

Running Head: FRENCH METACOGNITIONS QUESTIONNAIRE

**Embracing the Structure of Metacognitive Beliefs:
Validation of the French Short Version of the Metacognitions Questionnaire**

Vincent Dethier¹, Alexandre Heeren^{1,2}, Martine Bouvard³, Céline Baeyens⁴, & Pierre Philippot¹

¹Laboratory for Experimental Psychopathology, Psychological Sciences Research Institute,
Université catholique de Louvain, Louvain-la-Neuve, Belgium

²Department of Psychology, Harvard University, Cambridge, MA, USA

³Laboratoire de Psychologie et NeuroCognition, Université de Savoie Mont Blanc,
Chambéry, France

⁴Laboratoire Inter-universitaire de Psychologie : Personnalité, Cognition et Changement
Social, Université Grenoble Alpes, UFR SHS, Grenoble, France

Keywords: Metacognition; MCQ-30; Validation; Questionnaire ; French; Psychopathology; Assessment

Wordcount: 2694

Correspondence:

Vincent Dethier

Laboratory for Experimental Psychopathology, Institute of Psychological Science, Université catholique de Louvain, Place du Cardinal Mercier, 10, B-1348 Louvain-la-Neuve, Belgium

Tel: +32 10 474 122

Fax: +32 10 473 774

Email: vincent.dethier@uclouvain.be

Abstract

Cognitive models of psychopathology posit that metacognitive beliefs may figure prominently in the maintenance, and perhaps the etiology, of emotional disorders. Wells and Cartwright-Hatton (2004) developed the 30-item Metacognitions Questionnaire (MCQ-30) to measure metacognitive beliefs among individuals with anxiety and depression. However, uncertainty still abounds regarding the factorial structure of the French version of the MCQ-30. We designed the present study to overcome this issue. We computed confirmatory factor analyses to examine structural properties of the MCQ-30 in a French-speaking community sample ($N = 262$). Our results are consistent with previous studies, especially regarding the factorial structure. Moreover, good internal reliability and concurrent validity were observed. The MCQ-30 is a reliable and valid tool for assessing various factors of metacognitions for research and clinical purposes.

Keywords: Metacognition; MCQ-30; Self-report; Psychometrics, Metacognitive beliefs; Cognitive therapy; Assessment

Embracing the Structure of Metacognitive Beliefs:

Validation of the French Short Version of the Metacognitions Questionnaire

Cognitive models of psychopathology posit that metacognitive beliefs figure prominently in the maintenance, and perhaps the etiology, of emotional disorders (e.g., Harvey, Watkins, Mansell, & Shafran, 2004; Wells, 1995; Wells & Matthews, 1996; Wong & Rapee, 2016). In traditional cognitive models parlance, metacognitive beliefs represent knowledge about appraisal, monitoring, and control of cognitions. Accordingly, problematic metacognitive beliefs have been evidenced in a wide range of psychopathological conditions such as anxiety- and mood-related psychopathology as well as psychotic disorders (e.g., Janeck, Calamari, Riemann, & Heffelfinger, 2003; Papageorgiou & Wells, 2003; Lobban, Haddock, Kinderman, & Wells, 2002).

According to Wells (1995), individuals may hold two functionally distinct types of metacognitive beliefs about worry, namely positive beliefs and negative beliefs. In this way, beliefs about the efficacy of worrying as a problem-solving strategy—i.e. positive beliefs—may foster worrying as a coping strategy. Yet, some individuals might concurrently hold negative beliefs about worry, such as “worrying will turn me crazy”, which conflict with the positive beliefs and lead to unsuccessful attempts to suppress worry. For these individuals, the presence of both positive and negative beliefs about worry acts as a core dysfunctional process (Wells & Butler, 1997).

To assess metacognitive beliefs, Cartwright-Hatton and Wells (1997) developed the metacognitions questionnaire (MCQ). To generate the items of the MCQ, they relied on transcripts of cognitive therapy as well as materials from in-depth semi-structured interviews with patients and unselected participants regarding the reasons and consequences of worrying. As doubts about one’s own cognitive ability may lead to worry and rehearsal, Wells (1995) also included items assessing confidence in cognitive skills, ultimately leading to a 65-item scale.

Exploratory factor analyses revealed a five-factor structure: 1) *Positive Beliefs about Worry* (benefits of worrying); 2) *Negative Beliefs about the Uncontrollability of Thoughts and Corresponding Danger* (UD; absence of control over the activity of worrying and associated dangers); 3) *Superstition, Punishment and Responsibility* (SPR, negative beliefs about superstition, punishment, and responsibility); 4) *Beliefs about Cognitive Confidence* (CC, lack of confidence in one's own memory capabilities); and 5) *Cognitive Self-Consciousness* (CSC; indexing the tendency to focus on and monitor the thinking process). The authors also reported good scale score internal reliability (Cronbach's alphas: PB = .87; UD = .89; CC = .84; SPR = .74; CSC = .72). Each subscale correlated with trait anxiety, with the strongest correlation holding for UD. Moreover, whereas UD correlated with impaired control of mental activities, CSC correlated with the tendency to focus on one's thoughts and feelings and CC correlated with checking behaviors as well as with self-reported failures of memory, action and attention. Given its metric qualities, the MCQ was translated and validated in French by Larøi, Van der Linden, and d'Acremont (2009). The translation from English to French was performed by one of the authors and then back translated by a professional native English-speaking translator. These authors found a similar five-factor structure based on exploratory factor analyses.

