**Metacognitive beliefs in depressed inpatients: adaptation and validation of the short version of the Metacognitions Questionnaire (MCQ-30) for French clinical and nonclinical samples.**

**Keywords:** Depression; Worry; Metacognition; Assessment; French version; Psychometric properties.

**Abstract**

**Background**

The short form of the Metacognitions Questionnaire (MCQ-30) is a brief multidimensional measure which explores the metacognitive processes and beliefs about worry and cognition that are central to the vulnerability and maintenance of emotional disorders.

**Aims**

The first aim of the study was to create and validate a French version of the MCQ-30 in a nonclinical and a clinical sample of depressed inpatients.

**Method**

A French adaptation of the MCQ-30 were administered to a sample of 467 individuals from the general population and 73 hospitalized patients with major depressive disorder. Internal consistency was measured by Cronbach alpha reliability coefficients. Factor structure was assessed using a confirmatory factor analysis on the nonclinical group and a multitrait-multimethod analysis on the psychiatric group. Criterion validity was explored by comparing the scores of the two samples.Measures of rumination, worry and depression were used to explore convergent validity.

**Results**

Confirmatory factor analysis in the nonclinical sample indicated that the French version of the MCQ-30 has the same factor structure as the MCQ-30׳s original five-factor solution. In the clinical sample, the multitrait-multimethod analysis reveals discrepancies with the original factor structure, and the MCQ-30 and its subscales were less reliable. Our results provide evidence of a convergent validity. The MCQ-30 scores were also able to discriminate between psychiatric and nonclinical samples.

**Conclusions**

Our results show that the French version of the MCQ-30 is a valid instrument for measuring metacognitive beliefs in nonclinical population. Further research is needed to support its use among depressed inpatients.

# Introduction

The concept of metacognition was raised by Flavell (1981) to refer to the construct commonly viewed as thinking about thinking. It is currently thought of as describing the processes involved in the monitoring, appraisal and control of thinking itself. Over the last thirty years, metacognition has emerged as a new approach for treating psychiatric diseases. According to recent theories, metacognition is an important factor in the development and maintenance of psychological disorders (Papageorgiou & Wells, 2003; A. Wells & Matthews, 1996). Wells and Matthews proposed a metacognitive model of psychological disorders called S-REF (Self-Regulatory Executive Function) (A. Wells & Matthews, 1996) according to which a pattern of thinking and its control are crucial in the development of emotional distress. In particular, metacognitive beliefs activate and drive a pathogenic rumination that perpetuates maladjusted coping strategies (e.g., social withdrawal and reduction in activity). In turn, these coping strategies enhance the rumination, contribute to the development of negative affects, and lead to multiple other adverse consequences such as anxiety or depression. Since then, several studies provided empirical support for this model applied to depression (Huntley & Fisher, 2016; Papageorgiou & Wells, 2001, 2002, 2003, 2003; Roelofs et al., 2007).

The Metacognitions Questionnaire (MCQ) is a 65-item questionnaire developed by Cartwright-Hatton and Wells (1997) to explore the metacognitive dimensions that are central in the metacognitive model of emotional disorder. Despite good psychometric properties, its usefulness was restricted by its length. As a result, six items were selected to represent each of the five MCQ factors, mainly on the basis of their factorial loading on the MCQ factors, resulting in a 30-item short version of the questionnaire. Accordingly in its initial form, the short version of the questionnaire (MCQ-30) consisted of five subscales which corresponded to five factors. These correlated but conceptually distinct factors, listed in Table 1, assess three domains of positive and negative metacognitive beliefs, metacognitive monitoring, and judgments of cognitive confidence (Adrian Wells & Cartwright-Hatton, 2004) :

Table 1 - The subscales of the MCQ-30 (Adrian Wells & Cartwright-Hatton, 2004).

|  |  |
| --- | --- |
| Positive beliefs about the usefulness of worry (positive beliefs), which assesses the extent to which a person believes that worrying is helpful to them (e.g. “worrying helps me cope”). | Factor 1 - POS |
| Negative beliefs about uncontrollability of thoughts and danger (uncontrollability and danger), which measures the extent to which a person believes that worrying is uncontrollable and dangerous (e.g. “when I start worrying I cannot stop”). | Factor 2 - NEG |
| Lack of cognitive confidence, which measures confidence in memory (e.g. “my memory can mislead me at times”). | Factor 3 - CC |
| Beliefs concerning the need to control, and the consequences of not controlling, one's own thoughts (need to control thoughts) (e.g. “not being able to control my thought is a sign of weakness”). | Factor 4 - NC |
| Cognitive self-consciousness, which assesses the tendency to monitor one's own thoughts and focus on one's thinking processes (e.g. “I pay close attention to the way my mind works”). | Factor 5 - CSC |

Several studies have demonstrated a convergent validity with appropriate measures of depression (Cho, Jahng, & Chai, 2012; Sarisoy et al., 2014; Solem, Thunes, Hjemdal, Hagen, & Wells, 2015; Spada, Mohiyeddini, & Wells, 2008; Yılmaz, Gençöz, & Wells, 2008, 2011). Specifically, in nonclinical samples, Solem et al. (2015) showed that the five subscales were significantly associated with depression measured by the Patient Health Questionnaire 9-item (PHQ-9) (Kroenke, Spitzer, & Williams, 2001) based on the nine criteria for diagnosing depression in DSM-IV. Other studies have shown that among the subscales of the MCQ-30, NEG, CC, and NC were significantly associated with depression (Cho et al., 2012; Solem et al., 2017; Spada et al., 2008; Yılmaz et al., 2011). In addition, Spada et al. (2008) showed that CSC was also significantly associated with depression, and that among the five factors, NEG was the strongest predictor of depression measured by the Hospital anxiety and depression scale (Zigmond & Snaith, 1983). Yilmaz et al. (2011) further highlighted that NEG was an independent predictor of depression while controlling for negative effect of major life events measured by the Life Experiences Survey Negative change score (LES-N). Also, Yilmaz et al. showed that CC interacts with a measure of daily hassles (Inventory of College Students’ Recent Life Experiences - CSRLE) in predicting depression.

