PAMS – Positive Alcohol Metacognitions Scale - Version finale

Certaines personnes consomment de l'alcool à des fin récréatives, mais également pour d'autres raisons. Voici un certain nombre de croyances sur l'utilisation de l'alcool donné par les gens. En considérant à votre propre consommation d'alcool, veuillez lire chacun des énoncés et indiquer à quel point vous êtes d'accord, en sélectionnant le chiffre appropriée.

Il n'y a pas de bonne ou de mauvaise réponse, essayez simplement, d'être le plus sincère possible.

MERCI D'INDIQUER A QUEL POINT VOUS ÊTES D'ACCORD AVEC CHACUNE DES DECLARATIONS CI-DESSOUS, LORSQUE VOUS COMMENCEZ A BOIRE :

	Pas du tout d'accord	*Légèrement d'accord*	*Assez d'accord*	*Totalement d'accord*
1. Boire me rend plus affectueux(se)	1	2	3	4
2. Boire me rend plus confiant(e)	1	2	3	4
3. Boire me fait penser plus clairement	1	2	3	4
4. Boire me fait me sentir plus détendu(e)	1	2	3	4
5. Boire m'aide à contrôler mes pensées	1	2	3	4
6. Boire rend mes idées noires plus supportables	1	2	3	4
7. Boire réduit mon anxiété	1	2	3	4
8. Boire me rend plus sociable	1	2	3	4
9. Boire me rend moins gêné(e)	1	2	3	4
10. Boire me fait sentir heureux(se)	1	2	3	4
11. Boire m'aide à me concentrer	1	2	3	4
12. Boire m'aide à m'intégrer socialement	1	2	3	4

MERCI D'AVOIR PRIS LE TEMPS DE REMPLIR CE QUESTIONNAIRE.

Facteurs

Croyances métacognitives au sujet de l'autorégulation émotionnelle et sociale : 1, 2, 4, 7, 8, 9, 10 et 12.
Croyances métacognitives au sujet de l'autorégulation cognitive : 3, 5, 6 et 11.

NAMS – Negative Alcohol Metacognitions Scale - version finale

Certaines personnes consomment de l'alcool à des fin récréatives, mais également pour d'autres raisons.

Voici un certain nombre de croyances sur l'utilisation de l'alcool donné par les gens. En considérant à votre propre consommation d'alcool, veuillez lire chacun des énoncés et indiquer à quel point vous êtes d'accord, en sélectionnant le chiffre appropriée.

Il n'y a pas de bonne ou de mauvaise réponse, essayez simplement, d'être le plus sincère possible.

MERCI D'INDIQUER A QUEL POINT VOUS ETES D'ACCORD AVEC CHACUNE DES DECLARATIONS CI-DESSOUS, JUSTE APRES UN EPISODE DE CONSOMMATION D'ALCOOL :

	Pas du tout d'accord	*Légèrement d'accord*	*Assez d'accord*	*Totalement d'accord*
1. Je n'ai aucun contrôle sur ma consommation d'alcool	1	2	3	4
2. Si je n'arrive pas à contrôler ma consommation d'alcool, je vais en mourir	1	2	3	4
3. Boire endommagera mon cerveau	1	2	3	4
4. Ma consommation d'alcool persiste, quel que soit l'effort que je fais pour la contrôler	1	2	3	4
5. Boire me fera perdre le contrôle	1	2	3	4
6. Le fait de boire contrôle ma vie	1	2	3	4

MERCI D'AVOIR PRIS LE TEMPS DE REMPLIR CE QUESTIONNAIRE.

Facteurs
Croyances métacognitives au sujet de la perte de contrôle : 1,4 et 6.
Croyances métacognitives au sujet du préjudice : 2,3 et 5.

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Positive and negative metacognitions about alcohol use among university students: Psychometric properties of the PAMS and NAMS French versions

Fabien Gierski[a,b,*], Marcantonio M. Spada[d], Eveline Fois[c], Aurélie Picard[a,e], Mickaël Naassila[e], Martial Van der Linden[c]

[a] C2S Laboratory (EA 6291), Reims Champagne-Ardenne University, Reims, France
[b] Department of Psychiatry, Reims University Hospital, Reims, France
[c] Cognitive Psychopathology and Neuropsychology Unit, University of Geneva, Geneva, Switzerland
[d] School of Applied Sciences, London South Bank University, London, United Kingdom
[e] INSERM ERi24 GRAP, Research Group on Alcohol and Drugs, Jules Verne Picardie University, Amiens, France

