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**Psychometric properties of the Persian versions of the Positive Alcohol Metacognitions Scale (Persian-PAMS) and the Negative Alcohol Metacognitions Scale (Persian-NAMS) in alcohol-dependent individuals**

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**Contributors**

All authors were involved in the statistical analyses and data collection of the study. All authors contributed and have approved the final manuscript.

**Conflict of interest**

No declared.

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## **Abstract**

Positive and negative metacognitions regarding alcohol effects are related to drinking problems. This study aimed to validate the Persian versions of the Positive Alcohol Metacognitions Scale (Persian-PAMS) and the Negative Alcohol Metacognitions Scale (Persian-NAMS) and to assess the relations of metacognitions about alcohol use to alcohol craving and dependence in a clinical sample of males with a DSM diagnosis of alcohol dependence. Three hundred treatment-seeking males with alcohol dependence completed the Alcohol Use Disorders Identification Test (AUDIT), the Alcohol Outcome Expectancy Questionnaire (AOEQ), the Obsessive Compulsive Drinking Scale (OCDS), the Depression Anxiety Stress Scales (DASS-21), and the Persian-translated versions of the PAMS and NAMS. The results showed that similar to original versions of the PAMS and NAMS, the Persian version of the scales had a two-factor structure. Test-retest coefficients over a four-week interval and internal consistency showed good reliability for the Persian-PAMS and Persian-NAMS and their subscales. Predictive validity showed that positive metacognitions about alcohol use were associated with alcohol craving and dependence independent of outcome expectancies about alcohol use. The findings suggest that the Persian-PAMS and Persian-NAMS have appropriate psychometric properties in Iranian males with alcohol dependence. Results also highlight that positive metacognitions may be more related to alcohol craving and dependence relative to outcome expectancies about alcohol use.

**Keywords:** Positive metacognitions about alcohol use, Negative metacognitions about alcohol use, Alcohol-dependent individuals.

## **1. Introduction**

According to the Self-Regulatory Executive Function theory (S-REF; Wells & Matthews, 1994, 1996), metacognition may play an important role in psychopathology. Metacognition refers to beliefs, psychological structures, processes and knowledge that engage in controlling and modulating cognition and affect (Wells, 2000; Wells & Papageorgiou, 1995). Metacognition has been found to be important in predicting addictive behaviors (Hamoniere & Varescon, 2018; Spada, Caselli, Nikčević, & Wells 2015a), such as problematic drinking (Moneta, 2011; Spada & Wells, 2005, 2006; Spada et al., 2007a, 2009; Stefanatou et al., 2016), problematic Internet pornography use (Allen, Kannis-Dymand, & Katsikitis, 2017), gambling (Caselli et al., 2018a; Jauregui, Urbiola, & Estevez, 2016; Lindberg, Fernie, & Spada, 2011; Spada et al., 2015b), problematic Internet use (Casale, Caplan, & Fioravanti, 2016; Spada & Marino, 2017; Spada et al., 2008), smoking, cigarette use, and nicotine dependence (Alma et al., 2018; Najafi, Khosravani, Shahhosseini, & Afshari, 2018; Nikčević & Spada, 2008; Nikčević, Caselli, Wells, & Spada, 2015; Nikčević et al., 2017).

Regarding alcohol use, metacognitions are categorized into two categories: negative and positive. Positive metacognitions about alcohol use refer to an individual's expectations of alcohol consumption as a strategy aimed at modulating cognitions and emotions (Spada & Wells, 2006). Negative metacognitions about alcohol use represent the perceived deficits of executive control during alcohol use and the negative effect of alcohol use on cognitive functioning, often referred to as beliefs about uncontrollability and danger (Spada & Wells, 2006). Past research has demonstrated the role that metacognitions about alcohol use play with respect to problem drinking (Clark et al., 2012; Dragan, 2015; Gierski et al., 2015; Spada & Wells, 2008).

To assess alcohol metacognitions, Spada and Wells (2008) designed the Negative Alcohol Metacognitions Scale (NAMS) and the Positive Alcohol Metacognitions Scale (PAMS). Spada and Wells (2008) state that the NAMS is a 6-items self-report scale with a two-factor

structure measuring negative metacognitions about uncontrollability (e.g., “I have no control over my drinking”) and negative metacognitions about cognitive harm (e.g., “drinking will damage my mind”) in clinical and non-clinical samples using exploratory factor analysis (EFA). These authors also showed that the scale had appropriate internal consistency and test–retest reliability. The PAMS is a 12-item self-report instrument (Spada & Wells, 2008), which also has a two-factor solution following an EFA: evaluating positive metacognitions about alcohol use focusing on emotional self-regulation (e.g., “drinking makes me more affectionate”) and cognitive self-regulation (e.g., “drinking helps me to control my thoughts”). The PAMS was found to have appropriate internal consistency and test-retest reliability (Spada & Wells, 2008).

In another study, Gierski et al. (2015) reported that the French PAMS and NAMS have a two-factor structure in a normal sample of university students using confirmatory factor analysis (CFA) in addition to an EFA. These authors also revealed that the internal reliability of both scales and its subscales was confirmed to be adequate. Also, test-retest reliability for both PAMS and NAMS total scores, the two factors of the NAMS, and the PAMS subscale of positive alcohol metacognitions about emotional self-regulation were found to be good, while test-retest reliability for the other PAMS subscale, regarding positive alcohol metacognitions about cognitive regulation, was weak (Gierski et al., 2015). In addition, predictive validity of the French PAMS and NAMS was supported, demonstrating the relationships between both positive and negative metacognitions about alcohol use with alcohol use and binge drinking (Gierski et al., 2015).