Few studies reported the association between the MCQ-30 and its subscales and a measure of depression in a sample of depressed patients (Batmaz, Ulusoy Kaymak, Kocbiyik, & Turkcapar, 2014; Solem et al., 2017). Batmatz et al. showed that only the POS subscale was not significantly associated with depression. Solem et al. showed that all the subscales of the MCQ-30 were significantly associated with depression (Solem et al., 2017).

Furthermore, few studies explored the criterion validity of the MCQ-30 and its subscales by comparing the scores between groups of depressed and non-depressed subjects. These studies have all shown that depressed patients scored higher than nonclinical groups on the NEG, CC, and NC subscales (Batmaz, Ulusoy Kaymak, Kocbiyik, & Turkcapar, 2014; Solem et al., 2017; Valiente, Prados, Gómez, & Fuentenebro, 2012). Batmatz et al. (2014) showed that depressed patients also scored higher than nonclinical group on the CSC subscale.

Current research literature indicates that the MCQ-30 and its subscales are increasingly used as indicators of metacognitive beliefs involved in depression (Batmaz et al., 2014; Solem et al., 2017; Valiente et al., 2012). However, further research is needed to support the use of the MCQ-30 and its subscales as overall indicators of metacognitive beliefs involved in depression.

Since its conception, studies of the MCQ-30’s psychometric properties (in English, Spanish, Korean, Greek, Turkish and Italian versions of the questionnaire), have replicated the five factor structure and found an internal consistency of the subscales ranging from 0.69 to 0.92 (Cho et al., 2012; Cook, Salmon, Dunn, & Fisher, 2014; Martín et al., 2014; Quattropani, Lenzo, Mucciardi, & Toffle, 2014; Ramos-Cejudo, Salguero, & Cano-Vindel, 2013; Spada et al., 2008; Tosun & Irak, 2008; Typaldou et al., 2014; Yılmaz et al., 2008). A validation of a French-Belgium version of the MCQ (65 item long version) was conducted by Laroi et al. (2009). Dethier et al. (2017) conduced a validation of a short version (30 items) of this scale. To our knowledge, the psychometric properties of a version of the MCQ-30 in a clinical sample of depressed inpatients have never been studied.

The purpose of this research, authorized by Adrian Wells, was to create and validate a French version of the MCQ-30, evaluating the psychometric properties of the questionnaire in a nonclinical sample and a psychiatric sample of depressed and hospitalized patients. Measures of rumination, worry and depression were used to assess the convergent validity of the MCQ-30.

We hypothesized that the factor structure of the French version of the MCQ-30 would be similar to that of the original MCQ-30 (Adrian Wells & Cartwright-Hatton, 2004) in both samples, and that the MCQ-30 and its subscales would have an adequate internal consistency. We also hypothesized that the MCQ-30 and its subscales would have an adequate convergent validity: scores on the MCQ-30 and its subscales in both samples would be significantly and positively correlated with measures of trait anxiety, and rumination. In line with previous results, we hypothesized, that the POS subscale would not be significantly associated with depression, and that the NEG subscale would be the strongest predictor of depression. In line with the S-REF metacognitive model, we predicted that the patients’ group would score significantly higher than the nonclinical group on the MCQ-30 and its subscales as well as trait anxiety and rumination measures. Because depression does not require the presence of positive beliefs, although they might be involved in its onset, we predicted that the POS subscale scores would not significantly differ between nonclinical and patients’ groups.

# Methods

## Participants

We conducted a non interventional and cross-sectional study with psychiatric inpatients diagnosed with, and treated for, major depressive disorder in a French public hospital located in an urban area. The clinical participants were required to speak French and to be at least 18 years old. They were eligible for the study if they were diagnosed with depression based on the criteria established in the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (American Psychiatric association, n.d.). Patients were recruited between July 2014 and August 2016, and were interviewed in person. Patients were excluded if they suffered from malignant or severe organic disease, neurocognitive disorders such as dementia, delirium, amnesia or another cognitive disorders, or psychotic features or disorders. We also excluded those who could not complete the questionnaires for any reason such as language barrier, lack of comprehension, or those who failed to give a written consent to participate in the study. The final clinical sample consisted of 73 patients (29 men and 44 women). The mean age was 49.67 years (SD = 14.64, range =18 – 81) (Table 2).

The nonclinical sample consisted of participants from the general population. We sent an email to registered members of the database "Relais d’information sur les Sciences de la Cognition” (RiSC), as well as professional mailing lists. This email invited potential subjects to participate. It described and explained the rationale of the study, as well as its goals. More specifically, potential participants were told that the aim of the investigation was to initiate a study on metacognition in the general population. They were invited to self-administer a confidential Web survey by clicking on a URL link. The study was voluntary and the message specified that the results of the survey would be reported in scientific publications. Personal data were anonymised and stored on a secure server. On average, the survey took between 15 to 20 minutes to complete. It contained the different questionnaires presented below. The data collection was conducted between November 2014 and July 2016. The final nonclinical sample consisted of 467 participants (125 men and 342 women). The mean age was 35.04 years (SD = 14.91; range 18 – 79 years) (Table 2). Sample size was calculated according to the recommended 10:1 ratio of the number of subjects to the number of items, necessary to obtain a correct estimate for the factorial analysis (Kline, 2015).