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ABSTRACT

Background: Metacognitions about the positive and negative effects of alcohol use have been associated with various patterns of drinking. The aim of the present study was to validate French versions of the Positive Alcohol Metacognitions Scale (PAMS) and the Negative Alcohol Metacognitions Scale (NAMS) developed by Spada and Wells (2008, Addict. Behav. 33, 515) and to investigate the relationship between metacognitions and patterns of alcohol use among university students.
Methods: Responses of 1600 university students who participated in an internet survey-based study on alcohol use were submitted to confirmatory (N = 800, mean age 20.40 years, 45.50% male) and exploratory (N = 800, mean age 20.34 years, 45.38% male) factor analyses in two separate samples. Alcohol use, binge drinking and mood were also assessed.
Results: In line with the original versions of the scales, results provided support for a two-factor structure of the French PAMS and NAMS. Both scales revealed adequate internal reliability. Good temporal stability was found for the two factors of the NAMS, whereas one factor of the PAMS showed weakness across time. Predictive validity revealed that negative alcohol metacognitions about the uncontrollability of alcohol use were found to be consistently associated with alcohol use and binge drinking, whereas positive metacognitions about alcohol use were found to be differentially associated with alcohol use and binge drinking.
Conclusions: The French versions of the PAMS and NAMS exhibited suitable psychometric properties. This study also emphasized the role of metacognitions about alcohol use in drinking behaviour among university students.

1. Introduction

The Self-regulatory Executive Function (S-REF) model of psychopathology (Wells and Matthews, 1994, 1996) implicates maladaptive metacognitive processes in the predisposition towards, and maintenance of, psychological dysfunction. In this model, Wells and Matthews propose that psychological dysfunction is driven and maintained by maladaptive coping strategies (e.g., perseverative thinking, threat monitoring, thought suppression), collectively termed the Cognitive Attentional Syndrome (CAS), which cause negative thoughts and emotions to persist. The activation and persistence of the CAS is dependent on maladaptive metacognitions (or metacognitive beliefs). Metacognitions are defined as "stable knowledge or beliefs about one's own cognitive system, and knowledge about factors that affect the functioning of the system; the regulation and awareness of the current state of cognition, and appraisal of the significance of thought and memories" (Wells, 1995, p. 302). In support of this view, metacognitions have been found to be associated with a wide array of psychological and behavioural problems (for a review, see Wells, 2013).

* Corresponding author at: Université de Reims Champagne-Ardenne, Laboratoire C2S (EA6291), Maison de la Recherche—57, rue Pierre Taittinger, 51096 Reims Cedex, France. Tel.: +33 3 26 91 36 34; fax: +33 3 26 91 37 19.
E-mail address: fabien.gierski@univ-reims.fr (F. Gierski).

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In the domain of alcohol use, metacognitions can be divided into two broad sets: (1) positive metacognitions about the impact of alcohol use on cognitive (e.g., "Drinking helps me to control thoughts") and emotional (e.g., "Drinking helps me to improve my mood") self-regulation; and (2) negative metacognitions concerning the perception of lack of executive control over alcohol use (e.g., "My drinking persists no matter how I try to control it") and the negative impact of alcohol use on cognitive functioning ("Drinking will damage my mind"; Spada and Wells, 2006).

Positive metacognitions about alcohol use can be conceptualised as a specific form of expectancy relating to the use of alcohol as a means of controlling and regulating cognition and emotion (Spada and Wells, 2006). They differ from positive alcohol expectancies in their explicit focus on capturing how alcohol use can help achieve mental control by enhancing problem-solving, acting as a form of thought control, helping to regulate attention, and managing self-image (Spada and Wells, 2008, 2013; Spada et al., 2015). Negative metacognitions about alcohol use capture judgements concerning the perception of lack of executive control over alcohol use and the negative impact of alcohol use on cognitive functioning. From a metacognitive standpoint such beliefs are thought to play a crucial role in the perpetuation of alcohol use (Spada and Wells, 2006; Spada et al., 2013; Spada et al., 2015) by becoming activated during and following a drinking episode, and triggering negative emotional states that compel a person to use more. Negative alcohol expectancies differ from such beliefs in as much as they mainly measure general negative outcomes arising from alcohol use (e.g., "I get a hangover"; "I feel guilty"). Research has indicated that metacognitions about alcohol use are an independent predictor of drinking behaviour when controlling for alcohol expectancies (Spada and Wells, 2008).

Spada and Wells (2008) have developed instruments to specifically measure positive and negative metacognitions about alcohol use: the Positive Alcohol Metacognitions Scale (PAMS) and the Negative Alcohol Metacognitions Scale (NAMS). The PAMS consists of 12 items and an exploratory factor analysis conducted among non-clinical and clinical samples yielded a two-factor solution (Spada and Wells, 2008) representing positive metacognitions about using alcohol in emotional and cognitive self-regulation. The authors also reported adequate internal reliability and test–retest reliability over an 8-week interval. The NAMS consists of 6 items and an exploratory factor analysis conducted among the same samples as the PAMS (Spada and Wells, 2008) yielded a two-factor solution representing negative metacognitions about the uncontrollability of alcohol use and about cognitive harm related to alcohol use. The authors reported an adequate internal reliability for both factors, but a poor test–retest reliability for the uncontrollability factor (Spearman's rho = .42).