In follow-up research, Wells and Cartwright-Hatton (2004) developed a shortened version of the MCQ. Based on the factor-loading values of their initial studies (i.e., Cartwright-Hatton & Wells, 1997), they removed the items that loaded on more than one factor. This procedure yielded the MCQ-30, a 30-item version of the initial scale. In line with the earlier version, a five-factor structure was observed. Likewise, internal reliability and convergent validity were high. Given that the time matters in daily routine care assessment, the MCQ-30 may be especially appropriate for clinical settings. The observation that the MCQ-30 is as psychometrically good as the long MCQ supported this hypothesis.

In order to be used consistently worldwide, it is important that the factor structure of the MCQ-30 remains consistent across cultures. Accordingly, it remains across several cultural adaptations, e.g. Spanish (Martín et al., 2014; Ramos-Cejudo, Salguero, & Cano-Vindel, 2013), German (Arndt, Patzelt, Andor, Hoyer, & Gerlach, 2011), Turkish (Tosun & Irak, 2008; Yilmaz, Gençöz, & Wells, 2008), and Korean adaptations (Cho, Jahng, & Chai, 2012). Yet, the MCQ-30 has not been validated in French, which is unfortunate given that French is the official language in at least 32 countries and territories worldwide—i.e. 274 million people (French Language Observatory, 2014).

The present study was designed to address two main questions. First, does the MCQ-30 fit a five-factor solution in a community sample? Second, would the psychometric properties of the English version of the MCQ-30 be replicated in a French-speaking sample?

Methods

Participants

Two hundred and sixty-two participants (188 women) took part in the study. Their ages ranged from 18 to 72 years ($M = 36.30$, $SD = 14.78$), with 66% ($n = 173$) being from France and 34% ($n = 89$) from the French-speaking part of Belgium. Among them, 67.9% ($n = 178$) were university graduates, 16% ($n = 42$) had a college degree, 10.3% ($n = 27$) had a high school degree, 4.6 % ($n = 12$) had a middle school degree, and 1.1% ($n = 3$) had an elementary school degree. All participants were native French speakers. They were all recruited via listservs and performed the study online. Informed consent was obtained from each participant. The study was approved by the local ethical committee and carried out according to the 1964 Declaration of Helsinki.

Measures

Participants completed the MCQ-30, the trait version of the Spielberger State-Trait Anxiety Inventory (STAI-Trait; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983), and the Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1998). Measures were chosen in order to assess a potential relation between the various factors of the MCQ-30 and levels of anxious and depressive symptoms. Following the approach of Wells and Cartwright-Hatton (2004), the French MCQ-30 items were extracted from the long French version of the MCQ (Larøi et al., 2009)¹. The items are presented in the Electronic Supplementary Material section (Table b). The STAI-Trait is a 20-item self-reported measure of anxiety proneness. The BDI-II is a 21-item self-reported measure of symptoms of depression. We used the validated French versions of these scales (BDI-II: Beck et al., 1998; STAI-T: Bruchon-Schweitzer & Paulhan, 1993).

Data analysis

Confirmatory factor analyses (CFA) were performed using AMOS 16 (IBM, Armonk, NY, USA). Before performing the analyses, we conducted the Kolmogorov-Smirnov test on each item of the MCQ-30. Normality was not achieved for all items ($p < .0001$). Moreover, the standard method of estimation in structural equation modeling is maximum likelihood, which assumes multivariate normality of manifest variables. As noted by Byrne (1994), a frequent error when performing CFA is that the multivariate normality of the data is not taken into account. In our case, multivariate kurtosis was high, with a Mardia's (1974) coefficient of 87.59 (with a cut-off value of 16.18), indicating a lack of multivariate normality. MCQ-30's items refer to a sample of psychological constructs that can be present or absent with varying frequency. This makes non-normality and categorization problems likely (e.g., Douilliez et al.,

¹ In order to be more consistent with the original English version, a bilingual member of the team revised the translation of items 6, 9, and 12. Moreover, a pretest phase indicated potential confusions in the way those items might be understood by the participants.

2014; Heeren, Wong, Ceschi, Moulds, & Philippot, 2014; MacDonald & Ho, 2002). Therefore, using standard normal theory estimators with these data could produce estimation problems. The most appropriate approach to correct for the lack of multivariate normality is to implement an estimation method that makes no distributional assumptions, such as the unweighted least squares (ULS) estimation method. ULS is analogous to ordinary least squares in a traditional regression. Because the covariance matrix might not be as asymptotically distributed as chi-square with the ULS method, the chi-squared test and other fit indices based on such statistics cannot be computed and are thus not reported (Browne, 1982). Instead, we used the following fit indices: (a) Goodness-of-Fit Index (GFI); (b) Adjusted Goodness-of-Fit Index (AGFI); (c) Parsimony Goodness-of-Fit Index (PGFI); and (d) Parsimony Ratio (PRATIO). Incremental and residual fit indices cannot be used with the ULS method (Browne, 1982).