This study was conducted in accordance with the Declaration of Helsinki and French Good Clinical Practices: participants were informed that by accepting to send back their anonymous questionnaires, they gave their informed consent to participate. We recorded the age, sex, education level and employment status.

## Procedure

### Adaptation of the French version of the MCQ-30

Each item of the MCQ-30 is rated on a 4-point Likert scale, from 1 « do not agree » to 4 « agree very much ». The total score ranges from 30 to 120 points, with higher scores indicating a more dysfunctional metacognitive belief. The subscales provide 5 sub-scores with the higher score indicating more dysfunctional metacognitive belief on a specific theme than the lower ones.

Adaptation of the MCQ-30 for French speakers was performed using a back-forward process, which ensured conceptual equivalency (Falissard, 2008). Forward translation into French was performed by two independent native French-speaking translators who were fluent in English. The authors then systematically reviewed and compared the two translations and the corresponding items of the Belgium translation of the MCQ by Laroi et al. (2009) until settling on a first consensus version. Backward translation into English was performed by two other independent native English speaking translators fluent in French and blind to the original version. The version was then administered to a first clinical sample, a nonclinical sample, and to clinical experts. After evaluating the results of this intelligibility test, small modifications were made, resulting in the final version of our French version of the MCQ-30.

### Instruments

#### Beck Depression Inventory (BDI), short form

The BDI (Beck, Rush, Shaw, & Emery, 1979) is composed of 21 items for the assessment of depressive symptoms. The items are rated on a four-point Likert-type scale, from 0 to 3. The widely used short form of the BDI is composed of 13 items (Beck & Beamesderfer, 1974). A psychometric evaluation of the French version of the BDI was carried out by Pichot & Lemperiere (1964).

#### Penn State Worry Questionnaire (PSWQ)

The PSWQ is a widely used 16-item trait self-report measure designed to capture the frequency, intensity and uncontrollability of worry in general. It has shown good psychometric characteristics (Meyer, Miller, Metzger, & Borkovec, 1990). The French version of this scale used in our study was validated by Gosselin et al. (2001) .

#### Ruminative Response Scale (RRS).

The RRS is a 22-item subscale from the Response Styles Questionnaire (RSQ) that assesses an individual’s tendency to ruminate in response to depressed mood. Respondents are required to indicate how often they engage in each item using a 4-point Likert scale ranging from 1 « almost never » to 4 « almost always ». Treynor et al. (2003) showed that items of the RRS appear to overlap with items from measures of depressive symptomatology like the BDI, and accounted for the relation between depression and rumination in numerous studies. After designing a measure of rumination which was not confounded with measures of depression, they found support for a two-factor model of rumination. The items on the “reflection” factor suggested a purposeful turning inwards to engage in cognitive problem solving in order to alleviate one’s depressive symptoms. In contrast, the items on the “brooding” factor reflect a passive comparison of one’s current situation with some unachieved standard. In conclusion, there are three key subscales of the RRS: reflection (RRS-R), brooding (RRS-B), and the depression subscales (RRS-D). There was no severity threshold. We used the French version of the RRS, adapted by Douilliez et al. (2014).

### Statistical analysis

A descriptive analysis of the study sample was performed first. This is reported using means (M) and standard deviations (SD) for continuous variables, and frequencies and percentages for binary variables (Tables 2). Welch two samples t-tests were used to test whether there were any differences between both samples on continuous variables and chi-square tests of Independence were used to test whether there were any differences on categorical variables.

To examine the factorial structure of the MCQ-30 in the nonclinical sample, a Confirmatory Factor Analysis (CFA) was performed. As the primary aim of this study was to assess validity rather than achieve the best possible model fit, we took the decision not to modify the model based on the data. CFA in the nonclinical sample was estimated with robust weighted least squares estimator (diagonally weighted least squares), given its appropriateness for handling ordinal factor indicators (Kline, 2015). Adequacy of model fit was assessed by: (i) the Comparative Fit Index (CFI) and the Tucker-Lewis Fit Index (TLI), with values above 0.90 indicating a good fit to the model (Kline, 2005), (ii) the Root Mean Square Error of Approximation (RMSEA): 0.01, 0.05, and 0.08 indicate excellent, good, and mediocre fit, respectively (MacCallum, Browne, & Sugawara, 1996). We disregarded the chi-square test of model fitting, as it has been suggested that the chi-square value produced may be spurious in weighted least squares estimated models with ordinal measures (Jöreskog & Sörbom, 1989) and that it is sensitive to sample size (Floyd & Widaman, 1995). As mentioned above, the recommended number of subjects for a correct estimate for the factorial analysis should be at least 10 times the number of items of the scale (Kline, 2015). In view of this rule and of the limitation of our study, we estimated that a sample of 73 patients was insufficient to obtain a correct estimate for the factorial analysis of the MCQ-30 using CFA in the clinical sample. Therefore, we used a multitrait-multimethod approach to assess the factorial structure validity of the MCQ-30 in the clinical sample (Falissard, 2008). We calculated the Spearman's rank correlation coefficients between the responses to each item of the MCQ-30 and the scores of each MCQ-30 subscales.

Reliability of the MCQ-30 and its subscales in both groups were assessed using Cronbach’s alpha coefficient, which evaluates internal consistency (Cronbach, 1951).

The criterion validity (Kazdin, 2003) was explored by comparing the scores on the MCQ-30, the RRS, their subscales, the PSWQ and the BDI, across the two groups, using Welch two samples t-tests. Participants having missing values on the variables of interest were discarded from this analysis. Before performing this analysis, we used a matching procedure, as we found some differences between the groups on age, gender and educational level. Those differences may influence metacognitive beliefs. We matched each patient for age, sex, and educational level, with two specific participants in the nonclinical sample, using the Matchit R function of the MatchIt R package with the nearest neighbours method.