Exploration of the predictive validity of the two scales revealed significant correlations between factor scores and measures of alcohol use among healthy adults and problem drinkers (Spada et al., 2007a,b; Spada and Wells, 2008). Comparisons of PAMS and NAMS scores among groups of social drinkers, problem drinkers and alcohol-dependent patients (Spada and Wells, 2010) revealed significantly increased scores for each factor of the two scales among the three groups, with alcohol-dependent patients having higher scores and problem drinkers having intermediate scores. More recently, Clark et al. (2012) investigated the relative contribution of personality factors and metacognitions about alcohol use in predicting weekly levels of alcohol use in a sample of 138 binge drinking university students. They showed that positive alcohol metacognitions about cognitive self-regulation, negative alcohol metacognitions about uncontrollability and negative alcohol metacognitions about cognitive harm were significantly correlated with weekly levels of alcohol use. A hierarchical regression analysis revealed that metacognitions about alcohol use accounted for 6% of variance in weekly levels of alcohol use over and above the variance accounted for by gender, and personality factors (agreeableness and conscientiousness). More specifically, findings from this study showed that males with low conscientiousness and high positive alcohol metacognitions about cognitive self-regulation had increased weekly levels of alcohol use.

The aim of the current study was to translate into French the PAMS and NAMS and to examine their psychometric properties in a large non-clinical sample of university students. We first evaluated the goodness of fit of the two-factor model of each scale using confirmatory factor analysis (CFA). Then, we further conducted an exploratory examination of the two scales' factor structure (EFA). We also investigated reliability (i.e., both internal consistency and test–retest stability) and predictive validity. In line with Clark and colleagues' (2012) study, we investigated whether metacognitions about alcohol use were related with weekly levels of alcohol use and a more refined measure of binge drinking. Binge drinking involves several aspects of drinking such as drinking quickly, and heavily, to get drunk, and is characterised by repeated bouts of drinking leading to high levels of blood alcohol concentration (BAC) followed by periods in which BAC level return to zero (Scaife and Duka, 2009). For instance, consuming 21 units by week can be the resultant of different patterns of alcohol use such as consuming three drinks by day or consuming them on two occasions. We therefore included a measure of binge drinking developed by Townshend and Duka (2002) which encompasses the speed of drinking, the frequency of being drunk, and the percentage of times getting drunk when drinking.

2. Methods

2.1. Translation of the scales

The process of translation of the two scales was carried out as follows. We first forward translated the items of the PAMS and NAMS from English to French. After this stage an independent professional translator (native English speaker) back translated the items into English. Discrepancies emerging between the back translated and the original English versions were debated and translation adjustments were consensually made in agreement with one the originators of the scales (MMS). Final versions of the two scales were presented to a group of university students to ensure readability and correct understanding of items.

2.2. Procedure and participants

We conducted an internet survey-based study on alcohol use among students from the University of Reims Champagne-Ardenne, France, which consisted primarily of Caucasians. The participants were asked to complete a survey on the role of thinking styles and alcohol use as described below. The survey was completed anonymously and a personal code was used to trace respondents in the follow-up sessions. The recruitment information e-mail outlined the purpose of the study and reminded participants that they were under no obligation to participate. All participants provided online informed consent before starting. No compensation was given.

A total of 2250 participants completed the study. From this pool we filtered out scales with missing responses ($N = 86$), participants who were abstainers ($N = 390$), and those aged above 30 years ($N = 30$, to improve homogeneity of the sample). We also noted that some participants reported alcohol use values, which appeared to us as suspicious (overestimations or typos). Therefore, participants who reported aberrant/extreme amounts of alcohol use ($N = 144$) were discarded by computing the 95th percentile for

Table 1
Sociodemographic and clinical characteristics according to samples.

	Sample A (*N* = 800)	Sample B (*N* = 800)	Retest sample (*N* = 395)
Sociodemographics			
Females, *N* (%)	436 (54.50)	437 (54.62)	219 (55.44)
Males, *N* (%)	364 (45.50)	363 (45.38)	176 (44.56)
Age, years	20.40 (2.36)	20.34 (2.17)	20.71 (2.37)
Alcohol use			
AUDIT	6.99 (4.53)	7.28 (4.58)	7.65 (5.01)
Alcohol units (week)	6.49 (6.05)	6.98 (6.29)	7.40 (6.85)
Binge score	18.33 (13.14)	19.10 (13.39)	19.40 (13.98)
Mood			
STAI-Trait	43.69 (10.45)[a]	43.54 (10.83)[b]	42.83 (10.89)
BDI	5.82 (4.68)[c]	5.97 (4.88)[d]	5.42 (4.42)

Note. Data show means (standard deviations), unless otherwise noted; AUDIT = Alcohol Use Disorders Identification Test; STAI = State-Trait Anxiety Inventory; BDI = Beck Depression Inventory.

[a] *n* = 602.
[b] *n* = 626.
[c] *n* = 598.
[d] *n* = 621.

each variable (AUDIT, alcohol use and binge drinking) separately for men and women. The remaining sample consisted of 1600 participants (873 females and 727 males) with a mean age of 20.37 years (S.D. = 2.27; range = 18–30). In order to conduct CFA and EFA on the different samples, the whole sample was randomly divided in two sub-samples: sample A and sample B. This cross-validation approach was chosen to minimize sensitivity to sample-specific variation. To prevent an imbalance in sex ratios in the splitting procedure, data were first sorted by gender and then participants alternatively assigned to each sub-sample. A subgroup of participants (*N* = 395) completed the scale twice (with an interval of 7 weeks) to establish test–retest stability. These three samples were matched (all $p > .05$) on gender, age, drinking behaviour and mood variables (Table 1).