Although Gierski et al.’s (2015) study has involved a non-clinical sample, the study by Spada and Wells (2008) involved both clinical and non-clinical samples. However, the non-clinical sample was small ( $n=80$ ). Therefore, the examination of the psychometric properties of the PAMS and NAMS in different cultures with a large clinical sample of alcohol-

dependent individuals is needed to further clarify the factor structure, validity, and reliability of these scales. Accordingly, the aim of this study was to assess factor structure, reliability and validity of the Persian versions of the PAMS (Persian-PAMS) and NAMS (Persian-NAMS) in a clinical sample of males with alcohol dependence. We hypothesized that each the Persian-NAMS and Persian-PAMS would have a two-factor structure and appropriate reliability and validity among males with alcohol dependence.

## **2. Methods**

### **2.1. Participants**

Three hundred treatment-seeking males (age range=19-69 years, mean age=34 years) with alcohol dependence were selected for this study. All these participants met the inclusion criteria including: A principal diagnosis of alcohol dependence according to the information provided by the Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Patient version (SCID- I/P) (First, Spitzer, Gibbon, & Williams, 2002); having a score of 20 or higher on the Alcohol Use Disorders Identification Test (AUDIT) to determine alcohol dependence (Babor, de la Fuente, Saunders, & Grant, 1992); and the absence of intellectual disabilities, other substance dependencies (other than nicotine), neurological, medical and psychotic illnesses. All patients were currently in abstinent phase, so that all of them were assessed after 2 weeks of detoxification. The diagnoses were determined by an experienced clinical psychologist and a psychiatrist. All participants were studied in accordance with the 1989 revision of the Helsinki Declaration. This study was part of a research project approved by the Medical Ethics Committee of Alborz University of Medical Sciences (Code of Medical Ethics: IR.ABZUMS.REC. 1398.039).

### **2.2. Self-report instruments**

2.2.1. *The Negative and Positive Alcohol Metacognitions scales (NAMS/PAMS; Spada & Wells, 2008).*

The NAMS is a 6-item instrument that evaluates negative metacognitions about alcohol use in two subscales: uncontrollability and cognitive harm. The PAMS is a 12-item scale which examines two subscales: positive metacognitions about emotional self-regulation and positive metacognitions about cognitive self-regulation. Each item of the NAMS and PAMS is rated on a four-point Likert scale from 1 (Do not agree) to 4 (Agree very much). In the present study, we translated the original versions of the NAMS and PAMS into Persian, using the method first proposed by Brislin (1986). Firstly, we translated the PAMS and NAMS items from English to Persian. Secondly, the items of two scales were back translated into English by a native English speaker and were compared with the original English scales. There were no inconsistencies between the two versions.

2.2.2. *The Alcohol Use Disorders Identification Test (AUDIT; Babor et al., 1992).*

The AUDIT is a 10-item scale to identify individuals with hazardous or harmful patterns of alcohol use. We used the Persian version of the AUDIT developed by Zavar, Jarahi, Alimoradi, and Khosravi (2015) with good internal consistency (Ghorbani, Khosravani, Bastan, & Ardakani, 2017). Cronbach's alpha for the scale was 0.85 in the current study.

2.2.3. *The Alcohol Outcome Expectancy Questionnaire (AOEQ; Leigh & Stacy, 1993).*

The AOEQ is a 34-item scale which assesses positive and negative outcome expectancies about alcohol use. This scale involves four positive outcome expectancy subscales including social facilitation, fun, sex, and tension reduction and the four negative outcome expectancy subscales such as social, emotional, physical, and cognitive performance. The AOEQ items

are rated on a 6-point Likert scale from 1 (never) to 6 (always). In this study, we translated this scale into Persian.

In this research, in line with the original AOEQ, the results of EFAs showed that this scale had a two-factor first-order structure with eigenvalues of 5.03 and 1.3 [Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO=0.87); Bartlett's Test of Sphericity ( $\chi^2_{(28)}=1830.70$ ,  $p < 0.001$ ); calculated total variance= 78.9%; factor loadings between 0.72 and 0.99] and an eight-factor second-order structure with eigenvalues of 12.3, 4, 1.8, 1.6, 1.4, 1.3, 1.2, and 1.01 (KMO=0.92;  $\chi^2_{(56)}=6163.78$ ;  $p < 0.001$ ; calculated total variance= 66.5%; factor loadings between 0.40 and 0.91). Also, the results of CFAs confirmed good model fit for the two-factor first-order structure [ $\chi^2$  divided by degrees of freedom (CMIN/DF=2), goodness of fit index (GFI=0.96), comparative fit index (CFI=0.97), root mean square error of approximation (RMSEA=0.045), standardized root mean square residual (SRMSR=0.05), and standardized factor loadings between 0.77 and 0.92] and the eight-factor second-order structure (CMIN/DF=2, GFI=0.95, CFI=0.96, RMSEA=0.048, SRMSR=0.054) of the scale. In addition, Cronbach's alphas for the total scale and its subscales, positive outcome expectancies about alcohol use and negative outcome expectancies about alcohol use, were 0.95, 0.93, and 0.90, respectively.

#### 2.2.4. *The Obsessive Compulsive Drinking Scale (OCDS; Anton, Moak, & Latham, 1995).*

The OCDS is a 14-item questionnaire which measures craving in the form of two subscales: obsessive thoughts (6 items) and compulsive behaviors (8 items). Each item is rated from 0 (no symptoms) to 4 (severe symptoms). We used the Persian back-translated version of the OCDS (Khosravani, Bastan, Ghorbani, & Kamali, 2017a). In the present study, Cronbach's alpha for the scale was 0.82.