The convergent validity of the MCQ-30 and its subscales in both groups was explored with Pearson correlation coefficients between MCQ-30 total score, MCQ-30 subscales, worry, rumination and depression measures (PSWQ, BDI, RRS total score and RRS subscales).

All statistical analyses were performed using the R software suite, version 3.2.4 (2016-03-10). The confirmatory factor analysis was performed using the Lavaan R package.

# Results

The sociodemographic characteristics of each group are presented in Table 2. The psychiatric and nonclinical groups differed by age, sex, and educational level.

Table 2 - Sociodemographic characteristics of clinical and nonclinical participants.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Group 1Nonclinical (*n*=467) | Group 2Psychiatric (*n=*73) |  |
|  | n(%) | n(%) | Group comparison a |
| Gender |  |  |  |
| Female | 342 (73) | 44 (60) | χ2(1)= 4.58, *p =* 0.032 |
| Socio-professional Category (Desrosières & Thévenot, 1988) |  |  |  |
| Farmer | 2 (0.4) |  4(5.6) | χ2(1)= 10.6, *p =* 0.0011 |
| Craftsmen, tradesmen – business leader | 17 (3.6) |  4(5.6) | χ2(1)=0.21, *p* = 0.65 |
| Managers – higher intellectual professions | 217 (46.5) |  17(23.9) | χ2(1)= 12.35, *p* = 0.00044 |
| Intermediate professions | 60 (12.9) | 5 (7.0) | χ2(1)=1.53, *p* = 0.22 |
| Employees | 88 (18.8) | 13 (18.3) | χ2(1)=1.05e-29, *p =* 1 |
| Workers | 5 (1.1) | 0 (0) | χ2(1)=0.049, *p =* 0.82 |
| Retired | 52 (11.1) | 15 (21.1) | χ2(1) = 4.54, *p =* 0.033 |
| Unemployed | 26 (5.6) |  14 (19.7) | χ2(1) = 15.52, *p =* 8.15e-05 |
| Education level (UNESCO Institute for Statistics, 2012)  |  |  |  |
| Early childhood education or Primary education | 6 (1.3) | 2 (2.74) | χ2(1) = 0.19, *p* = 0.66 |
| Lower secondary education | 4 (0.9) | 9 (12.3) | χ2(1) = 30.65, *p* = 3.089e-08 |
| Upper secondary education | 76 (16.3) | 18 (24.7) | χ2(1) = 2.53, *p* = 0.11 |
| Short-cycle tertiary education | 41 (8.8) | 6 (8.2) | χ2(1) = 2.28e-30, *p =* 1 |
| Bachelor’s or equivalent - Master’s or equivalent - Doctoral or equivalent | 340 (72.8) | 38 (52.1) | χ2(1) = 11.98, *p =* 0.00054 |
| Age M (SD) | 35.04 (14.91) | 49.67 (14.64) | t(96.073) = 7.85, p = 5.99e-12 b |

a *Chi-square tests of Independence* b *Welch Two sample t-test*

## Factor structure

In the nonclinical sample, the CFA of the MCQ-30 provided adequate fit of the five-factor model from Wells and Cartwright-Hatton (2004) to the data, with the following indices: CFI = 0.97, TLI = 0.96, RMSEA = 0.06 IC-90%=(0.056; 0.065). As shown in Table 3, items loaded above the criteria of 0.40 (Cicchetti, 1994) on their expected factors, with only one exception (item 5 - “I am aware of the way my mind works when I am thinking through a problem”, as in Martin et al.’s (2014) study). This result supports the stability of the factor structure of this questionnaire in this sample.

Table 3 - Confirmatory factor analysis: factor loadings and fit indexes for nonclinical participants (n=467) together with comparisons with samples from the original study.

| Items | Group 1nonclinical*n* = 467 | Original study (Wells & Cartwright-Hatton, 2004)Nonclinical*n* = 182 |
| --- | --- | --- |
|
| POS: Positive beliefs |  |  |
| 1 | 0.66 | 0.87 |
| 7 | 0.78 | 0.86 |
| 10 | 0.76 | 0.85 |
| 19 | 0.79 | 0.85 |
| 24 | 0.82 | 0.84 |
| 28 | 0.84 | 0.83 |
| NEG: Uncontrollability and danger |  |  |
| 2 | 0.45 | -0.9 |
| 4 | 0.58 | -0.88 |
| 9 | 0.8 | -0.8 |
| 11 | 0.67 | -0.79 |
| 15 | 0.77 | -0.78 |
| 22 | 0.826 | -0.77 |
| CC: Lack of cognitive confidence |  |  |
| 8 | 0.75 | 0.92 |
| 14 | 0.5 | 0.88 |
| 17 | 0.89 | 0.86 |
| 25 | 0.66 | 0.84 |
| 27 | 0.95 | 0.81 |
| 29 | 0.69 | 0.81 |
| NC: Need to control thoughts |  |  |
| 6 | 0.68 | 0.87 |
| 13 | 0.53 | 0.78 |
| 20 | 0.78 | 0.75 |
| 21 | 0.65 | 0.36 |
| 23 | 0.74 | 0.31 |
| 26 | 0.56 | 0.14 |
| CSC: Cognitive self-consciousness |  |  |
| 3 | 0.78 | -0.90 |
| 5 | 0.26 | -0.90 |
| 12 | 0.69 | -0.86 |
| 16 | 0.43 | -0.85 |
| 18 | 0.74 | -0.85 |
| 30 | 0.96 | -0.69 |
| Chi2 (dl) | - | NA |
| RMSEA (IC 90%) | 0.06 (0.056- 0.065) | 0.07 |
| CFI | 0.97 | 0.91 |
| TLI | 0.96 | NA |