2.3. Measures

2.3.1. The Positive Alcohol Metacognitions Scale (PAMS; Spada and Wells, 2008). The PAMS is a 12-item scale assessing positive metacognitions about alcohol use. It consists of two factors: (1) positive alcohol metacognitions about emotional self-regulation; and (2) positive alcohol metacognitions about cognitive self-regulation. Participants are asked to indicate how much they agree with each of the statements when they begin drinking. All items are scored on a Likert scale from 1 (Do not agree) to 4 (Agree very much). Higher scores represent higher levels of positive metacognitions about alcohol use.

2.3.2. The Negative Alcohol Metacognitions Scale (NAMS; Spada and Wells, 2008). The NAMS is a 6-item scale assessing negative metacognitions about alcohol use. It consists of two factors: (1) negative alcohol metacognitions about uncontrollability; and (2) negative alcohol metacognitions about cognitive harm. Participants are asked to indicate how much they agree with each of the statements when they have stopped a drinking session. All items are scored on a Likert scale from 1 (Do not agree) to 4 (Agree very much). Higher scores represent higher levels of negative metacognitions about alcohol use.

2.3.3. The Alcohol Use Disorders Identification Test (AUDIT; Babor et al., 1992). The AUDIT was developed as a screening tool by the World Health Organisation (WHO) for early identification of problem drinkers. We used the French version of this scale, which consists of 10 questions regarding recent alcohol use, alcohol dependence symptoms and alcohol-related problems. The summary score ranges from 0, indicating no presence of problem drinking behaviour, to 40 indicating marked levels of problem drinking behaviour and alcohol dependence. The Cronbach's alpha for the full sample on this scale was .75.

2.3.4. The Alcohol Use Questionnaire-revised (AUQ-R; Townshend and Duka, 2002). We used a French version of the revised version of the Alcohol Use Questionnaire initially developed by Mehrabian and Russell (1978). This version allows for the calculation of weekly level of alcohol use [units of alcohol by week, considering that in France 1 unit of alcohol is defined as 10 g of ethanol] and a binge score. This score was calculated for all participants on the basis of the information provided regarding: speed of drinking (average drinks per hour), number of times being drunk in the previous 6 month, and percentage of times getting drunk when drinking (for more details, see Townshend and Duka, 2002).

2.3.5. Mood assessment. Anxiety was assessed with the trait anxiety part of the French version of the State-Trait Anxiety Inventory (STAI; Spielberger et al., 1983), whereas depressive symptomatology was assessed with the 13-item French version of the Beck Depression Inventory (BDI-13; Beck et al., 1988; Bouvard and Cottraux, 1996). The Cronbach's alphas for the full sample on these scales were .91 and .83 respectively.

2.4. Statistical analyses

Statistical analyses were conducted in the R environment (R Development Core Team, 2014) using Psych (Revelle, 2015) and Lavaan packages (version 0.5-17; Rosseel, 2012). Univariate and multivariate skewness and kurtosis analyses revealed that, according to the nature of the data (ordinal 4-point Likert scale items), normality assumptions were not met. Therefore data analysis was conducted using nonparametric methods.

First, data from sample A was subjected to CFAs carried out using robust diagonally weighted least squares estimation method (Rhemtulla et al., 2012; WLSMV in Lavaan package). Factor loadings were examined using Comrey and Lee's (1992) recommendations (i.e. >.71 = excellent, >.63 = very good, >.55 = good, >.45 = fair and >.32 = poor). Overall goodness-of-fit of the PAMS and NAMS models was evaluated using a scaled chi-square, scaled χ^2/degree of freedom (df) ratio, the Standardized Root Mean Square Residual (SRMR), the Root Mean Square Error of Approximation (RMSEA) with 90% confidence intervals, and the Comparative Fit Index (CFI). Conventional cut-offs for fitting indices were as follows: $\chi^2/df \leq 5$ = good (Hooper et al., 2008); SRMR ≤ .05 = good, between .05 and .10 = acceptable fit (Schermelleh-Engel et al., 2003); RMSEA ≤ .05 = good, between .05 and .08 = acceptable; CFI ≥ .90 = acceptable, although ideally ≥ .95 (Hu and Bentler, 1999). Modification indices were also explored in order to identify parameter misfit.

Following this, data from the sample B was subjected to EFA using ordinary least squares (minres method) based on the polychoric matrix correlation (Holgado-Tello et al., 2008). Parallel analysis (Horn, 1965) was used to determine the number of factors to be retained. As we expected factors to be correlated, we subjected these to oblique rotation (oblimin rotation).