GFI is an absolute fit index with a corresponding adjusted version, the AGFI, developed to incorporate a penalty function for the addition of free parameters in the model (Jöreskog & Sörbom, 1984). The GFI is analogous to R-square and performs better than any other absolute fit index regarding the absolute fit of the data (Hoyle & Panter, 1995; Marsh, Balla, & McDonald, 1988). Both GFI and AGFI have values between 0 and 1, with 1 indicating a perfect fit. A value of .80 is usually considered a minimum for model acceptance (Cole, 1987).

PGFI and PRATIO are parsimony-based fit measures. Absolute fit measures judge the fit of a model per se without reference to other models that could be appropriate (James, Mulaik, & Brett, 1982). Parsimony-adjusted measures introduce a penalty for complicating the model by increasing the number of parameters in order to increase the fit. Usually parsimony fit indices are much lower than other normed fit measures. Values larger than .60 are generally considered satisfactory (Blunch, 2008).

The present study also requires comparing fit across different models that are not necessarily nested (i.e., meaning that one model is not simply a constrained version of the other). Therefore, we also reported the Akaike Information Criterion (AIC; Akaike, 1987) the Browne-Cudeck Criterion (BCC; Browne & Cudeck, 1989), and the Expected Cross-Validation Index (ECVI; Browne & Cudeck, 1989), which are the best suited for comparison of non-nested models (Blunch, 2008). AIC, BCC, and ECVI are fit measures based on information theory. These indices are not used for judging the fit of a single model, but are used in situations in which one needs to choose from several realistic but different models. These indices are a function of both model complexity and goodness of fit. For these indices, low scores refer to simple well-fitting models, whereas high scores refer to complex poor-fitting models. Therefore, in a comparison-model approach, the model with the lower score is to be preferred.

Results

Structural Validity

We first imposed a default single factor model (Model A) and, following Wells and Cartwright-Hatton (2004), a five-factor model (Model B). Results appear in Table 1. Model B exhibited a better fit than Model A as indexed by GFI, AGFI and PGFI. Moreover, the AIC, BCC, and ECVI strongly favored Model B.

-----Insert Table 1 and Figure 1 about here-----

As shown in Figure 1, all the standardized factor loadings of Model B were statistically significant ($p < .01$). Yet, some items showed loadings below .40 (see Figure 1). We thus ran Model B analyses again, but without these items. However, most of the parsimony-based fit measures were lower ($GFI = .972$, $AGFI = .963$, $PGFI = .741$, $PRATIO = .842$). Consequently, we did not exclude these items. Further analyses refer to Model B.

Descriptive statistics and internal consistency

Descriptive statistics and scale score reliability of the French short MCQ-30, as compared to previous MCQ validation studies, are presented in Table 2. Good Cronbach's alphas were observed ($\alpha > .79$). Item-total descriptive statistics and factors score distributions are presented in the supplementary materials section (see Tables b and c).

-----Insert Table 2 about here-----

Intercorrelations and convergent validity

Table 3 displays the zero-order correlations among the subscales of the MCQ-30, the measure of trait-anxiety, and depressive symptoms. We used the Benjamini-Hochberg procedure (1995) to hold the false discovery rate at 5% for the 34 correlations. The strongest correlation was found between the UD and trait anxiety. Likewise, a similar pattern of findings was observed for each MCQ factor. Moreover, anxiety and depressions were highly correlated [$r(262) = .70, p < .0001$].

In order to examine whether metacognitive factors are uniquely associated with anxiety or depression, we also computed first-order partial correlations. These analyses revealed a distinct pattern of correlations. Anxiety specifically relates to the "Uncontrollability of Thoughts" factor, while depression is related to the "Superstition, Punishment and Responsibility" factor.

-----Insert Table 3 about here-----

Wells' (1995) meta-cognitive theory specifically postulates that the cognitive engine of generalized anxiety is the presence of both positive and negative beliefs about worries concurrently. To test this assumption, we computed a compound variable by multiplying the normalized PB and UD scales of the MCQ-30, thus indexing the interactive effect of positive and negative beliefs. This compound variable was entered in a regression after the normalized PB and UD scores to predict the STAI-Trait score. These analyses revealed a significant regression equation, $F(3,258) = 65.77, p < .001$. However, the combination of PB and UD factors did not significantly predict the STAI-Trait score, $\beta = -.02, p = .75$, whereas sole PB and UD did significantly predict the STAI-Trait score, $\beta = .17, p < .001$, and $\beta = .61, p < .001$ respectively.

Discussion

Our goals in this study were to (a) test whether the French version of the MCQ-30 fit with a five-factor solution in a community sample, and (b) investigate whether the psychometric properties of the English version of the MCQ-30 would be replicated in a French-speaking community sample. First, confirmatory factor analysis indicated that the five-factor solution adequately fit the data. This observation is consistent with the original model (Cartwright-Hatton & Wells, 1997). Moreover, this study is the first to show this structure *via* confirmatory factor analysis. Second, this study also found adequate internal reliability values corroborating findings from the initial MCQ-30 (Wells & Cartwright-Hatton, 2004).