### 2.2.5. *Depression Anxiety and Stress Scales (DASS-21; Lovibond & Lovibond, 1995).*

The DASS-21 is a self-report scale containing 21 items that examine depression (7 items), anxiety (7 items), and stress (7 items) symptoms. Each item is rated on four-point Likert scale from 0 (not at all) to 3 (very much). We used the Persian version of the DASS-21 (Asghari, Saed, & Dibajnia, 2008) with appropriate internal consistency (Khosravani et al., 2017b). In the present study, Cronbach's alphas for depression, anxiety, and stress scales were 0.76, 0.74, and 0.76, respectively.

### 2.3. Statistical analysis

To assess the factor structures of the Persian-PAMS and Persian-NAMS, we performed a series of Exploratory Factor Analyses (EFAs) (with Principal Component Analysis (PCA) using Promax rotation) and Confirmatory Factor Analyses (CFAs). In CFA analyses, the model fit was examined through chi-square index ( $\chi^2$ ), CMIN/DF, GFI, CFI, RMSEA, and SRMSR. CMIN/DF $\leq$ 2, CFI and GFI $\geq$ 0.95, and SRMR and RMSEA $\leq$ 0.05 were set as indicators of good fit. CMIN/DF $\leq$ 3, CFI and  $\geq$ 0.90, and RMSEA and SRMR $\leq$ 0.08 were set as indicators for acceptable fit (Browne, Cudeck, Bollen, & Long, 1993; Kline, 2015; Schermelleh-Engel, Moosbrugger, & Müller, 2003).

Cronbach's alpha and test-retest coefficients were estimated to evaluate reliability of the Persian-PAMS and Persian-NAMS. Intraclass correlation coefficient (ICC) was examined to evaluate test-retest reliability of the scales. According to Koo and Li (2016), ICC coefficients are rated as ICC $<$ 0.50 (showing poor reliability), values between 0.50 and 0.75 (reporting moderate reliability), values between 0.75 and 0.90 (indicating good reliability), and ICC $\geq$  0.90 (showing excellent reliability). Pearson's correlation analyses were performed to determine the zero-order relationships between the Persian-PAMS and Persian-NAMS subscales with the demographic factors, DASS-21, outcome expectancies about alcohol use

and alcohol-related outcome variables (e.g., alcohol dependence on the AUDIT and alcohol craving on the OCDS). To examine the predictive validity of the Persian-PAMS and Persian-NAMS, their relationships with the AOEQ, the AUDIT, and the OCDS were evaluated using hierarchical regression analyses. The data concerning all scales were normally distributed according to the Kolmogorov-Smirnov test. No aberrant values (outliers) were observed. Data were analyzed using SPSS (version 22; IBM Corp., 2013) and LISREL 8.8 (Jöreskog & Sörbom, 1996).

### 3. Results

#### 3.1. EFAs for the Persian-PAMS and Persian-NAMS

A series of PCAs using Promax rotation on 12 items of the Persian-PAMS and 6 items of the Persian-NAMS were computed to assess factor structure of the scales. Both Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO=0.87) and Bartlett's Test of Sphericity ( $\chi^2_{(66)}=1514.85$ ,  $p < 0.001$ ) for the Persian-PAMS as well as KMO=0.68 and  $\chi^2_{(15)}=448.60$  ( $p < 0.001$ ) for the Persian-NAMS indicated that factor analyses of these scales were appropriate. Eigenvalues greater than 1 were considered to determine the number of factors. The Scree test and rotated factor matrix yielded a two-factor solution for the Persian-PAMS (eigenvalues of 5.3 and 1.4) and Persian-NAMS (eigenvalues of 2.6 and 1.3). The two factors of the Persian-PAMS accounted for 55.8% of variance and that the two factors of the Persian-NAMS accounted for 64.4% of variance. All factor loadings for the 12 items of the Persian-PAMS were above 0.52 (0.52 to 0.91) and for the 6 items of the Persian-NAMS items were above 0.55 (0.55 to 0.92). The factor matrix for the EFA is presented in Table 2.

#### 3.2. CFA for the Persian-PAMS and Persian-NAMS

Following the EFAs, which showed a two-factor structure for the Persian-PAMS and Persian-NAMS, we performed CFAs using maximum likelihood estimation (MLE) to confirm the latent factor structures of these scales. The findings showed the two-factor structure of the Persian-PAMS ( $\chi^2=157.12$ , degree of freedom ( $df$ )=53, CMIN/DF=2.9, CFI=0.93, GFI=0.91, SRMR=0.070, RMSEA=0.061) and the Persian-NAMS ( $\chi^2=23.01$ ,  $df$ =8, CMIN/DF=2.9, CFI=0.90, GFI=0.93, SRMR=0.08, RMSEA=0.074) showed an acceptable fit. All standardized factor loadings were higher than 0.30 and were significant (Table 3). The inter-correlations of the Persian-PAMS subscales and Persian-NAMS subscales were found to be significant ( $p<0.001$ ). In the Persian-PAMS subscale, inter-correlation between positive metacognitions about emotional self-regulation and positive metacognitions about cognitive self-regulation was 0.60 ( $p<0.001$ ). In the Persian-NAMS subscale, inter-correlation between negative metacognitions about uncontrollability and negative metacognitions about cognitive harm was 0.37 ( $p<0.001$ ).

