were corrected. Values were reported with their 95% CI.

2.4. Data availability

Anonymized demographic data, PANSS scores, AUDIT scores, DMQ-R SF scores, and the R code are available at [https://osf.io/\[upon peer review acceptance\]](https://osf.io/[upon peer review acceptance])

3. Results

3.1. Factorial validity and internal consistency of the DMQ-R SF

Results of the confirmatory factor analysis of DMQ-R SF items revealed adequate goodness-of-fit values: CFI = .969, SRMR = .059, RMSEA = .037 (90% CI .001–.075). Figure 1 displays standardized factor loadings and correlations between latent variables of the measurement model. Examination of this table shows that all the items loaded significantly on their respective factors and yielded good to excellent coefficients, except for Item “Because it’s fun” (enhancement factor), which had a poor factor loading. Suppression of this item did not significantly improve neither the loadings of remaining items (see supplementary figure 1) nor the model’s goodness of fit: CFI = .969, SRMR = .054, RMSEA = .040 (90% CI .001–.081).

Internal consistency, as measured by Cronbach’s alpha, were .85 for the social motives factor, .66 for the enhancement motives factor, .86 and .85 for the coping and conformity motives factors respectively.

Insert Figure 1 about here

3.2. Comparison between AUD+ and AUD- patients

There were no significant differences between the AUD+ and AUD- groups for sex ratio, age, or marital and housing status (see Table 2). There were also no significant differences between the two groups on PANSS scores, previous number of admissions to psychiatric departments, or most current antipsychotics, antidepressants and benzodiazepines treatments. One patient in the AUD- group was receiving methadone treatment for opioid use disorder, while in the AUD+ group, six patients were receiving medication for AUD (14.28%): three (7.14%) acamprosate, two (4.76%) naltrexone, and one (2.38%) baclofen.

Group comparisons on use of alcohol and other substances are displayed on Table 2. Most comparisons were not significant, excluding AUDIT total score and DMQ-R SF scores, where the AUD+ group exhibited higher scores than the AUD- group.

Insert Table 2 about here

3.3. Correlational and multiple regression analyses

Correlational and multiple regression analyses were conducted on the full sample of patients. Owing to the non-normality of the four drinking motive scores, the correlational analyses were conducted using Spearman's rho coefficients (see Supplementary Table 1). No significant correlations were found between the four drinking motives and patients' clinical characteristics (PANSS scores, number of psychiatric admissions and neuroleptic class). By contrast, significant correlations were found with several alcohol-related measures (including AUDIT items or total score and number of DSM-5 AUD criteria met). Results also revealed a significant correlation between father's AUD status and enhancement motive.

The first step of the multiple hierarchical regression, including sex and age variables, was not significant ($R^2 = .02$), $F(2, 110) = 1.09$, $p = .338$, but the inclusion of DMQ-R SF dimensions in the second step generated a significant model ($R^2 = .53$), $F(4, 106) = 29.04$, $p < .001$. In the whole sample of patients with schizophrenia, stronger enhancement ($B = 1.36$, 95% CI [.82 – 1.91], $\beta =$

0.42, $t = 4.96$, $p < .001$) and coping ($B = 1.01$, 95% CI [.59 – 1.44], $\beta = 0.40$, $t = 4.70$, $p < .001$) motives were associated with higher AUDIT scores, whereas social ($B = -.21$, 95% CI [-.66 – .25], $\beta = -0.08$, $t = -.06$, $p = .369$) and conformity ($B = .47$, 95% CI [-.07 – 1.01], $\beta = 0.14$, $t = 1.74$, $p = .08$) motives were not significantly associated with AUDIT scores. The tolerance values ranged from 1.02 to 1.82, indicating no multicollinearity issue on this model.

4. Discussion

4.1. Factorial validity and internal consistency of the DMQ-R SF

In an extension of Öster et al. (2017)'s study, which highlighted good fit indices for the DMQ-R SF among a clinical sample of adults with nonpsychotic psychiatric disorders, the results of the present study revealed satisfactory goodness of fit among a clinical sample of non-abstainers patients with schizophrenia. In agreement with the four-factor structure of the scale, we found that all items loaded significantly on their respective factors, although Item 10 (“Because it’s fun”) appeared to have a fairly low factor loading. This is not particularly surprising, as this was the item with the lowest factor loading in the initial validation of the scale, conducted among a community sample of adolescents (Kuntsche and Kuntsche, 2009) suggesting that the *fun* nature of alcohol consumption is a randomly shared characteristic among individuals. The scale also had good internal consistency, with higher values than in the validation study (Kuntsche and Kuntsche, 2009), except for the enhancement motive. Again, one possible explanation is the presence of Item 10 in this factor.