Internal consistency was assessed using nonparametric Cronbach's alpha coefficients (i.e. based on the polychoric correlation matrix) for the whole sample (*N* = 1600), whereas test–retest reliability was assessed by using intraclass correlation coefficients (ICC; with its 95% confidence intervals [CIs]) among the sample of students who responded twice to the questionnaires (*N* = 395). Cronbach's alpha values ranging from .70 to .95 were considered as acceptable (Nunnally and Bernstein, 1994), while ICC values were

examined using the Chichetti (1994; cited in Hallgren, 2012) recommendations (i.e. ≥.74 = excellent, ≥.60 = good, ≥.40 = fair).

Finally, we used multiple hierarchical regression analyses to determine the predictive validity of the scales. The criterion variables were mean number of units of alcohol consumed per week and binge drinking, and the predictors were gender, age, mood scores and the PAMS and NAMS factors scores.

3. Results

3.1. Confirmatory factor analysis

To investigate whether items of the PAMS were related to a single underlying factor we first tested a single factor model. Results suggested that the model had substandard fit: $\chi^2(54) = 276.959$, $p < .001$, $\chi^2/df = 5.13$; SRMR = .089; RMSEA = .072 (90% IC: .064–.080); CFI = .913. We then tested the original two-factor model of the PAMS. Results revealed an improved fit of the model to the data with acceptable goodness of fit values: $\chi^2(53) = 268.417$, $p < .001$, $\chi^2/df = 5.06$; SRMR = .082; RMSEA = .071 (90% IC: .063–.080); CFI = .916. The correlation between the two factors was .65.

Examination of the modification indices (MI) revealed a highly elevated modification index (MI) between items 6 and 7 (MI = 47.85) indicating that residual errors between the two items shared variance. This was coupled by a high MI between item 6 and the positive alcohol metacognitions about emotional self-regulation factor (MI = 37.18). Both indicated a problem in how items six was specified on the positive alcohol metacognitions about cognitive self-regulation factor and suggested cross-loading onto the positive alcohol metacognitions about emotional self-regulation factor. Content review of this item helped us to understand these results: "Drinking makes my negative thoughts more bearable", as negative thoughts are involved in negative emotions and are not solely cognitive in nature. We therefore decided to drop item 6 from the model and reassessed the fit to determine whether this new model might provide a better account of the data. As expected, fit statistics revealed a substantial improvement of all indices: $\chi^2(43) = 155.600$, $p < .001$, $\chi^2/df = 3.618$; SRMR = .050; RMSEA = .057 (90% IC: .048–.067); CFI = .952. Results also provided a decrement in the correlation between the two factors: from .65 to .30, suggesting an increase in the distinctiveness of the two factors.

Standardized factor loadings of the three measurement models are displayed on Table 2.

The same analytical procedure was conducted for the NAMS. We first tested a single factor model, with results revealing a substandard fit: $\chi^2(9) = 50.519$, $p < .001$, $\chi^2/df = 5.613$; SRMR = .071; RMSEA = .076 (90% IC: .056–.097); CFI = .890. In contrast, the two-factor model revealed a good fit of the data: $\chi^2(8) = 22.511$, $p < .001$, $\chi^2/df = 2.813$; SRMR = .039; RMSEA = .048 (90% IC: .025–.071); CFI = .961. The correlation between the two factors was .54. Standardized factor loadings and correlations between the two latent variables of the NAMS are displayed on Table 3. All the items loaded significantly on their respective factors, and they yielded coefficients of .45 or higher, except for item 1 which showed a relatively poor loading value.

3.2. Exploratory factor analysis

Data from sample B were subjected to EFA in order to explore whether these French versions of the two scales would provide different factor solutions compared to the original model.

To ensure that data were suitable for performing the EFA we computed the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and the Bartlett's test of sphericity. Results revealed a "meritorious" KMO value (.85) and a significant Bartlett's test of sphericity ($p < .001$), both suggesting that the adequacy of the polychoric correlation matrix was sufficient to perform the EFA. Results from the parallel analysis indicated the possibility of a three-factor solution. This solution accounted for 61% of the total variance. The first factor comprised items from the positive alcohol metacognitions about emotional self-regulation factor with the exception of item 7. The second factor was composed of items from the positive alcohol metacognitions about cognitive self-regulation factor with

Table 2
Standardized factor loadings of CFA models of the French PAMS from sample A ($N = 800$; $n_{males} = 364$; $n_{females} = 436$).

Original items and their corresponding French translation	Single-factor model	Two-factor model		Two-factor model without item 6	
		Emotional	Cognitive	Emotional	Cognitive
1. Drinking makes me more affectionate *Boire me rend plus affectueux(se)*	.56	.56		.56	
2. Drinking makes me more confident *Boire me rend plus confiant(e)*	.71	.71		.72	
3. Drinking makes me think more clearly *Boire me fait penser plus clairement*	.29		.42		.91
4. Drinking makes me feel more relaxed *Boire me fait me sentir plus détendu(e)*	.62	.62		.61	
5. Drinking helps me to control my thoughts *Boire m'aide à contrôler mes pensées*	.19		.30		.56
6. Drinking makes my negative thoughts more bearable *Boire rend mes idées noires plus supportables*	.40		.59		*Deleted*
7. Drinking reduces my anxious feelings *Boire réduit mon anxiété*	.55	.55		.52	
8. Drinking makes me more sociable *Boire me rend plus sociable*	.77	.78		.79	
9. Drinking reduces my self-consciousness *Boire me rend moins gêné(e)*	.73	.73		.74	
10. Drinking makes me feel happy *Boire me fait sentir heureux(e)*	.63	.63		.61	
11. Drinking helps me focus my mind *Boire m'aide à me concentrer*	.10		.15		.37
12. Drinking helps me fit in socially *Boire m'aide à m'intégrer socialement*	.62	.63		.63	

Note. PAMS = Positive Alcohol Metacognitions Scale; CFA = confirmatory factor analysis.