In keeping with previous studies (Cartwright-Hatton & Wells, 1997; Davis & Valentiner, 2000; Wells & Cartwright-Hatton, 2004), the Uncontrollability of Thoughts subscale was particularly related to trait-anxiety. For instance, Davis and Valentiner (2000) reported that Uncontrollability of Thoughts was the only subscale to predict pathology worry. Taken together, these findings suggest that Uncontrollability of Thoughts is particularly connected to anxiety vulnerability. Though the intercorrelations scores among the subscales of

the MCQ-30 were low in the present study, Cartwright-Hatton and Wells (1997) reported similar findings.

Notably, as anxiety correlated with “Uncontrollability of Thoughts” and depression with “Superstition, Punishment and Responsibility”, our results suggest that metacognitive factors contribute to depression and anxiety differently. Future studies should replicate this effect among clinically depressed samples with low anxiety and anxious samples with low depression.

In contrast to Wells’ meta-cognitive model (1995), the combination of both positive and negative beliefs did not significantly predict trait anxiety above and beyond their respective individual contributions. However, this model focuses on individuals with pathological worry, whereas our study was conducted among a community sample. Alternatively, although the positive beliefs might be involved in the onset of emotional disorders, the presence of an emotional disorder does not require the presence of such beliefs. Longitudinal studies are thus needed to explore this issue.

Some authors have proposed methodological guidelines to ensure the validity of abbreviated forms (Smith, McCarthy, & Anderson, 2000). According to their recommendations, the justification of a reduction in the number of items must balance a reduction of the requisite time for completion and the maintenance of sufficient validity. In regards to the MCQ-30, both elements were met. The shortened version substantially reduces participant burden. And, we found that the abbreviated form of the MCQ maintains good psychometric qualities, including construct validity and internal consistency.

In follow-up studies, several issues require further research. First, our sample was part of the general population and highly educated, thereby reducing the generalizability of the present data. Second, the literature could benefit from studies investigating the sensitivity of the scale in response to clinical interventions, for instance showing changes from before and

after behavioral and cognitive interventions. Moreover, ten items showed factor loadings below 0.40. Although our complementary analyses indicated that the removal of these items did not change the fit indices of the five-factor solution, future studies are needed to ensure that these items do not weaken the psychometric properties of the scale. Finally, we only assessed concurrent validity with self-report measures. Future studies exploring the associations between responses on the MCQ and non-self-report indices of maladaptive cognitions are needed (e.g., behavioral tasks). Furthermore, a study directly comparing the English and French versions would further establish the equivalence of the two versions. These limitations notwithstanding, in the current study, we provided the first adaptation and validation of the MCQ-30 in a French-speaking community sample.

Acknowledgments

The authors would like to thank Emily E. Bernstein (Harvard University, MA, USA) for her valuable comments on a previous version of this paper. Alexandre Heeren is a postdoctoral research fellow supported from the Helaers Foundation for Medical Research and the « World Excellence postdoctoral fellowship from the Competitive Cluster in Health and Life Sciences of Wallonia—BioWin ».

229
230
231
232
233
234
235
236
237
238
239
240
241

Compliance with Ethical Standards

Conflict of interest: None

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study.

Funding. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

REFERENCES

- Akaike, H. (1987). Factor analysis and AIC. *Psychometrika*, 52, 317-332. doi:10.1007/BF02294359
- Arndt, A., Patzelt, J., Andor, T., Hoyer, J., & Gerlach, A. L. (2011). Psychometric properties of the short german version of the metacognitions questionnaire (MKF-30). *Zeitschrift für Klinische Psychologie und Psychotherapie*, 40(2), 107-114. doi:10.1026/1616-3443/a000087
- Beck, A. T., Steer, R. A., & Brown, G. K. (1998). Beck Depression Inventory Manual (2nd Edition). Paris, France: Editions du Centre de Psychologie Appliquée.
- Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate : a practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society, Series B (Methodological)*, 57(1), 289-300.
- Blunch, N. J. (2008). *Introduction to structural equation modeling using SPSS and AMOS*. London: Sage Publications.
- Bouman, T. K., & Meijer, K. J. (1999). A Preliminary Study of Worry and Metacognitions in Hypochondriasis. *Clinical Psychology and Psychotherapy*, 6(2), 96-101. doi:10.1002/(SICI)1099-0879(199905)6:2<96::AID-CPP190>3.0.CO;2-G
- Browne, M. W. (1982). Covariance structures. In D. M. Hawkins (Ed.), *Topics in Multivariate Analysis* (pp. 72-141). Cambridge: Cambridge University Press.
- Browne, M. W., & Cudeck, R. (1989). Single sample cross-validation indices for covariance structures. *Multivariate Behavioral Research*, 24, 445-455. doi:10.1207/s15327906mbr2404_4
- Bruchon-Schweitzer, M., & Paulhan, I. (1993). *Adaptation francophone de l'inventaire d'anxiété Trait-Etat (Forme Y) de Spielberger*. Paris, France: Editions du Centre de Psychologie Appliquée.
- Byrne, B. M. (1994). *Structural equation modeling with EQS and EQS/Windows*. Thousand Oaks, CA: Sage Publications.
- Cartwright-Hatton, S., & Wells, A. (1997). Beliefs about worry and intrusions: The Meta-Cognitions Questionnaire and its correlates. *Journal of Anxiety Disorders*, 11(3), 279-296. doi:10.1016/S0887-6185(97)00011-X