The results of Pearson's correlation analyses showed that positive outcome expectancies about alcohol use (AOEQ positive) were significantly associated with alcohol dependence severity ( $r=0.20$ ,  $p<0.01$ ) measured by the AUDIT and alcohol craving ( $r=0.18$ ,  $p<0.01$ ), assessed through the OCDS. Negative outcome expectancies about alcohol use (AOEQ negative) had significant associations with alcohol dependence ( $r=0.26$ ,  $p<0.01$ ) and craving ( $r=0.20$ ,  $p<0.01$ ). The PAMS emotional ( $r=0.35$ ,  $p<0.01$ ) and cognitive self-regulation ( $r=0.37$ ,  $p<0.01$ ) subscales and the NAMS uncontrollability ( $r=0.23$ ,  $p<0.01$ ) and cognitive harm ( $r=0.18$ ) subscales were significantly associated with the AUDIT total score. Emotional ( $r=0.36$ ,  $p<0.01$ ) and cognitive self-regulation ( $r=0.31$ ,  $p<0.01$ ) and uncontrollability ( $r=0.17$ ,  $p<0.01$ ) subscales but not cognitive harm subscale ( $r=0.03$ , n.s), showed significant relations to alcohol craving. The DASS-21 which measures depression, anxiety, and stress was significantly related to the AUDIT total score ( $r=0.39$ ,  $p<0.01$ ) and craving ( $r=0.41$ ,  $p<0.01$ ).

Demographic (e.g., age and marital status) and clinical factors related to alcohol use (e. g., depression, anxiety, and stress assessed by the DASS-21) had no significant associations with alcohol-related outcome factors.

### 3.3. Internal consistency reliability and test–retest reliability

Internal consistency reliability and test–retest reliability were measured to determine reliability of the Persian-PAMS, the Persian-NAMS, and their subscales. We computed Cronbach’s alphas to clarify internal consistency. Results showed that Cronbach’s alphas for the Persian-PAMS total score and its subscales including positive metacognitions about emotional self-regulation and positive metacognitions about cognitive self-regulation were 0.89, 0.87, and 0.81, respectively. Also, Cronbach’s alphas for the Persian-NAMS total score and its subscales including negative metacognitions about uncontrollability and negative metacognitions about cognitive harm were 0.73, 0.67, and 0.72, respectively.

Test–retest reliability for the Persian-PAMS and Persian-NAMS and its subscales was evaluated using ICC. Test-retest reliability was assessed on a subset of 70 males with alcohol dependence over a four-week period. Test-retest reliability coefficients for the Persian-PAMS total score (ICC=0.84; 95% CI: 0.76–0.91) and its subscales, positive metacognitions about emotional self-regulation (ICC=0.79; 95% CI: 0.66–0.87) and positive metacognitions about cognitive self-regulation (ICC=0.82; 95% CI: 0.71–0.89) were found to be good. Test-retest reliability coefficients for the Persian-NAMS total score (ICC=0.87; 95% CI: 0.79–0.92) and its subscales, negative metacognitions about uncontrollability (ICC=0.90; 95% CI: 0.85–0.94) and negative metacognitions about cognitive harm (ICC= 0.78; 95% CI: 0.64–0.86) were good.

### 3.4. Predictive validity

To assess predictive validity of the Persian-PAMS and Persian-NAMS, multiple hierarchical regression analyses were performed. In the regression models, alcohol craving on the OCDS and alcohol dependence on the AUDIT were alcohol-related outcome variables. Also, factors which were found to have significant associations with the outcome variables in Pearson's correlation analyses were entered as predictors in the regression models. To predict alcohol craving, DASS-21 was entered in step 1. Positive and negative outcome expectancies about alcohol use were entered on step 2. The PAMS emotional and cognitive self-regulation subscales and the NAMS uncontrollability subscale were entered in step 3. To predict alcohol dependence, in the first step DASS-21 was entered, followed by positive and negative outcome expectancies about alcohol use on the second step. All subscales of the PAMS and NAMS were entered on the third step. To assess multicollinearity, tolerance values and variance inflation factors (VIF) were calculated. The results showed that multicollinearity was not found (tolerance values  $< 1$  and VIF  $< 0.10$ ). In addition, a 95% confidence interval (CI) was achieved via bootstrapping with 1000 resamples (Table 4). The results showed that positive metacognitions about alcohol use, including emotional and cognitive self-regulation, predicted 12% of total variance for alcohol craving independently of clinical factors (depression, anxiety, and stress on the DASS-21) and positive and negative outcome expectancies about alcohol use. Meanwhile, negative metacognitions did not predict alcohol craving. Positive, but not negative, metacognitions predicted 14% of the total variance for alcohol dependence beyond the DASS-21 and positive and negative outcome expectancies about alcohol use. Thus, given these results, predictive validity of the Persian-PAMS was confirmed.

#### **4. Discussion**

The present study aimed to assess the psychometric properties of the Persian-PAMS and Persian-NAMS and to examine the associations of positive and negative metacognitions about alcohol use with alcohol craving and dependence among males with alcohol dependence.

In line with the findings from the original PAMS validation (Spada & Wells, 2008), the results of EFA showed that the Persian-PAMS had a two-factor solution named positive metacognitions about emotional self-regulation and positive metacognitions about cognitive self-regulation in this population sample. The results of the CFA also supported a two-factor structure to the Persian-PAMS with an acceptable model fit, similar to what was reported by Gierski et al. (2015). However, Gierski et al.'s (2015) study showed that one item of the PAMS cognitive self-regulation (i.e., "Drinking makes my negative thoughts more bearable") from the original version (Spada & Wells, 2008) was loaded on the PAMS emotional self-regulation factor. The present study did not replicate the same result. Instead, the Persian-PAMS was in line with the original version. It is important to note that Gierski et al.'s (2015) study was conducted among a non-clinical sample of college students and this discrepancy may be due to the study sample. Evidence has shown that individuals with alcohol dependence have greater difficulties with cognitive and emotion regulation than non-clinical samples without alcohol use (Ghorbani et al., 2017).