Taken together, these results suggest that the DMQ-R SF is a suitable tool for the assessment of drinking motives among patients with schizophrenia. It may be useful in the management of alcohol misuse among these patients through psychosocial interventions, motivational interviewing, cognitive-behavioral therapy programs, or other patient centered psychotherapies (see: Bennett and al., 2017 for an overview). Community-based and clinical programs aimed treating or even preventing problematic alcohol use in patients with schizophrenia could benefit from including information about drinking motives.

4.2. Comparison between patients with and without comorbid AUD

Univariate analyses showed that the four distinct drinking motives (i.e., social, enhancement, coping, and conformity) differed significantly between the two groups, with higher endorsement among AUD+ patients. Furthermore, results of the regression analysis indicated that positive reinforcement (i.e., enhancement) and negative reinforcement (i.e., coping) were significantly associated with higher AUDIT scores among patients with schizophrenia, whereas social and conformity motives were not. According to Cooper's model (1994), enhancement and coping motives are internal rewards, related to affects: individuals drink to enhance positive affect (enhancement motives) or to cope with negative emotions. By contrast, conformity and social motives are linked to interpersonal relations. Therefore, consistent with a study involving electronic ambulatory monitoring of substance use (Swendsen et al., 2011) showing that alcohol use is most likely to follow increases in anxious mood or psychotic symptoms, our results suggest that patients with schizophrenia mainly drink alcohol to cope with negative emotions and to experience enjoyable physical internal sensations (i.e., pharmacological effects of alcohol intoxication). By contrast, the weaker relationship between AUDIT scores and conformity and social motives could be related to the psychosocial difficulties experienced by people living with schizophrenia (Świtaj et al., 2012).

The AUD+ and AUD- groups were similar on demographic variables and clinical variables that were not related to substance use. In particular, we found no significant differences between the two groups on PANSS mean scores. This result is partially in agreement with Carrà et al. (2016)'s study, which did not find any significant difference on PANSS positive scores between patients with and without comorbid substance dependence, but found that those with alcohol or drug dependence had lower negative scores and higher general psychopathology scores than their nondependent counterparts. It is, however, in line with Dervaux et al. (2002), who found no difference on any of the PANSS subscales between patients with and without comorbid SUD.

These authors emphasized that the discrepancy could be related to methodological differences, in particular whether participants with current AUD had been assessed while hospitalized or not, as well as to the differential availability of drugs across countries.

As expected, the AUD+ and AUD- groups scored differently on AUDIT total score. However, several comparisons on alcohol and other substances uses were comparable or failed to reach statistical significance. For instance, we did not find any significant differences between the two groups regarding age at first drink and first drunkenness, although age at first drink was descriptively lower in the AUD+ group. These ages (13.12 years for AUD+ and 14.65 years for AUD-) were slightly lower than in the general population in France (15.2 years; Spilka et al., 2012). In humans, early age at first drink has been associated with an increased risk factor for the development of AUD (De Wit, et al., 2000). In the animal neurodevelopmental model of schizophrenia, alcohol use by pre-symptomatic adolescent rats has been shown to be predictive of later signs of AUD (Jeanblanc, 2015; Jeanblanc et al., 2015).

In line with Jones, et al. (2011)'s study, our results descriptively revealed a higher percentage of patients with a family history of AUD in the AUD+ group (specifically concerning fathers), suggesting a potentially cumulative role of genetic factors.

Finally, our results showed that the use of other substances were higher among AUD+ patients, although again, not surviving the correction for multiple comparisons, suggesting the extent of polydrug use among AUD+ patients. This could be put into perspective with preclinical modeling studies that suggest a fundamental connection between schizophrenia and multiple addictions (Sentir, et al., 2020).

A number of limitations of the present study should be acknowledged. Firstly, the data is based on self-reported information which can therefore be subject to a set of biases such as social desirability and/or a memory bias, with both potentially leading to a minimization of drinking motives and alcohol uses (including frequency, quantity and consequences). In addition, the temporal stability of drinking motives remains to be investigated. Another limitation lies in the

cross-sectional design of the study, which does not allow a direct causal relationship to be established between motivations and alcohol consumption. Besides, the relatively small sample size may have reduce the predictive power (e.g., concerning clinical variables). And finally, we failed to assess several clinical variables, which may had impact our results such as the onset of the diseases (schizophrenia and AUD), duration of untreated psychosis and comorbid mood disorders. Future studies with a larger sample should collect these data, in order to investigate whether they could impact drinking motives in patients with schizophrenia.