Table 3
Standardized factor loadings of CFA models of the French NAMS from sample A ($N = 800$; $n_{males} = 364$; $n_{females} = 436$).

Original items and their corresponding French translation	Single-factor model	Two-factor model	
		Cognitive harm	Uncontrollability
1. I have no control over my drinking *Je n'ai aucun contrôle sur ma consommation d'alcool*	.17		.34
2. If I cannot control my drinking I will cease to function *Si je n'arrive pas à contrôler ma consommation d'alcool, je vais en mourir*	.56	.70	
3. Drinking will damage my mind *Boire endommagera mon cerveau*	.32	.69	
4. My drinking persists no matter how I try to control it *Ma consommation d'alcool persiste, quel que soit l'effort que je fais pour la contrôler*	.69		.66
5. Drinking will make me lose control *Boire me fera perdre le contrôle*	.30	.73	
6. Drinking controls my life *Le fait de boire contrôle ma vie*	.43		.55

Note. NAMS = Negative Alcohol Metacognition Scale; CFA = confirmatory factor analysis.

the exception of item 6. The third factor was composed of items 6 and 7. This result confirmed the problematic redundancy between items 6 and 7. We therefore dropped item 6 and re-conducted the EFA. Results from the parallel analysis indicated a two-factor solution, accounting for 56% of the total variance. The resulting pattern matrix indicated that items of the French version of the PAMS were assigned to the same factors as in the original scale.

NAMS' data from sample B were also subjected to EFA and met middling KMO value criteria (.72) and a significant Bartlett's test of sphericity ($p < .001$). Results from parallel analysis indicated the possibility of a two-factor solution, accounting for 57% of the total variance. According to the original English version, the EFA gave an optimal solution of two factors that reflected the same domains.

3.3. Internal consistency

We computed nonparametric Cronbach's alphas on the entire sample ($N = 1600$). For the PAMS this coefficient was .88 for the entire scale, suggesting a good internal consistency. These were .88 for the positive alcohol metacognitions about emotional self-regulation factor and .79 for the positive alcohol metacognitions about cognitive self-regulation factor from the initial two-factor model. The coefficient of this last factor score improved to .88 when excluding item 6. For the NAMS Cronbach's alphas were .80 for the entire scale, .83 for negative alcohol metacognitions about cognitive harm factor and .71 for the negative alcohol metacognitions about uncontrollability factor.

3.4. Test–retest reliability

Test–retest reliability was evaluated among a sample of 395 students with ICC. After a mean interval of 6.89 weeks (S.D. = 1.22), the ICC between the test and the retest were computed for total scores and factors scores. Results revealed an excellent test–retest reliability for the PAMS total score (ICC = .79; 95% CI: .74–.82) and the positive alcohol metacognitions about emotional self-regulation factor (ICC = .81; 95% CI:.77–.85). In contrast, test–retest reliability for the positive alcohol metacognitions about cognitive self-regulation factor was between good and fair (ICC = .59; 95% CI: .50–.66). NAMS test–retest reliability was good for the total score (ICC = .73; 95% CI: .67–.78), excellent for the negative alcohol metacognitions about cognitive harm factor (ICC = .74; 95% CI: .68–.79) and good for the negative alcohol metacognitions about uncontrollability factor (ICC = .67; 95% CI: .60–.73).

3.5. Predictive validity

Multiple hierarchical regression analyses were conducted on the entire sample. However, as 381 individuals (23.81%) from the initial sample did not fully complete the STAI-Trait and BDI scales, the effective sample consisted of 1219 participants (529 males and 690 females). Predictors were entered according to the following model: step 1: gender (0 = male; 1 = female) and age, step 2: the BDI and STAI-Trait scores, step 3: the PAMS two-factor subscales scores and the NAMS two-factor subscales scores. This procedure was chosen in order to determine the incremental predictive validity of the subscales and establish them as meaningful constructs. Criteria were the mean number of units of alcohol consumed by week and binge drinking scores. We examined the tolerance values in order to test for multicollinearity; with all predictors entered, the tolerance values ranged from 1.06 to 2.07, indicating that there was no multicollinearity present. To account for the non-normality of the data bootstrapping was carried out (with 1000 samples) and biases corrected; values with their 95% CI are reported (see Table 4). We found that metacognitions about alcohol use accounted for 4.9% of variance of in the number of units of alcohol consumed per week and 13.7% of variance in the binge drinking scores.