Similarly to the factorial structure obtained from the original NAMS in clinical and non-clinical samples in Spada and Wells' (2008) study and the French version using a non-clinical sample in Gierski et al.'s (2015) study, the present study revealed that the Persian-NAMS had a two-factor structure (i.e., negative metacognitions about uncontrollability and negative metacognitions about cognitive harm) using EFA. Also, these findings were replicated using CFA with an acceptable fit. Therefore, according to the results of EFA and CFA, the study

hypothesis was supported in relation to the presence of a two-factor structure for the Persian-PAMS and Persian-NAMS.

The present study reported that the Persian-PAMS and its subscales had good internal consistency using Cronbach's alpha coefficients (Cronbach's  $\alpha > 0.70$ ; Nunnally, 1978). In the present research, these findings for the scale and its subscales were very similar to values reported by Spada and Wells (2008) and Gierski et al. (2015) (Cronbach's alpha  $> 0.80$ ). Cronbach's alpha coefficients for the Persian-NAMS and its subscale regarding metacognitions about cognitive harm confirmed a good internal consistency reliability (Cronbach's  $\alpha > 0.70$ ). However, metacognitions about uncontrollability confirmed an acceptable internal consistency reliability (Cronbach's  $\alpha = 0.67$ ). These results are in line with previous studies (Gierski et al., 2015; Spada & Wells, 2008), which showed good reliability for the scale. Moreover, similarly to English and French versions of these scales (Gierski et al., 2015; Spada & Wells, 2008), test-retest reliability for the Persian-PAMS and Persian-NAMS and their subscales were found to be good, so that ICC coefficients were between 0.77 and 0.90. Evidence has shown that ICC coefficients between 0.75 and 0.90 refer to good reliability (Koo & Li, 2016). Contrary to our results, in Gierski et al.'s (2015) study, temporal stability of positive metacognitions about cognitive self-regulation was found to be weak. However, one of possible explanations for this discrepancy may be due to the nature of the study sample (solely non-clinical) and different time intervals (4 weeks vs. 6.89 weeks). Therefore, these findings confirm the study hypothesis concerning appropriate reliability of the Persian-PAMS and Persian-NAMS.

The results of hierarchical regression showed that independent of clinical factors (depression, anxiety, and stress on the DASS-21) and outcome expectancies about alcohol use, positive, but not negative, metacognitions about alcohol use, including emotional and cognitive self-regulation, predicted alcohol dependence. In addition, an interesting finding

from the hierarchical regression analyses in the present study was that the prediction of alcohol craving by positive, but not negative, metacognitions about alcohol use, even after controlling for the effects of clinical factors (depression, anxiety, and stress) and positive and negative outcome expectancies about alcohol use. These findings confirmed the predictive validity of the Persian-PAMS, but not the Persian-NAMS. The results also indicate that positive metacognitions about alcohol use may be more associated with alcohol craving and dependence relative to negative metacognitions. In line with these findings, it has been observed that positive metacognitions about alcohol use are related to problem drinking, including alcohol dependency (Dragan, 2015). Spada et al. (2007b) reported that all subscales of metacognitions about alcohol use, with the exception of negative metacognitions about cognitive harm, were significant predictors of drinking behavior. Other studies on samples with smoking use have found that metacognitions about smoking were more strongly associated with nicotine dependency than were outcome expectancies about smoking (Alma et al., 2018; Najafi et al., 2018; Nikčević et al., 2017). Therefore, metacognitions about alcohol use and outcome expectancies about alcohol use may be different from each other with respect to predicting drinking behavior (Spada et al., 2007b).

Since positive metacognitions about alcohol use consist of emotional and cognitive self-regulation, and may be more associated to elevated risk for weekly levels of alcohol use relative to negative metacognitions (Clark et al., 2012), the findings of the present study suggest that self-regulation may be related to alcohol dependence and craving and subsequently higher levels of alcohol use. Evidence has shown that positive metacognitions may be important factors in alcohol dependency and may play an important role in the transition of non-problem drinking to problematic drinking (Spada & Wells, 2010). A number of studies have suggested alcohol use is used as an emotional self-regulatory strategy to cope with psychological distress (Khosravani et al., 2017a; Simons, Hahn, Simons, & Murase,

2017; Veilleux, Skinner, Reese, & Shaver, 2014). Therefore, positive metacognitions which are related to cognitive and emotional self-regulation may be more important with respect to alcohol craving relative to negative metacognitions. However, these explanations are subjective and require further research.

Negative metacognitions were not significant predictors for alcohol craving and dependence in the current research. A potential explanation may be that these types of metacognitions emerge longer term. In view of the average age of the sample in the present study (34 years) it may be that they will become more salient later in the trajectory of development of alcohol problem (maybe when the person has had the problem for 15-20 years).