5. Conclusions

Our findings highlight the strength of drinking motives among patients with schizophrenia who have a comorbid SUD (i.e., AUD). It is very important to address these comorbid disorders, often underdiagnosed and untreated, as they have been linked to poorer clinical outcomes and higher morbidity and mortality (Lähteenvuo et al., 2021; Volkow, 2009). The present study validated the use of the DMQ-R SF among patients with schizophrenia, and showed that enhancement and coping drinking motives, both related to affect, are associated with a pattern of AUD.

Community-based and clinical programs aimed at preventing or treating problematic alcohol use in patients with schizophrenia may benefit from including information about drinking motives (i.e., enhancement and coping) in a comprehensive model of AUD to improve outcomes.

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Table 1. Demographic and clinical characteristics of the AUD+ ($n = 42$) and AUD- ($n = 71$) groups of patients with schizophrenia.

	AUD+	AUD-	<i>p</i>
Sex (% male)	83.33	73.24	0.218
Mean age \pm SD	38.26 \pm 9.83	40.35 \pm 12.07	0.414
Mean PANSS score \pm SD			
Positive scale	15.38 \pm 6.21	16.35 \pm 6.28	0.347
Negative scale	24.83 \pm 8.94	23.44 \pm 8.13	0.426
General psychopathology scale	38.95 \pm 11.16	37.61 \pm 11.39	0.542
Total score	79.17 \pm 22.41	77.39 \pm 22.64	0.687
Number of previous hospitalizations	10.40 \pm 13.46 ^a	9.56 \pm 15.07 ^b	0.254
Psychotropic drugs (%)			
Antipsychotic drugs			
typical neuroleptics	26.19	36.62	0.254
atypical neuroleptics	73.81	63.38	
Antidepressants	30.95	32.39	0.874
Benzodiazepines	80.95	71.83	0.278
AUD medication	14.29	0.00	0.001
Buprenorphine	7.14	0.00	0.022
Methadone	0.00	1.41	0.440
Marital and housing status (%)			
Living as a couple	4.76	09.86	0.339
Single, living alone	42.86	33.80	
Single, living with family or room-mate	14.29	25.35	
Single, living in a therapeutic home setting	38.09	30.99	

Note: PANSS = Positive and Negative Syndrome Scale. ^a $n = 30$; ^b $n = 41$. Significant Holm-Bonferroni adjusted p values are indicated in bold characters.