*CFI: Comparative Fit Index. TLI: Tucker-Lewis Fit Index. RMSEA: Root Mean Square Error of Approximation.*

In the clinical sample, each item of the POS and CC factors were more correlated with their expected factors than with the others (see Table 4). This wasn’t the case for other factors. Within the NEG subscale, item n°2 “My worrying is dangerous for me” had its highest correlation coefficient with the CSC subscale, and item n°15 “My worrying could make me go mad” had its highest correlation coefficient with the NC subscale. Within the NC subscale, item n°13 “I should be in control of my thoughts all of the time” had its highest correlation coefficient with the CSC subscale, item n°20 “Not being able to control my thoughts is a sign of weakness” had its highest correlation coefficient with the NEG subscale, and item 23 “I will be punished for not controlling certain thoughts” had its highest correlation coefficient with the POS subscale. Within the CSC subscale, item n°12 “I monitor my thoughts” was strongly negatively correlated with the CC subscale.

Table 4 - Multitrait-multimethod analysis of the structure of the MCQ-30 in the psychiatric group.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | POS | NEG  | CC | NC  | CSC  |
| Items of Factor 1 : Positive beliefs (POS) |
| 1 | 0.37\*\* | -0.12  | 0.021 | 0.14 | 0.083 |
| 7 | 0.43\*\*\* | 0.40\*\*\* | 0.18 | 0.38\*\* | 0.10 |
| 10 | 0.63\*\*\* | 0.089 | 0.14 | 0.14 | 0.079 |
| 19 | 0.57\*\*\* | 0.26\* | -0.014 | 0.24\* | 0.26\* |
| 24 | 0.75\*\*\* | 0.054 | 0.099 | 0.17 | 0.13 |
| 28 | 0.37\*\* | 0.13 | 0.31\*\* | 0.24\* | -0.18 |
| Items of Factor 2 : Uncontrollability and danger (NEG) |
| 2 | -0.0016 | 0.37\*\* | -0.04 | 0.23 | 0.41\*\*\* |
| 4 | 0.21 | 0.31\*\* | 0.063 | 0.26\* | 0.27\* |
| 9 | 0.099 | 0.51\*\*\* | 0.27\*\* | 0.29\* | 0.14 |
| 11 | 0.13 | 0.32\*\* | 0.15 | 0.21 | 0.009 |
| 15 | 0.049 | 0.26\* | 0.22 | 0.46\*\*\* | 0.21 |
| 22 | 0.19 | 0.46\*\*\* | 0.24\* | 0.45\*\*\* | 0.20 |
| Items of Factor 3 : Lack of cognitive confidence (CC) |
| 8 | 0.19 | 0.22 | 0.70\*\*\* | 0.034 | 0.28\* |
| 14 | 0.099 | -0.001 | 0.51\*\*\* | -0.05 | -0.36\*\* |
| 17 | 0.12 | 0.04 | 0.69\*\*\* | 0.082 | -0.40\*\*\* |
| 25 | -0.06 | 0.22 | 0.63\*\*\* | 0.18 | -0.36\*\* |
| 27 | 0.22 | 0.25\* | 0.84\*\*\* | 0.20 | -0.42\*\*\* |
| 29 | 0.22 | 0.29\* | 0.68\*\*\* | 0.23\* | -0.16 |
| Items of Factor 4 : Need to control one’s own thought (NC) |
| 6 | 0.34\*\* | 0.36\*\* | 0.012 | 0.41\*\*\* | 0.21 |
| 13 | 0.12 | 0.31\*\* | -0.22 | 0.24\* | 0.32\*\* |
| 20 | 0.21 | 0.46\*\*\* | 0.21 | 0.40\*\*\* | 0.19 |
| 21 | -0.03 | 0.42\*\*\* | 0.21 | 0.43\*\*\* | 0.14 |
| 23 | 0.36 | 0.091 | 0.082 | 0.30\*\* | 0.038 |
| 26 | 0.27\* | 0.20 | 0.25\* | 0.34\*\* | 0.089 |
| Items of Factor 5 : Cognitive self-consciousness (CSC) |
| 3 | 0.14 | 0.36\*\* | -0.23 | 0.30\*\* | 0.43\*\*\* |
| 5 | 0.074 | 0.14 | -0.41\*\*\* | -0.023 | 0.52\*\*\* |
| 12 | 0.035 | 0.025 | -0.38\*\* | -0.011 | 0.24\* |
| 16 | -0.037 | 0.20 | -0.19 | 0.093 | 0.41\*\*\* |
| 18 | 0.13 | 0.36\*\* | -0.11 | 0.32\*\* | 0.62\*\*\* |
| 30 | 0.16 | 0.28\* | -0.29\* | 0.40\*\*\* | 0.47\*\*\* |

(\* p< 0.05, \*\*p< 0.01, \*\*\* p< 0.001)

## Internal Consistency

The Cronbach alpha coefficients, used to assess reliability, were computed in each group for the whole scale and its subscales (Table 6 and 7). In the nonclinical group, coefficients returned values above the criterion of 0.8 for the whole scale, POS, CC, and above 0.7 for NEG, NC, and CSC factors. In the psychiatric group, we observed coefficients values above the criterion of 0.8 for the global scale and CC subscale, above 0.7 for POS and CSC subscales, and equal to 0.69 and 0.65 for NEG and NC subscales respectively. Except for CC, the reliability of each MCQ-30 subscale in the psychiatric group was lower than in the nonclinical group.