- 268 Cho, Y., Jahng, S., & Chai, S. (2012). The Factor Structure and Concurrent Validity of the Korean
 269 Version of the Metacognitions Questionnaire 30 (K-MCQ-30). *Journal of Clinical Psychology*,
 270 68(3), 349-361. doi:10.1002/jclp.20867
- 271 Cole, D. A. (1987). Utility of confirmatory factor analysis in test validation research. *Journal of*
 272 *Consulting and Clinical Psychology*, 55, 584-594. doi:10.1037/0022-006X.55.4.584
- 273 Davis, R. N., & Valentiner, D. P. (2000). Does meta-cognitive theory enhance our understanding of
 274 pathological worry and anxiety? *Personality and Individual Differences*, 29, 513-526.
 275 doi:10.1016/S0191-8869(99)00211-1
- 276 Douilliez, C., Heeren, A., Lefèvre, N., Watkins, E., Barnard, P., & Philippot, P. (2014). Validation of
 277 the French version of a questionnaire that evaluates constructive and nonconstructive repetitive
 278 thoughts. *Canadian Journal of Behavioural Science*, 46, 2, 185-192. doi:10.1037/a0033185
- 279 Emmelkamp, P. M. G., & Aardema, A. (1999). Metacognition, Specific Obsessive-Compulsive Beliefs
 280 and Obsessive-Compulsive Behaviour. *Clinical Psychology and Psychotherapy*, 6(2), 139-145.
 281 doi:10.1002/(SICI)1099-0879(199905)6:2<139::AID-CPP194>3.0.CO;2-9
- 282 Fenigstein, A., Scheier, M. F., & Buss, A. H. (1975). Public and private self-consciousness : Assesment
 283 and theory. *Journal of Consulting and Clinical Psychology*, 43, 522-527. doi:10.1037/h0076760
- 284 French Language Observatory (2014). *The French Language Worldwide*. Paris: Editions Nathan.
- 285 Harvey, A. G., Watkins, E., Mansell, W., & Shafran, R. (2004). *Cognitive Behavioral Processes across*
 286 *Psychological Disorders : A transdiagnostic approach to research and treatment*. Oxford:
 287 Oxford University Press.
- 288 Heeren, A., Wong, Q.J.J., Ceschi, G., Moulds, M. L., & Philippot, P. (2014). Probing the structural
 289 validity of the Self-Beliefs in Social Anxiety Scale (SBSA): Adaptation and validation in a
 290 French-speaking community sample. *Canadian Journal of Behavioural Science*, 46, 506-513.
- 291 Holeva, V., Tarrier, N., & Wells, A. (2001). Prevalence and Predictors of Acute Stress Disorder and
 292 PTSD following Road Traffic Accidents: Thought Control Strategies and Social Support.
 293 *Behavior Therapy*, 32(1), 65-83. doi:10.1016/S0005-7894(01)80044-7

- 294 Hoyle, R. H., & Panter, A. T. (1995). Writing about structural equation models. In R. H. Hoyle (Ed.),
 295 *Structural Equation Modeling, Concepts, Issues, and Applications* (pp. 158-176). Thousand
 296 Oaks, CA: Sage Publications.
- 297 James, L. R., Mulaik, S. A., & Brett, J. M. (1982). *Causal analysis: Assumptions, models and data*.
 298 Berveley Hills, CA: Sage.
- 299 Janeck, A. S., Calamari, J. E., Riemann, B. C., & Heffelfinger, S. K. (2003). Too much thinking about
 300 thinking?: Metacognitive differences in obsessive-compulsive disorder. *Journal of Anxiety*
 301 *Disorders*, 17(2), 181-195. doi:10.1016/S0887-6185(02)00198-6
- 302 Jöreskog, K. C., & Sörbom, D. (1984). *LISREL 7: A guide to programs and applications (3rd Edition)*.
 303 Chicago: SPSS Inc.
- 304 Larøi, F., Van der Linden, M., & d'Acremont, M. (2009). Validity and reliability of a French version of
 305 the metacognitions questionnaire in a nonclinical population. *Swiss Journal of Psychology*,
 306 68(3), 125-132. doi:10.1024/1421-0185.68.3.125
- 307 Lobban, F., Haddock, G., Kinderman, P., & Wells, A. (2002). The role of metacognitive beliefs in
 308 auditory hallucinations. *Personality and Individual Differences*, 32(8), 1351-1363.
 309 doi:10.1016/S0191-8869(01)00123-4
- 310 MacDonald, R. P., & Ho, M. R. (2002). Principles and practice in reporting structural equation analyses.
 311 *Psychological Methods*, 7, 64-82. doi:10.1037/1082-989X.7.1.64
- 312 Mardia, K. V. (1974). Applications of some measures of multivariate skewness and kurtosis in testing
 313 normality and robustness studies. *Sankhya : The Indian Journal of Statistics*, 36, 115-128.
- 314 Marsh, H. W., Balla, J. R., & McDonald, R. P. (1988). Goodness-of-fit indices in confirmatory factor
 315 analysis: The effects of sample size. *Psychological Bulletin*, 103, 391-410. doi:10.1037/0033-
 316 2909.103.3.391
- 317 Martín, J., Padierna, A., Unzurrunzaga, A., González, N., Berjano, B., & Quintana, J. M. (2014).
 318 Adaptation and validation of the metacognition questionnaire (MCQ-30) in Spanish clinical and
 319 nonclinical samples. *Journal of Affective Disorders*, 167, 228-234.
 320 doi:10.1016/j.jad.2014.06.009