4. Discussion

The current study investigated the psychometric properties of the French version of the PAMS and NAMS. Our aim was to validate a version of the scales and to determine whether its factors were related to drinking behaviour. To do this, we used CFA and EFA with robust nonparametric estimators in large sample of data obtained from an internet survey among university students.

Confirmatory factor analyses carried out on the first sample confirmed the two-factor solution of the French PAMS, though a good model fit was only achieved following the exclusion of item 6. Exploratory factor analysis revealed a quite similar factorial structure as Spada and Wells (2008) identified. More specifically, we found that item 6 "Drinking makes my negative thoughts more bearable" loaded on the positive alcohol metacognitions about emotional self-regulation factor instead of the positive alcohol metacognitions about cognitive self-regulation factor as expected by the model. It thus appears that the nature of this item involves both cognitive and emotional processes. The scale evidenced a good internal consistency, with Cronbach's alpha coefficients identical to the ones reported by Spada and Wells (2008) for the full scale and closely comparable to those reported for the subscales (.88 vs .81 for the positive alcohol metacognitions about emotional self-regulation factor and .88 vs .87 for the positive alcohol metacognitions about cognitive self-regulation factor). Test–retest reliability was excellent for the total score and the positive alcohol metacognitions about emotional self-regulation factor score, and between good and fair (ICC 95% CI: .50–.66) for the positive alcohol metacognitions about cognitive self-regulation factor score. This

Table 4
Summary of hierarchical regression analysis for PAMS and NAMS predicting weekly levels of alcohol consumption and binge score ($N = 1219$; $n_{males} = 529$; $n_{females} = 690$).

			Units of alcohol by week					
Step	Predictors	Bêta	*B*	SE	BC 95% CI	*p* Value	Adj. R^2	δR^2
1	Gender	−.37	−4.68	.37	−5.36; −3.95	.001		
	Age	.06	.18	.07	.05; .33	.014	.140	.141***
2	Gender	−.36	−4.54	.37	−5.24; −3.78	.001		
	Age	.06	.18	.07	.05; .32	.016		
	BDI	.08	.11	.05	.01; .21	.027	.144	.006*
	STAI-Trait	.10	−.06	.02	−.11; −.02	.006		
3	Gender	−.35	−4.37	.36	−5.03; −3.64	.001		
	Age	.08	.22	.07	.09; .36	.003		
	BDI	.06	.07	.05	−.02; .17	.125	.190	.049***
	STAI-Trait	.13	−.08	.02	−.12; −.04	.001		
	PAMS Emotional S.R.	.14	.16	.03	.09; .23	.001		
	PAMS Cognitive S.R.	.07	.28	.15	.01; .62	.024		
	NAMS Cognitive Harm	−.06	−.16	.06	−.28; −.03	.021		
	NAMS Uncontrollability	.11	.68	.20	.30; 1.08	.001		
			Binge scores					
		Bêta	*B*	SE	BC 95% CI	*p* Value	Adj. R^2	δR^2
1	Gender	−.34	−9.00	.78	−10.59; −7.47	.001		
	Age	−.06	−.33	.15	−.61; −.05	.037	.116	.117***
2	Gender	−.34	−9.17	.79	−10.83; −7.62	.001		
	Age	−.05	−.30	.15	−.58; −.01	.060		
	BDI	.08	.22	.12	−.02; .43	.034	.120	.005*
	STAI-Trait	.01	−.01	.05	−.11; .09	.799		
3	Gender	−.34	−9.06	.72	−10.55; −7.66	.001		
	Age	−.03	−.17	.13	−.42; .10	.252		
	BDI	.06	.18	.10	−.03; .37	.067	.255	.137***
	STAI-Trait	.06	−.08	.05	−.17; .02	.087		
	PAMS Emotional S.R.	.32	.77	.07	.64; .90	.001		
	PAMS Cognitive S.R.	−.02	−.22	.27	−.74; .30	.375		
	NAMS Cognitive Harm	−.08	−.46	.13	−.70; −.20	.001		
	NAMS Uncontrollability	.19	2.49	.43	1.71; 3.43	.001		

Note. BDI = Beck Depression Inventory; STAI = State-Trait Anxiety Inventory; PAMS = Positive Alcohol Metacognitions Scale; NAMS = Negative Alcohol Metacognitions Scale; S.R. = Self-Regulation.
* $p < .05$.
*** $p < .001$.

observation is in line with Spada and Wells (2008) who found a Spearman rho value of .65 between the two sessions for this factor, suggesting a mild weakness of this factor across time. A possible explanation is that the mean score of our sample for this factor was low (mean = 5.21) suggesting a floor effect for non-clinical samples. It is thus possible that most individuals in our sample, which were in majority non problem drinkers, experienced difficulties in recognizing themselves on such items and therefore produced less reliable answers.