## Criterion validity

The means and standard deviations of the MCQ-30, the RRS, their subscales, the PSWQ and the BDI in both groups are presented in Table 5. 126 nonclinical participants were matched with 63 patients for age, sex, and educational level.

The mean MCQ-30 score in the nonclinical group was 61.01 (SD = 12.57) versus 48.41 (SD = 13.31) in the original study (Wells & Cartwright-Hatton, 2004). The mean scores of the MCQ-30 and its subscales in the psychiatric group were similar to those of Batmatz et al.’s and Valiente et al.’s studies, but higher than those of Solem et al.’s study in samples of depressed patients.

The psychiatric group scored significantly higher than the nonclinical group on the PSWQ, BDI, RRS-D, RRS-B and on the NEG, CC, NC subscales, but not on the POS, CSC subscales of the MCQ-30 and the RRSR subscale of the RRS.

Table 5 - Comparisons across matched groups for the MCQ-30 and its subscales, the RRS and its subscales, the PSWQ and the BDI.

|  | Group 1Nonclinical*n* = 126Mean (SD) | Group 2Psychiatric*n* = 63Mean (SD) |  Group comparison a |
| --- | --- | --- | --- |
|
| MCQ-30 | 61.01 (12.57) | 71.90 (12.93) | t(121.03) = 5.51, p = 2.029e-07 |
| POS | 10.48 (3.83) | 10.83 (4.33) | t(111.53) = 0.543, p = 0.59 |
| NEG | 13.82 (4.05) | 17.40 (3.88) | t(129.07) = 5.9, p = 3.055e-08 |
| CC | 10.84 (3.95) | 14.063 (5.41) | t(95.95) = 4.2, p = 6.007e-05 |
| NC | 10.25 (3.76) | 13.79 (4.013) | t(117.26) = 5.84, p = 4.86e-08 |
| CSC | 15.62(4.03) | 15.83 (4.24) | t(118.53) = 0.32, p = 0.75 |
| PSWQ | 45.41 (13.14) | 59.33 (10.83) | t(147.26) = 7.75, p = 1.42e-12 |
| RRS | 43.17 (13.58) | 57.016 (12.31) | t(135.58) = 7.038, p = 8.82e-11 |
| RRS-R | 10.048 (3.73) | 10.65 (3.11) | t(145.86) = 1.18, p = 0.24 |
| RRS-B | 10.22 (3.60) | 13.68 (3.83) | t(117.5) = 5.97, p = 2.64e-08 |
| RRS-D | 22.90 (7.96) | 32.68 (7.67) | t(128.23) = 8.16, p = 2.76e-13 |
| BDI | 5.98 (6.008) | 16.46 (8.18) | t(96.5) = 9.024, p = 1.79e-14 |

PSWQ = Penn State Worry Questionnaire. BDI = Beck Depression Inventory. RRS = Ruminative Response Scale. RRS-B = Ruminative Response Scale, « brooding » subscale. RRS-R= Ruminative Response Scale, « reflection » subscale. MCQ-30 = Metacognitions Questionnaire-30. CC = lack of cognitive confidence. POS = positive beliefs. CSC = cognitive self-consciousness. NEG = uncontrollability and danger. NC = need to control thoughts. aWelch two Sample t-test.

## Convergent validity

The Pearson correlation coefficients between MCQ-30 total score, MCQ-30 subscales, worry, rumination and depression measures (PSWQ, BDI, RRS total score and RRS subscales) were examined in both groups in order to evaluate the convergent validity of the MCQ-30 and its subscales (Table 6 and 7). In the nonclinical group, each subscale correlated with anxiety, rumination and depression measures. In the psychiatric group, CC and POS were not significantly associated withrumination measured by the RRS. CSC was not significantly associated with anxiety measured by the PSWQ. POS and CSC were not significantly associated with depression. In both group NEG, CC and NC, but not POS and CSC, were significantly associated with depression.

Table 6 - Correlation of the MCQ-30 and its subscales with measures of anxiety, depression and rumination in the nonclinical group.

| Variable | POS | NEG | CC | NC | CSC | MCQ-30 | RRS | RRS-R | RRS-B | RRS-D | BDI  | PSWQ |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Items, *n* | 6 | 6 | 6 | 6 | 6 | 30 | 22 | 5 | 5 | 12 | 13 | 16 |
| Reliability, Cronbach alpha | 0.85 | 0.79 | 0.83 | 0.72 | 0.77 | 0.85 | 0.89 | 0.75 | 0.71 | 0.84 | 0.87 | 0.93 |
| Subscale, correlation |  |  |  |  |  |  |  |  |  |  |  |  |
| NEG | 0.17\*\*\* |  |  |  |  |  |  |  |  |  |  |  |
| CC | 0.1\* | 0.23\*\*\* |  |  |  |  |  |  |  |  |  |  |
| NC | 0.19\*\*\* | 0.48\*\*\* | 0.16\*\* |  |  |  |  |  |  |  |  |  |
| CSC | 0.2\*\*\* | 0.32\*\*\* | 0.081 | 0.33\*\*\* |  |  |  |  |  |  |  |  |
| MCQ-30 | 0.54\*\*\* | 0.72\*\*\* | 0.53\*\*\* | 0.68\*\*\* | 0.62\*\*\* |  |  |  |  |  |  |  |
| RRS | 0.25\*\*\* | 0.51\*\*\* | 0.21\*\*\* | 0.35\*\*\* | 0.39\*\*\* | 0.56\*\*\* |  |  |  |  |  |  |
| RRS-R | 0.16\*\* | 0.31\*\*\* | 0.078 | 0.11\* | 0.4\*\*\* | 0.35\*\*\* | 0.75\*\*\* |  |  |  |  |  |
| RRS-B | 0.28\*\*\* | 0.46\*\*\* | 0.22\*\*\* | 0.36\*\*\* | 0.3\*\*\* | 0.52\*\*\* | 0.77\*\*\* | 0.4\*\*\* |  |  |  |  |
| RRS-D | 0.21\*\*\* | 0.49\*\*\* | 0.21\*\*\* | 0.36\*\*\* | 0.32\*\*\* | 0.51\*\*\* | 0.94\*\*\* | 0.57\*\*\* | 0.62\*\*\* |  |  |  |
| BDI  | 0.13\* | 0.47\*\*\* | 0.16\*\* | 0.39\*\*\* | 0.3\*\*\* | 0.47\*\*\* | 0.64\*\*\* | 0.37\*\*\* | 0.51\*\*\* | 0.65\*\*\* |  |  |
| PSWQ  | 0.35\*\*\* | 0.7\*\*\* | 0.21\*\*\* | 0.37\*\*\* | 0.32\*\*\* | 0.63\*\*\* | 0.59\*\*\* | 0.35\*\*\* | 0.52\*\*\* | 0.58\*\*\* | 0.52\*\*\* |  |