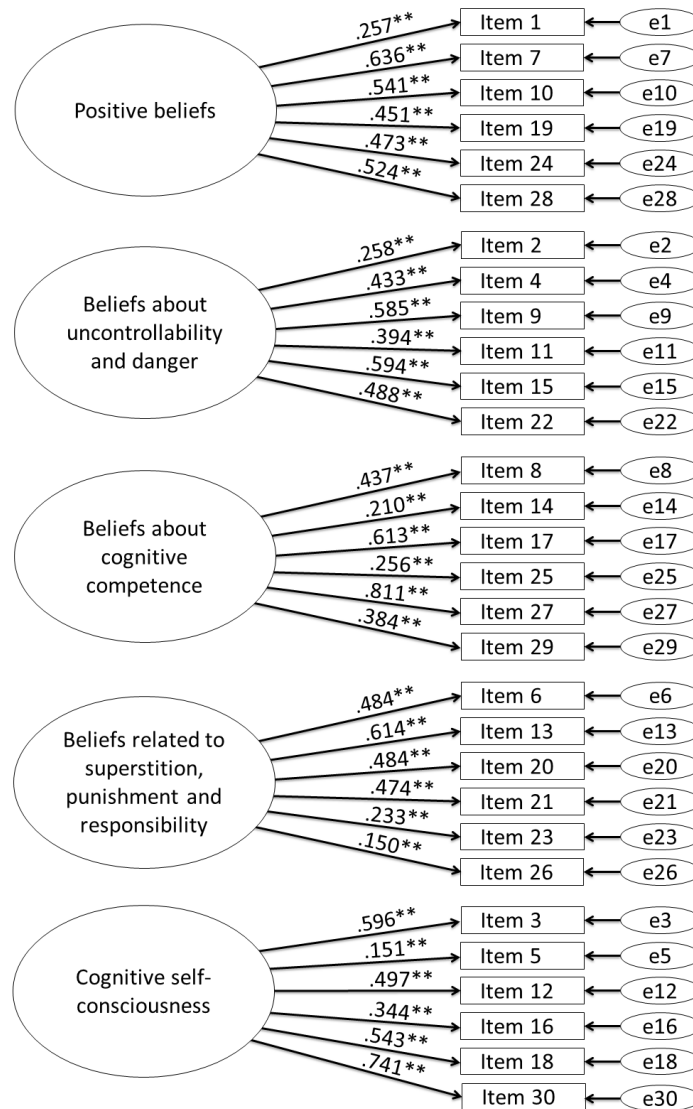
- Papageorgiou, C., & Wells, A. (2003). An empirical test of a clinical metacognitive model of rumination and depression. *Cognitive Therapy and Research*, 27(3), 261-273. doi:10.1023/A:1023962332399
- Philippot, P., Bouvard, M., Baeyens, C., & Dethier, V. (2015). Vers un protocole de traitement processuel et modulaire des troubles anxio-dépressifs. [Towards a modular, processual treatment protocol for anxio-depressive disorders]. *Journal de Therapie Comportementale et Cognitive*, 25(3), 106-116. doi:10.1016/j.jtcc.2015.07.001
- Ramos-Cejudo, J., Salguero, J. M., & Cano-Vindel, A. (2013). Spanish version of the meta-cognitions questionnaire 30 (MCQ-30). *Spanish Journal of Psychology*, 16. doi:10.1017/sjp.2013.95
- Reynolds, M., & Wells, A. (1999). The Thought Control Questionnaire - Psychometric properties in a clinical sample, and relationships with PTSD and depression. *Psychological Medicine*, 29(5), 1089-1099. doi:10.1017/S003329179900104X
- Sanavio, E. (1988). Obsessions and Compulsions: The Padua Inventory. *Behaviour Research and Therapy*, 26, 169-177. doi:10.1016/0005-7967(88)90116-7
- Smith, G. T., McCarthy, D. M., & Anderson, K. G. (2000). On the sins of short-form development. *Psychological Assessment*, 12(1), 102-111. doi:10.1037/1040-3590.12.1.102
- Spielberger, D. C., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). *Manual for the State-Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychology Press.
- Tosun, A., & Irak, M. (2008). Adaptation, validity, and reliability of the Metacognition Questionnaire-30 for the Turkish population, and its relationship to anxiety and obsessive-compulsive symptoms. *Türk psikiyatri dergisi = Turkish journal of psychiatry*, 19(1), 67-80.
- Wells, A. (1995). Meta-cognition and worry: A cognitive model of generalized anxiety disorder. *Behavioural and Cognitive Psychotherapy*, 23(3), 301-320. doi:10.1017/S1352465800015897
- Wells, A., & Butler, G. (1997). Generalized anxiety disorder. In D. M. Clark & C. G. Fairburn (Eds.), *Science and practice of cognitive behaviour therapy* (pp. 155-178). New York: Oxford University Press.
- Wells, A., & Carter, K. (1999). Preliminary tests of a cognitive model of generalized anxiety disorder. *Behaviour Research and Therapy*, 37(6), 585-594. doi:10.1016/S0005-7967(98)00156-9