Previous research has shown that metacognitions are associated with several addictive behaviors (Allen et al., 2017; Alma et al., 2018; Casale et al., 2016; Caselli et al., 2018a; Jauregui et al., 2016; Hamonniere & Varescon, 2018; Lindberg et al., 2011; Najafi et al., 2018; Nikčević & Spada, 2008; Nikčević et al., 2015, 2017; Spada & Marino, 2017; Spada et al., 2015a, 2015b, 2008), especially problematic drinking (Moneta, 2011; Spada & Wells, 2005, 2006; Spada et al., 2007a, 2009; Stefanatou et al., 2016). Dragan, Domozych, Czerski, and Dragan (2018) reported that the FKBP5 gene had indirect effect on problematic drinking through positive metacognitions about alcohol use. Clark et al. (2012) showed that metacognitions about alcohol use were associated with weekly levels of alcohol use. These authors also found that only positive alcohol metacognitions about cognitive self-regulation were significant predictors of weekly levels of alcohol use. Gierski et al. (2015) revealed that alcohol use and binge drinking were predicted by metacognitions about alcohol use.

The current research, which conforms to these earlier studies, has some implications. This study suggests that the Persian-PAMS and Persian-NAMS had appropriate psychometric properties in a large clinical sample of alcohol-dependent males in an Iranian community.

Also, the results of confirmatory and exploratory factor analyses of the present study suggest that each of positive metacognitions and negative metacognitions about alcohol use may have a universal two-factor structure. In addition, this study showed the relations of metacognitions about alcohol use to alcohol craving and dependence, thus providing more evidence for the S-REF model (Wells & Matthews, 1994; 1996) and a metacognitive formulation of problem drinking (Spada et al., 2013). Therefore, paying attention to metacognitions in alcohol users may be important to treat problem drinking (Spada et al., 2009). In this regard, Metacognitive Therapy (MCT; Wells, 2009) has been found to be helpful in reducing weekly levels of alcohol use and the number of binge drinking episodes (Caselli et al., 2018b). Also, detached mindfulness, described as a process of distancing oneself from laborious cognitive processes or coping strategies (Wells, 2005), is a core technique of MCT to improve metacognitive awareness. Additionally, it may be useful to help modify metacognitions and urges to use alcohol in alcohol-dependent individuals in an abstinence regime (Caselli et al., 2016). Therefore, examining the effect of MCT or detached mindfulness on metacognitions about alcohol use and alcohol craving and dependence in future research is warranted. In addition, since metacognitions have been found to be associated with alcohol-related problems (Spada et al., 2009), use of cognitive-behavior therapy through focus on metacognitions may be useful to reduce alcohol problems (Spada et al., 2009).

This research has limitations that must be acknowledged when interpreting the results. First, the study was a cross-sectional design in nature. Therefore, to clarify the predictive role of metacognitions regarding alcohol craving and dependence, longitudinal studies are needed. Second, the use of self-report instruments may lead to bias in participant responses. Therefore, using interviews could be beneficial in future research. Third, the findings were obtained from a sample of treatment-seeking males and may not be generalized to alcohol-

dependent females or those not entered into treatment. Fourth, the clinical nature of the sample makes it impossible to generalize the findings to non-clinical samples. Thus, the use of the Persian-PAMS and Persian-NAMS in Iranian non-clinical samples requires the study of these scales in the general Iranian population. Fifth, comorbid psychiatric disorders (e.g., major depressive disorder, bipolar disorder, borderline personality disorder, etc.), which may affect metacognitions and alcohol use, were not assessed in the present study.

## **5. Conclusions**

The Persian-PAMS and Persian-NAMS had appropriate psychometric properties, including two-factor structure and appropriate reliability and predictive validity in a clinical sample of males with a DSM diagnosis of alcohol dependence. The Persian-PAMS and Persian-NAMS showed good temporal stability across time. Overall, the findings of the present research indicate that the Persian-PAMS and Persian-NAMS are valid scales to be used with Iranian males with alcohol dependence. In addition, positive metacognitions about alcohol use play a more important role in alcohol craving and dependence than outcome expectancies about alcohol use.

## **Contributors**

All authors were involved in the statistical analyses and data collection of the study. All authors contributed and have approved the final manuscript.

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## **Conflict of interest**

No conflict declared.

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## Appendix A. The Persian version of the Positive Alcohol Metacognitions Scale (Persian-PAMS).

نسخه فارسی مقیاس فراشناخته‌های مثبت الکل

عاملها	کاملا موافقم	تقریبا موافقم	کمی موافقم	موافق نیستم	
فراشناخته‌های مثبت درباره خودتنظیمی هیجانی	4	3	2	1	1- مصرف مشروبات الکلی مرا مهربان‌تر می‌کند.
فراشناخته‌های مثبت درباره خودتنظیمی هیجانی	4	3	2	1	2- مصرف مشروبات الکلی اعتماد به نفس مرا بالا می‌برد.
فراشناخته‌های مثبت درباره خودتنظیمی هیجانی	4	3	2	1	3- مصرف مشروبات الکلی به من احساس آرامش بیشتری می‌دهد.
فراشناخته‌های مثبت درباره خودتنظیمی هیجانی	4	3	2	1	4- مصرف مشروبات الکلی احساسات اضطراب‌آور مرا کاهش می‌دهد.
فراشناخته‌های مثبت درباره خودتنظیمی هیجانی	4	3	2	1	5- مصرف مشروبات الکلی مرا اجتماعی‌تر و خوش‌مشرب‌تر می‌کند.
فراشناخته‌های مثبت درباره خودتنظیمی هیجانی	4	3	2	1	6- مصرف مشروبات الکلی کم‌رویی و خجالت مرا کاهش می‌دهد.
فراشناخته‌های مثبت درباره خودتنظیمی هیجانی	4	3	2	1	7- مصرف مشروبات الکلی مرا شادتر می‌کند.
فراشناخته‌های مثبت درباره خودتنظیمی هیجانی	4	3	2	1	8- مصرف مشروبات الکلی به من کمک می‌کند تا با اجتماع هماهنگ شوم.
فراشناخته‌های مثبت درباره خودتنظیمی شناختی	4	3	2	1	9- مصرف مشروبات الکلی باعث می‌شود بتوانم شفاف‌تر و بهتر فکر کنم.
فراشناخته‌های مثبت درباره خودتنظیمی شناختی	4	3	2	1	10- مصرف مشروبات الکلی به من کمک می‌کند تا افکارم را کنترل کنم.
فراشناخته‌های مثبت درباره خودتنظیمی شناختی	4	3	2	1	11- مصرف مشروبات الکلی باعث می‌شود که افکار منفی من قابل تحمل‌تر شوند.
فراشناخته‌های مثبت درباره خودتنظیمی شناختی	4	3	2	1	12- مصرف مشروبات الکلی به تمرکز بیشتر من کمک می‌کند.