PSWQ = Penn State Worry Questionnaire. BDI = Beck Depression Inventory. RRS = Ruminative Response Scale. RRS-B = Ruminative Response Scale, « brooding » subscale. RRS-R= Ruminative Response Scale, « reflection » subscale. MCQ-30 = Metacognitions Questionnaire-30. CC = lack of cognitive confidence. POS = positive beliefs. CSC = cognitive self-consciousness. NEG = uncontrollability and danger. NC = need to control thoughts. (\* p< 0.05, \*\*p< 0.01, \*\*\* p< 0.001).

Table 7 - Correlation of the MCQ-30 and its subscales with measures of anxiety, depression and rumination in the psychiatric group.

| Variable | POS | NEG | CC | NC | CSC | MCQ-30  | RRS | RRS-R | RRS-B | RRS-D | BDI | PSWQ |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Items, *n* | 6 | 6 | 6 | 6 | 6 | 30 | 22 | 5 | 5 | 12 | 13 | 16 |
| Cronbach alpha | 0.79 | 0.69 | 0.87 | 0.65 | 0.7 | 0.82 | na | na | na | na | na | na |
| Subscale, correlation |  |  |  |  |  |  |  |  |  |  |  |  |
| NEG | 0.19 |  |  |  |  |  |  |  |  |  |  |  |
| CC | 0.18 | 0.22 |  |  |  |  |  |  |  |  |  |  |
| NC | 0.4\*\*\* | 0.52\*\*\* | 0.16 |  |  |  |  |  |  |  |  |  |
| CSC | 0.12 | 0.36\*\* | -0.41\*\*\* | 0.31\*\* |  |  |  |  |  |  |  |  |
| MCQ-30 | 0.63\*\*\* | 0.73\*\*\* | 0.48\*\*\* | 0.77\*\*\* | 0.39\*\*\* |  |  |  |  |  |  |  |
| RRS | 0.01 | 0.44\*\*\* | 0.05 | 0.54\*\*\* | 0.3\*\* | 0.42\*\*\* |  |  |  |  |  |  |
| RRS-R | 0.04 | 0.38\*\*\* | -0.07 | 0.39\*\*\* | 0.41\*\*\* | 0.35\*\* | 0.77\*\*\* |  |  |  |  |  |
| RRS-B | 0.11 | 0.23\* | -0.11 | 0.52\*\*\* | 0.33\*\* | 0.32\*\* | 0.77\*\*\* | 0.59\*\*\* |  |  |  |  |
| RRS-D | -0.05 | 0.44\*\*\* | 0.17\* | 0.46\*\*\* | 0.16 | 0.38\*\*\* | 0.92\*\*\* | 0.55\*\*\* | 0.51\*\*\* |  |  |  |
| BDI | -0.06 | 0.42\*\*\* | 0.23\* | 0.47\*\*\* | 0.01 | 0.35\*\* | 0.54\*\*\* | 0.18 | 0.41\*\*\* | 0.59\*\*\* |  |  |
| PSWQ | 0.3\* | 0.64\*\*\* | 0.25\* | 0.45\*\*\* | 0.18 | 0.59\*\*\* | 0.4\* | 0.24 | 0.22 | 0.43\*\*\* | 0.51\*\*\* |  |

PSWQ = Penn State Worry Questionnaire. BDI = Beck Depression Inventory. RRS = Ruminative Response Scale. RRS-B = Ruminative Response Scale, « brooding » subscale. RRS-R= Ruminative Response Scale, « reflection » subscale. MCQ-30 = Metacognitions Questionnaire-30. CC = lack of cognitive confidence. POS = positive beliefs. CSC = cognitive self-consciousness. NEG = uncontrollability and danger. NC = need to control thoughts. (\* p< 0.05, \*\*p< 0.01, \*\*\* p< 0.001).

#  Discussion

Our work aimed to adapt and validate the MCQ-30, a well-known instrument for the assessment of metacognitive beliefs, evaluating the psychometric properties of the questionnaire in a nonclinical sample and a psychiatric sample of depressed and hospitalized patients. The adaptation and validation procedure was conducted in accordance with standard practices (Falissard, 2008; Wild et al., 2005).