- Wells, A., & Cartwright-Hatton, S. (2004). A short form of the metacognitions questionnaire: properties of the MCQ-30. *Behaviour Research and Therapy*, 42(4), 385-396. doi:10.1016/S0005-7967(03)00147-5
- Wells, A., & Matthews, G. (1996). Modelling cognition in emotional disorder: The S-REF model. *Behaviour Research and Therapy*, 34(11-12), 881-888. doi:10.1016/S0005-7967(96)00050-2
- Wells, A., & Papageorgiou, C. (1998). Relationships between worry, obsessive-compulsive symptoms and meta-cognitive beliefs. *Behaviour Research and Therapy*, 36(9), 899-913. doi:10.1016/S0005-7967(98)00070-9
- Yilmaz, A. E., Gençöz, T., & Wells, A. (2008). Psychometric characteristics of the Penn State Worry Questionnaire and Metacognitions Questionnaire-30 and metacognitive predictors of worry and obsessive-compulsive symptoms in a Turkish sample. *Clinical Psychology and Psychotherapy*, 15(6), 424-439. doi:10.1002/cpp.589

362

FIGURE CAPTIONS

363 **Figure 1.** Path diagram depicting the five-factor solution (Model C) of the French short
 364 version of the Metacognitions Questionnaire.



365

366 **Note.** For each item, e represents the error measurement related to that specific item.

367 *, $p < .01$.

368

Table 1. Fit index values for the different tested models.

Model	df	GFI	AGFI	PGFI	PRATIO	AIC	BCC	ECVI
A	405	.822	.796	.716	.931	2354.538	2370.712	9.021
B	395	.956	.948	.812	.908	829.934	848.804	3.180

Note. We considered Model B (emphasized by bold font) as the best fitting model. AGFI, Adjusted Goodness-of-Fit Index; AIC, Akaike Information Criterion; BCC, Browne-Cudeck Criterion; ECVI, Expected Cross-Validation Index; GFI, Goodness-of-Fit Index; PGFI, Parsimony Goodness-of-Fit Index; PRATIO, Parsimony Ratio.

Table 2. Descriptive statistics and Cronbach's alpha for each factor of the MCQ-30 and other measures

	Present Study				Wells et al. (2004)
	α	Number of items	M	SD	α
MCQ-30					
Positive Beliefs	.85	6	10.81	3.70	.92
Beliefs about Uncontrollability and Danger	.83	6	13.33	4.29	.91
Cognitive confidence	.81	6	10.74	3.83	.93
Beliefs related to Superstition, Punishment and Responsibility	.79	6	9.73	3.63	.72
Cognitive Self- Consciousness	.84	6	15.56	4.32	.92
Total score		30	60.16	12.44	
STAI-Trait	.92	20	44.31	10.64	
BDI-II	.90	21	10.24	8.94	

Note. ** $p < .01$. BDI-II: Beck Depression Inventory-II; MCQ-30: Abbreviated Metacognitions Questionnaire; STAI-Trait: Spielberger Trait Anxiety Inventory; BDI-II.

381 **Table 3.** Pearson's Correlations

	Bivariate correlations				Partial correlations			
	MCQ-30				STAI-T	BDI-II	STAI-T	BDI-II
					(controlling for BDI-II) (controlling for STAI-Trait)			
	UD	CC	SPR	CSC				
Positive Beliefs (PB)	.16*	.09	.27*	.28*	.26*	.26*	.12	.11
Beliefs about Uncontrollability and Danger (UD)		.16*	.46*	.41*	.64*	.54*	.44*	.17*
Cognitive Confidence (CC)			.16*	.02	.30*	.29*	.14	.12
Beliefs related to Superstition, Punishment and Responsibility (SPR)				.40*	.40*	.43*	.16*	.23*
Cognitive Self-Consciousness (CSC)					.28*	.25*	.16*	.07
MCQ-30 Total score					.61*	.56*	.36*	.25*

382 *Note.* *Correlations significant at $p < .05$, corrected for multiple correlations using the false
383 discovery procedure (Benjamini-Hochberg procedure). BDI-II: Beck Depression Inventory-II;
384 MCQ-30: Abbreviated Metacognitions Questionnaire; STAI-Trait: Spielberger State-Trait
385 Anxiety Inventory.