Confirmatory and exploratory factor analyses of the French NAMS were in line with the factorial structure provided by Spada and Wells (2008). This structure allows for the distinction between negative metacognitions about alcohol use regarding uncontrollability and negative metacognitions about alcohol use regarding cognitive harm. The scale evidenced good internal consistency for both the full scale and the factors with values similar or above those observed in the original version. Test–retest reliability were classified from good to excellent for the full scale and each factor (ICC value = .74 for the negative alcohol metacognitions about cognitive harm factor and .67 for the negative alcohol metacognitions about uncontrollability factor). In contrast, Spada and Wells (2008) reported a weakness across time for the negative alcohol metacognitions about uncontrollability factor with a Spearman rho value of .42 between the two sessions. One possible explanation for this discrepancy can originate from the differential use of ICC and Spearman rho's in the two studies. In contrast to Spearman rho's, the ICC accounts for both consistency of performance from test to retest (within-participant change), as well as change in mean score of participants as a group over time (for example a systematic increase in scores; see Shrout and Fleiss, 1979). Indeed, the calculation of the Spearman rho value between the two sessions for this scale in our sample lead to a significant but weaker value: .59.

Results from the hierarchical regression analysis revealed that the PAMS and NAMS factors were the strongest predictors, after gender, of both alcohol use and binge drinking, confirming previous findings from non-clinical and clinical samples (Clark et al., 2012; Spada et al., 2007a,b; Spada and Wells, 2008). Alcohol use was predicted by both factors from PAMS and NAMS, whilst binge drinking by all factors with the exception of positive alcohol metacognitions about cognitive self-regulation. Negative alcohol metacognitions about the uncontrollability of alcohol use (which reflect the perception of lack of executive control over behaviour) explained the majority of variance (amongst the metacognitions factors) in both alcohol use and binge drinking. This finding aligns itself to what has been observed in previous research, namely that these metacognitions are a marker of excessive alcohol use (e.g., Spada et al., 2013). However, negative alcohol metacognitions about cognitive harm were found to inversely predict drinking behaviour. This finding does not align itself with previous research which found that such metacognitions are positively associated with problem drinking (Spada et al., 2013). A possible explanation for this inconsistency lies, as with that provided for the low mean scores on positive alcohol metacognitions about cognitive self-regulation, in the non-clinical nature of the sample under investigation. It is plausible to assume that the majority of participants would not endorse such beliefs as they are typically associated with severe and enduring drinking presentations.

Another interesting finding from the hierarchical regression analysis is the dissociation between positive metacognitions about alcohol use and the measures of alcohol use: whereas emotional

self-regulation and cognitive self-regulation factors of the PAMS were significant predictors of weekly levels of alcohol use, the emotional self-regulation factor of the PAMS alone was a significant predictor of binge drinking. This finding suggests that metacognitive influences may differ between patterns of alcohol use with a major clinical implication being the necessity to conduct focused interventions on specific metacognitions among adults according to their patterns of drinking as has been advocated by Spada et al. (2015). Taken together, the findings of the hierarchical regression analysis support the metacognitive model (Wells and Matthews, 1994; 1996) and its formulation of problem drinking (Spada et al., 2013) in that both positive and negative metacognitions about alcohol use are found to predict both alcohol use and binge drinking.

A number of limitations of the current study need to be acknowledged. First, the study relied exclusively on the use of self-report data. Thus, although the AUQ has been shown to be highly correlated with a 4-week diary account of alcohol intake (Townshend and Duka, 2002), one might suspect recall bias because of the retrospective nature of alcohol use questions. Furthermore, participants may have been unwilling to report their alcohol use and endorse particular drinking patterns for fear of stigma and social desirability reasons. Therefore, the use of interviews could have improved the reliability of the measures of alcohol use. However, such procedure is not reasonably practicable on large samples such as ours. Another possible limitation is the use of the Internet to run the survey which may lead participants to provide false information. However, this procedure is more likely to reduce the fear of stigma with recent data suggesting that Internet surveys are as reliable as paper-pencil surveys (Weigold et al., 2013). A third limitation regards the non-clinical nature and age homogeneity of the sample which may prevent the generalisation of the findings to clinical and other age groups. Thus, using these French versions of the PAMS and NAMS in clinical settings will need confirmation using more representative samples of problem drinkers and alcohol-dependent patients, who are mostly older (WHO, 2014). Finally, it is clear that metacognitions about alcohol use are one amongst numerous factors involved in drinking behaviour and that the understanding of this complex behaviour must be seen in its entirety, and more specifically from a biopsychosocial perspective. For instance, it has been shown that metacognition is a moderator between alexithymia and personality disorders traits among adults with substance use disorder (Lysaker et al., 2014). Therefore, future studies could investigate the relationship between metacognitions about alcohol use and other individual or social variables involved in drinking behaviour.

The findings of the present study provide evidence for the dimensionality, reliability and validity of the PAMS and NAMS in a sample of university students and emphasize the role of metacognitions about alcohol use in drinking behaviour in this population. Future studies, specifically investigating test–retest reliability among clinical samples, will be necessary for additional validation.

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Conflict of interest statement

The authors report no potential conflicts of interest.

Contributors

Gierski and Naassila designed the study. Gierski and Picard conducted the survey process. Gierski undertook the statistical analysis. Spada, Fois, and Van der Linden contributed to data interpretation and manuscript preparation. Gierski wrote the first draft of the manuscript. All authors contributed to and have approved the final manuscript.

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