The final version of the MCQ-30 showed an adequate face validity. The result of the CFA supported the five factor structure of the questionnaire in the nonclinical sample, in line with previous studies. However, in the psychiatric sample, our results reveal that some items, most of them from the NEG and NC subscales, did not have their highest correlation coefficient with their related construct. In this group, we also observed that NEG and NC displayed poor consistency (0.69 and 0.65 respectively). Only the CC subscale displayed a good consistency (= 0.87) and POS and CSC displayed adequate consistency (> 0.69). In the nonclinical sample, the results show the good internal consistencies (> 0.79) (Lance, Butts, & Michels, 2006; Nunnally & Bernstein, 1994) of the POS, NEG and CC subscales in line with previous studies. The reliability of the CSC subscale is only adequate (> 0.69) in this sample, and the lowest alpha coefficient was for NC as in previous studies (Bright et al., 2018; Cho et al., 2012; Cook et al., 2014; Grøtte et al., 2016; Quattropani et al., 2014; Solem et al., 2015; Spada et al., 2008; Typaldou et al., 2014; Adrian Wells & Cartwright-Hatton, 2004).

Thus, the reliability of the MCQ-30 and its subscales as well as the factor structure in the two groups was not homogeneous. The psychiatric group showed lower reliability values related to a factor structure that may not be similar to the one of the original MCQ-30. This misfit in the measurement model and the related decline in internal consistency in the clinical sample may in part be explained by cognitive impairment (i.e. altered executive function, memory and attention), known to be a core feature of depression (Rock, Roiser, Riedel, & Blackwell, 2014). It may have reduced the accuracy of patients’ report of their metacognitive thoughts.

With regard to the criterion validity, in line with the S-REF model, the mean scores for the global MCQ-30 scale was higher in the psychiatric group than in the nonclinical group, meaning that depressed inpatients have more dysfunctional beliefs than subjects from nonclinical population. Scores in the nonclinical group were also significantly lower than in the psychiatric group for the NEG, CC and NC subscales but not for the POS and CSC subscales. These results are consistent with those of previous studies (Solem et al., 2017; Valiente et al., 2012).

The relationship of the MCQ-30 and its subscales with related constructs such as worry, depression and rumination provides evidence of convergent validity in nonclinical population. Our results are consistent with other studies in nonclinical samples showing positive relationships between metacognition and worry, rumination and depression. However, in the psychiatric group, the convergence of the five MCQ-30 factors with these measures was less consistent. Specifically, the NEG, CC and NC subscales but not the POS and CSC subscales correlated with depression in that group. In both groups, NEG and NC were more strongly correlated with depression than the other metacognitive beliefs. This result is consistent with the findings of previous studies except Yilmaz et al.’s (2011).

Altogether, the results reveal a consistent pattern of metacognitive beliefs associated with depression, given: (i) the correlation of the NEG, CC and NC subscales with depression in the psychiatric group, and the strong correlation of the NEG and NC subscales with depression in both current samples as well as in previous studies (Batmaz et al., 2014; Cho et al., 2012; Solem et al., 2017, 2015; Spada et al., 2008; Yılmaz et al., 2011), and (ii) the ability of these subscales to discriminate between psychiatric and nonclinical samples in agreement with previous results (Batmaz et al., 2014; Solem et al., 2017; Valiente et al., 2012). Notwithstanding the low reliability of the NC and NEG subscales in the psychiatric sample, this consistent pattern supports the interest of using these subscales in this population. However, further research is needed to explore the relevance of alternative versions of the NEG and NC subscales for use among depressed patients.

## Limitations

Certain limitations of our study should be noted. The reliability of the MCQ-30 was evaluated through Cronbach's alpha coefficient. Further evidence of score stability could be added with a test-retest study. Another potential limitation concerns the fact that participants in the nonclinical group were never interviewed in person. Also, only self-report measures of the depression, worry and rumination were used in both groups. Thus, these measures may have been biased by personal experience and social desirability. It would be relevant to explore these biases in future studies, by the inclusion of multiple measures of main variables: these measures could be subjective, objective, and implicit. Also, other measures of emotional disorders as well as measures of global functioning and quality of life could have been used, and their relationship to metacognitive beliefs should be investigated in future studies.

Given the small size of the clinical sample which unfortunately prevented the realisation of a CFA, further evidence of the MCQ-30 psychometric properties is needed in a larger clinical sample.

Some consideration should be given to the representativeness of the current samples. In both groups, the gender distribution was uneven with an overrepresentation of women. Moreover, in the psychiatric group, information concerning the number of previous hospitalizations wasn’t available. Thus, the nonclinical group may not be representative of nonclinical population. Also, the psychiatric group may not be representative of all individuals hospitalized and diagnosed with depression, thereby reducing the generalizability of the present data. Conversely, in favour of the representativeness of the current samples, BDI scores were compatible with minimal depression in the nonclinical sample, and with severe depression in the psychiatric sample. Also, the scores in the nonclinical group on the MCQ-30 and its subscales were consistent with those of previous studies in nonclinical samples (Cho et al., 2012; Martín et al., 2014; Quattropani et al., 2014; Spada et al., 2008; Typaldou et al., 2014; Yılmaz et al., 2008), and patients’ scores on these scales were also consistent with those of previous studies among depressed patients (Batmaz et al., 2014; Valiente et al., 2012).

## Conclusion

Our results show that the French version of the MCQ-30 maintains adequate psychometric properties in the general French population, indicating that it is a valid instrument for measuring metacognitive beliefs in this population. Further research is needed to support its use as an indicator of metacognitive beliefs among depressed inpatients. However, in line with previous studies (Normann, van Emmerik, & Morina, 2014), our results provide evidence that metacognitive beliefs are an important component of depression. As shown in recent studies, addressing these metacognitive beliefs in therapy could be beneficial (Hagen et al., 2017; Jelinek, Van Quaquebeke, & Moritz, 2017).

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