386

387

388

Electronic Supplementary Material

389 *Table a.* MCQ-30 items

Item Number	French	English	Factor
1	Le fait de m'inquiéter m'aide à éviter des problèmes qui pourraient survenir	Worrying helps me to avoid problems in the future	PB
2	Le fait de m'inquiéter est dangereux pour moi	My worrying is dangerous for me	UD
3	Je réfléchis beaucoup sur mes pensées	I think a lot about my thoughts	CSC
4	Le fait de m'inquiéter pourrait me rendre malade	I could make myself sick with worrying	UD
5	Je suis conscient(e) de la façon dont mon esprit fonctionne quand j'examine un problème en détail	I am aware of the way my mind works when I am thinking through a problem	CSC
6	Si je ne contrôlais pas une pensée inquiétante et puis qu'elle arrivait, je considérerais que c'est de ma faute	If I did not control a worrying thought, and then it happened, it would be my fault	SPR
7	J'ai besoin de me tracasser pour rester organisée	I need to worry in order to remain organized	PB
8	J'ai peu confiance en ma mémoire pour les mots et pour les noms	I have little confidence in my memory for words and names	CC
9	Mes inquiétudes persistent, malgré mes tentatives d'essayer de les arrêter	My worrying thoughts persist, no matter how I try to stop them	UD
10	L'inquiétude m'aide à mettre de l'ordre dans ma tête	Worrying helps me to get things sorted out in my mind	PB
11	Je ne peux pas ignorer mes inquiétudes	I cannot ignore my worrying thoughts	UD
12	Je surveille mes pensées	I monitor my thoughts	CSC
13	Je devrais garder en permanence le contrôle sur mes pensées	I should be in control of my thoughts all of the time	SPR
14	Ma mémoire peut parfois m'induire en erreur	My memory can mislead me at times	CC
15	Mon inquiétude pourrait me rendre fou (folle)	My worrying could make me go mad	UD
16	Je suis en permanence conscient(e) de mes pensées	I am constantly aware of my thinking	CSC
17	J'ai une mauvaise mémoire	I have a poor memory	CC
18	Je prête beaucoup d'attention à la façon dont mon esprit fonctionne	I pay close attention to the way my mind works	CSC

19	L'inquiétude m'aide à m'adapter aux choses	Worrying helps me to cope	PB
20	Le fait de ne pas pouvoir contrôler mes pensées est un signe de faiblesse	Not being able to control my thoughts is a sign of weakness	SPR
21	Si je ne contrôlais pas mes pensées, je ne serais pas capable de fonctionner	If I could not control my thoughts, I would not be able to function	SPR
22	Quand je commence à me tracasser, je ne peux pas m'arrêter	When I start worrying, I cannot stop	UD
23	Je serai puni(e) pour ne pas avoir contrôlé certaines pensées	I will be punished for not controlling certain thoughts	SPR
24	Le fait de m'inquiéter m'aide à résoudre les problèmes	Worrying helps me to solve problems	PB
25	J'ai peu confiance en ma mémoire pour les lieux	I have little confidence in my memory for places	CC
26	Ce n'est pas bien d'avoir certaines pensées	It is bad to think certain thoughts	SPR
27	Je n'ai pas confiance en ma mémoire	I do not trust my memory	CC
28	Pour bien travailler, j'ai besoin de m'inquiéter	I need to worry in order to work well	PB
29	J'ai peu confiance en ma mémoire pour les actions	I have little confidence in my memory for actions	CC
30	J'examine constamment mes pensées	I constantly examine my thoughts	CSC

Note. CC: Cognitive Confidence; CSC: Cognitive Self-Consciousness; PB: Positive Beliefs; SPR: Beliefs related to Superstition, Punishment and Responsibility; UD: Beliefs about uncontrollability and danger

396 **Table b** Item-total descriptive statistics

MCQ-30 Factors	Item	Scale mean if item deleted	Scale variance if item deleted	Alpha if item deleted	Alpha	Corrected Item-factor correlation
Positive Beliefs	1	8.81	10.14	.84	.85	.55
	7	8.98	9.33	.82	.85	.65
	10	9.24	9.99	.82	.85	.63
	19	8.94	10.60	.83	.85	.60
	24	8.94	9.60	.81	.85	.72
	28	9.11	9.77	.82	.85	.64
Beliefs about Uncontrollability and Danger	2	11.26	13.93	.82	.83	.51
	4	10.85	12.23	.79	.83	.65
	9	11.21	12.60	.78	.83	.70
	11	10.65	14.17	.82	.83	.49
	15	11.42	12.80	.80	.83	.63
	22	11.25	13.38	.80	.83	.63
Cognitive Confidence	8	8.76	10.16	.80	.81	.52
	14	8.31	11.13	.81	.81	.44
	17	9.10	9.81	.74	.81	.74
	25	9.11	11.18	.80	.81	.46
	27	9.14	9.88	.73	.81	.81
	29	9.27	11.39	.79	.81	.52
Beliefs related to Superstition, Punishment and Responsibility	6	7.99	9.30	.77	.79	.54
	13	7.92	8.35	.72	.79	.70
	20	8.08	8.73	.74	.79	.65
	21	7.92	9.04	.76	.79	.59
	23	8.55	11.25	.78	.79	.48
	26	8.17	10.62	.80	.79	.37
Cognitive Self-Consciousness	3	12.44	13.27	.81	.84	.66
	5	12.74	15.00	.84	.84	.44
	12	13.32	13.81	.83	.84	.54
	16	13.29	13.71	.83	.84	.56
	18	12.70	12.29	.79	.84	.75
	30	13.34	12.27	.78	.84	.76

397 Note. **p<.01

399 **Table c** Centiles of the factors scores distributions

Centiles	5th	10th	25th	50th	75th	90th	95th
Positive Beliefs (PB)	6	6	8	10	14	16	18
Beliefs about Uncontrollability and Danger (UD)	7	8	10	13	16	19	21.85
Cognitive Confidence (CC)	6	7	8	10	13	16	18.85
Beliefs related to Superstition, Punishment and Responsibility (SPR)	6	6	7	9	12	15	17
Cognitive Self-Consciousness (CSC)	8	10	12.75	16	19	21	23

400 **Notes.** A centile is the value of a variable below which a certain percent of observation fall.

401

402

403

404

405

406

407