## Appendix B. The Persian version of the Negative Alcohol Metacognitions Scale (Persian-NAMS).

نسخه فارسی مقیاس فراشناخته‌های منفی الکل

عاملها	کاملا موافقم	تقریبا موافقم	کمی موافقم	موافق نیستم	
فراشناخته‌های منفی درباره غیر قابل کنترل بودن	4	3	2	1	1- من هیچ کنترلی بر مصرف مشروبات الکلی ندارم.
فراشناخته‌های منفی درباره غیر قابل کنترل بودن	4	3	2	1	2- من مصرف مشروبات الکلی را ادامه می‌دهم و اهمیتی ندارد که چقدر سعی کنم آن را کنترل کنم.
فراشناخته‌های منفی درباره غیر قابل کنترل بودن	4	3	2	1	3- مصرف مشروبات الکلی زندگی مرا کنترل می‌کند.
فراشناخته‌های منفی درباره آسیب شناختی	4	3	2	1	4- اگر نتوانم مصرف مشروبات الکلی خودم را کنترل کنم، ادامه زندگی برایم سخت خواهد شد.
فراشناخته‌های منفی درباره آسیب شناختی	4	3	2	1	5- مصرف مشروبات الکلی به ذهن من آسیب خواهد زد.

فرآشناختهای منفی درباره آسیب شناختی	4	3	2	1	6- مصرف مشروبات الکلی باعث خواهد شود کنترلم را از دست بدهم.
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Table 1

Socio-demographic and clinical characteristics of males with alcohol dependence ( $n=300$ ).

Characteristics	Mean $\pm$ S.D or $n$ (%)
Age, years	34.00 $\pm$ 9.4
Marital status	
Single	137 (45.7%)
Married	127 (42.3%)
Divorced	36 (12%)
Age of onset of alcohol use	20.5 $\pm$ 5.9
Duration of alcohol use	13.00 $\pm$ 7.7
OCDS	25.8 $\pm$ 10.00
AUDIT	26.00 $\pm$ 7.5
PAMS	26.5 $\pm$ 8.2
NAMS	13.6 $\pm$ 4.1
DASS-21	28.3 $\pm$ 10.8
AOEQ positive outcome expectancies about alcohol use	61.2 $\pm$ 18.01
AOEQ negative outcome expectancies about alcohol use	45.1 $\pm$ 13.6

Note.

PAMS=Positive Alcohol Metacognitions Scale; NAMS=Negative Alcohol Metacognitions Scale; DASS-21=Depression Anxiety Stress Scale-21; OCDS=Obsessive Compulsive Drinking Scale; AUDIT= Alcohol Use Disorders Identification Test; AOEQ= Alcohol Outcome Expectancy Questionnaire.

Table 2

Factor loadings for 12 items of the PAMS and 6 items of the NAMS based on exploratory factor analyses ( $n=300$ ).

PAMS	Factor 1: positive metacognitive beliefs about emotional	Factor 1 for	Factor 2 for	Communality
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	self- regulation	the PAMS	the PAMS	
	Q1. Drinking makes me more affectionate.	<b>0.80</b>	0.06	0.59
	Q2. Drinking makes me more confident.	<b>0.70</b>	0.12	0.61
	Q3. Drinking makes me feel more relaxed.	<b>0.71</b>	0.12	0.61
	Q4. Drinking reduces my anxious feelings.	<b>0.63</b>	0.17	0.55
	Q5. Drinking makes me more sociable.	<b>0.55</b>	0.21	0.47
	Q6. Drinking reduces my self-consciousness.	<b>0.82</b>	0.13	0.57
	Q7. Drinking makes me feel happy.	<b>0.78</b>	0.15	0.51
	Q8. Drinking helps me fit in socially.	<b>0.66</b>	0.12	0.54
	Factor 2: positive metacognitive beliefs about cognitive self-regulation			
	Q1. Drinking makes me think more clearly.	0.11	<b>0.91</b>	0.72
	Q2. Drinking helps me to control my thoughts.	0.13	<b>0.87</b>	0.66
	Q3. Drinking makes my negative thoughts more bearable.	0.17	<b>0.52</b>	0.40
	Q4. Drinking helps me focus my mind.	0.06	<b>0.66</b>	0.49
NAMS	Factor 1: negative metacognitive beliefs about uncontrollability	Factor 1 for the NAMS	Factor 2 for the NAMS	Communality
	Q1. I have no control over my drinking.	<b>0.64</b>	0.23	0.55
	Q2. My drinking persists no matter how I try to control it.	<b>0.88</b>	0.20	0.71
	Q3. Drinking controls my life.	<b>0.76</b>	0.04	0.60
	Factor 2: negative metacognitive beliefs about cognitive harm			
	Q1. If I cannot control my drinking I will cease to exist.	0.23	<b>0.55</b>	0.49
	Q2. Drinking will damage my mind.	0.07	<b>0.92</b>	0.81
	Q3. Drinking will make me lose control.	0.08	<b>0.86</b>	0.70

Note.