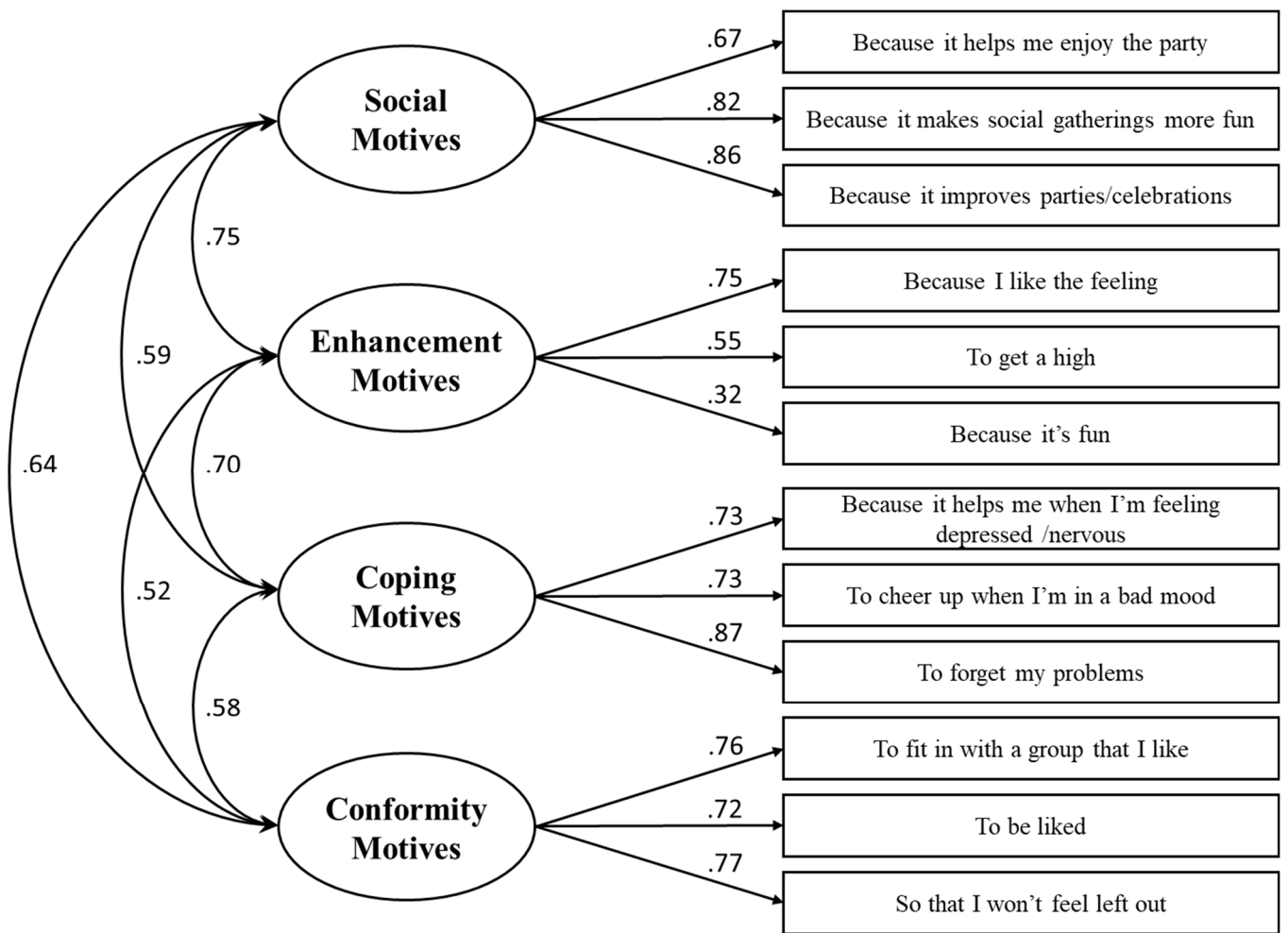


Figure 1. Confirmatory factor analysis model of the DMQ-R SF among patients with schizophrenia ($N = 113$). All factor loadings (numbers above single-headed arrows) are significant at $p < .001$ except for Item “Because it’s fun” ($p = 0.01$). All correlations (numbers above double-headed arrows) are significant at $p < .002$.

Table 2. Comparison of alcohol and other substance use variables between the AUD+ ($n = 42$) and AUD- ($n = 71$) groups of patients with schizophrenia.

	AUD+	AUD-	<i>p</i>
Mean AUDIT total score \pm <i>SD</i>	16.50 \pm 8.64	3.65 \pm 3.71	<0.001
Mean age at first drink \pm <i>SD</i>	13.12 \pm 5.20 ^a	14.65 \pm 4.42 ^b	0.103
Mean age at first drunkenness \pm <i>SD</i>	17.92 \pm 7.51 ^c	17.91 \pm 4.57 ^d	0.370
Father's AUD (%)	46.34	22.86	0.010
Mother's AUD (%)	21.95	11.43	0.137
Other substance use			
Lifetime tobacco consumer (%)	97.62	80.28	0.009
Current tobacco consumer (%)	64.28	38.03	0.007
Lifetime ever use of cannabis (%)	73.81	50.70	0.016
Current daily cannabis user (%)	42.86	23.35	0.054
Mean CAST total score \pm <i>SD</i>	11.78 \pm 4.78 ^e	9.06 \pm 7.54 ^e	0.205
Lifetime cocaine experimentation (%)	26.19	16.90	0.236
Current cocaine user (%)	21.43	11.27	0.144
Lifetime heroin experimentation (%)	28.57	16.90	0.143
Current heroin user (%)	23.81	05.63	0.005
Drinking motives (SF DMQ-R)			
Mean total score \pm <i>SD</i>	30.40 \pm 9.37	19.00 \pm 6.44	<0.001
Mean enhancement motive score \pm <i>SD</i>	7.55 \pm 2.49	4.80 \pm 2.21	<0.001
Mean social motive score \pm <i>SD</i>	8.26 \pm 3.53	5.67 \pm 2.87	<0.001
Mean conformity motive score \pm <i>SD</i>	5.76 \pm 3.24	4.08 \pm 1.91	<0.001
Mean coping motive score \pm <i>SD</i>	8.83 \pm 3.16	4.45 \pm 2.23	<0.001

Note: AUDIT = Alcohol Use Disorders Identification Test; AUD = alcohol use disorder; CAST = Cannabis Abuse Screening Test; SF DMQ-R = Short Form of the Drinking Motives Questionnaire Revised. ^a $n = 41$, ^b $n = 69$, ^c $n = 37$, ^d $n = 55$, ^e among current cannabis users ($n = 18$). Significant Holm-Bonferroni adjusted *p* values are indicated in bold characters.