PAMS=Positive Alcohol Metacognitions Scale; NAMS=Negative Alcohol Metacognitions Scale.

Table 3

Standardized factor loadings of the two-factor model of the PAMS and the NAMS based on confirmatory factor analyses ( $n=300$ ).

PAMS	Factor 1: positive metacognitive beliefs about emotional self-regulation	Factor loading	t-value
	Q1. Drinking makes me more affectionate.	0.69	12.98
	Q2. Drinking makes me more confident.	0.75	14.44
	Q3. Drinking makes me feel more relaxed.	0.76	14.94
	Q4. Drinking reduces my anxious feelings.	0.72	13.64

	Q5. Drinking makes me more sociable.	0.65	12.01
	Q6. Drinking reduces my self-consciousness.	0.63	11.42
	Q7. Drinking makes me feel happy.	0.58	10.33
	Q8. Drinking helps me fit in socially.	0.57	10.16
	Factor 2: positive metacognitive beliefs about cognitive self-regulation		
	Q1. Drinking makes me think more clearly.	0.74	13.53
	Q2. Drinking helps me to control my thoughts.	0.73	13.17
	Q3. Drinking makes my negative thoughts more bearable.	0.60	10.29
	Q4. Drinking helps me focus my mind.	0.63	11.03
NAMS	Factor 1: negative metacognitive beliefs about uncontrollability		
	Q1. I have no control over my drinking.	0.73	10.72
	Q2. My drinking persists no matter how I try to control it.	0.59	8.88
	Q3. Drinking controls my life.	0.59	8.88
	Factor 2: negative metacognitive beliefs about cognitive harm		
	Q1. If I cannot control my drinking I will cease to exist.	0.54	9.01
	Q2. Drinking will damage my mind.	0.86	14.18
	Q3. Drinking will make me lose control.	0.70	11.66

Note.

PAMS=Positive Alcohol Metacognitions Scale; NAMS=Negative Alcohol Metacognitions Scale.

Table 4

Summary of hierarchical regression analyses for the PAMS and NAMS predicting alcohol outcomes ( $n=300$ ).

Step	Outcome variables	Predictors	Beta	<i>B</i>	<i>SE</i>	<i>BC</i> 95% <i>CI</i>	<i>p</i>	Adj. $R^2$	$R^2$ change
OCDS									
1		DASS-21	0.41	0.38	0.05	0.29, 0.48	< 0.001	0.17	0.17
2		DASS-21	0.35	0.32	0.06	0.22, 0.43	< 0.001		
		Positive AOEQ	0.02	0.03	0.03	-0.09, 0.06	0.74		
		Negative AOEQ	0.17	0.01	0.04	0.03, 0.24	0.013	0.19	0.02
3		DASS-21	0.32	0.30	0.06	0.19, 0.41	< 0.001		
		Positive AOEQ	0.11	0.06	0.04	-0.13, 0.01	0.15		
		Negative AOEQ	0.19	0.14	0.05	0.04, 0.25	0.006		
		PAMS emotional self-regulation	0.26	0.43	0.09	0.26, 0.40	< 0.001		
		PAMS cognitive self-regulation	0.21	0.35	0.12	0.20, 0.30	< 0.001		
		NAMS uncontrollability	0.03	0.13	0.26	-0.43, 0.76	0.62	0.31	0.12
AUDIT									

1	DASS-21	0.39	0.27	0.04	0.20, 0.34	< 0.001	0.15	0.15
2	DASS-21	0.27	0.19	0.04	0.11, 0.27	< 0.001		
	Positive AOEQ	0.08	0.03	0.03	-0.03, 0.09	0.26		
	Negative AOEQ	0.20	0.11	0.04	0.02, 0.19	0.004	0.20	0.05
3	DASS-21	0.25	0.18	0.04	0.10, 0.25	< 0.001		
	Positive AOEQ	0.001	0.001	0.03	-0.06, 0.07	0.99		
	Negative AOEQ	0.19	0.11	0.04	0.02, 0.19	0.005		
	PAMS emotional self-regulation	0.25	0.41	0.08	0.23, 0.38	< 0.001		
	PAMS cognitive self-regulation	0.28	0.45	0.07	0.28, 0.45	< 0.001		
	NAMS uncontrollability	0.06	0.18	0.21	-0.23, 0.57	0.38		
	NAMS cognitive harm	0.07	0.20	0.17	-0.16, 0.54	0.23	0.34	0.14

Note.

PAMS=Positive Alcohol Metacognitions Scale; NAMS=Negative Alcohol Metacognitions Scale; DASS-21=Depression Anxiety Stress Scale-21; OCDS=Obsessive Compulsive Drinking Scale; AUDIT= Alcohol Use Disorders Identification Test; AOEQ= Alcohol Outcome Expectancy Questionnaire.

### **Highlights**

- Validation of the Persian versions of the PAMS and NAMS and their relations to alcohol outcomes.
- Persian versions of the PAMS and NAMS had a two-factor structure.
- Reliability for the Persian-PAMS and NAMS and their subscales was found to be good.
- Positive metacognitions predicted alcohol outcomes beyond alcohol expectancies, confirming predictive validity.

Journal Pre-proof

**Conflict of interest**

No declared.

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