

# Psychometric properties of the Automatic Thoughts Questionnaire-8 in Spain

Francisco J. Ruiz <sup>Corresp., 1</sup>, Miguel A. Segura-Vargas <sup>1</sup>, Paula Odriozola-González <sup>2</sup>, Juan C. Suárez-Falcón <sup>3</sup>

<sup>1</sup> Fundación Universitaria Konrad Lorenz, Bogotá, Colombia

<sup>2</sup> Universidad de Valladolid, Valladolid, Spain

<sup>3</sup> Universidad Nacional de Educación a Distancia, Madrid, Spain

Corresponding Author: Francisco J. Ruiz

Email address: franciscoj.ruizji@gmail.com

**Background.** The ATQ is a widely used instrument consisting of 30 items that assess the frequency of negative automatic thoughts. However, the extensive length of the ATQ could compromise its measurement efficiency in survey research. Consequently, an 8-item shortened version of the ATQ has been developed. This study aims to analyze the validity of the ATQ-8 in two Spanish samples. **Method.** The ATQ-8 was administered to a total sample of 1148 participants (302 undergraduates and 846 general online population). To analyze convergent construct validity, the questionnaire package also included the Dysfunctional Attitude Scale - Revised (DAS-R), Depression Anxiety and Stress Scale - 21 (DASS-21), Acceptance Action Questionnaire - II (AAQ-II), Cognitive Fusion Questionnaire (CFQ), Generalized Pliance Questionnaire (GPQ), and Satisfaction with Life Scale (SWLS). To analyze internal consistency, we computed Cronbach's alpha and McDonald's omega. A confirmatory factor analysis was conducted to test the one-factor structure of the ATQ-8. In so doing, a robust diagonally weighted least square estimation method (Robust DWLS) was adopted using polychoric correlations. Afterward, we analyzed measurement invariance across samples, gender, groupage, and education level. Lastly, we evaluated convergent construct validity by computing Pearson correlations between the ATQ-8 and the remaining instruments. **Results.** The internal consistency across samples was adequate (alpha and omega = .89). The one-factor model demonstrated a good fit to the data (RMSEA = 0.10, 90% CI [0.089, 0.011], CFI = 0.98, NNFI = 0.97, and SRMR = 0.048). The ATQ-8 showed scalar metric invariance across samples, gender, groupage, and education level. The ATQ-8 scores were significantly associated with emotional symptoms (DASS-21), satisfaction with life (SWLS), dysfunctional schemas (DAS-R), cognitive fusion (CFQ), experiential avoidance (AAQ-II), and generalized pliance (GPQ). In conclusion, the Spanish version of the ATQ-8 demonstrated adequate psychometric properties in Spanish samples.

1

## 2 **Psychometric properties of the Automatic Thoughts** 3 **Questionnaire – 8 in two Spanish nonclinical samples**

4

5

6 Francisco J. Ruiz<sup>1</sup>, Miguel A. Segura-Vargas<sup>1</sup>, Paula Odriozola-González<sup>2</sup>, Juan C. Suárez-  
7 Falcón<sup>3</sup>

8

9 <sup>1</sup> Faculty of Psychology, Fundación Universitaria Konrad Lorenz, Bogotá, Colombia

10 <sup>2</sup> Department of Psychology, Universidad de Valladolid, Valladolid, Spain

11 <sup>3</sup> Faculty of Psychology, Universidad Nacional de Educación a Distancia (UNED), Madrid,  
12 Spain

13

14 Corresponding Author:

15 Francisco J. Ruiz<sup>1</sup>

16 Carrera 9 bis, N° 62-43, Bogotá, 110231, Colombia

17 Email address: franciscoj.ruizj@konradlorenz.edu.co

18

19

20

21

22

23

24

25

26

## 27 **Abstract**

28 **Background.** The ATQ is a widely used instrument consisting of 30 items that assess the  
29 frequency of negative automatic thoughts. However, the extensive length of the ATQ could  
30 compromise its measurement efficiency in survey research. Consequently, an 8-item shortened  
31 version of the ATQ has been developed. This study aims to analyze the validity of the ATQ-8 in  
32 two Spanish samples.

33 **Method.** The ATQ-8 was administered to a total sample of 1148 participants (302  
34 undergraduates and 846 general online population). To analyze convergent construct validity, the  
35 questionnaire package also included the Dysfunctional Attitude Scale – Revised (DAS-R),  
36 Depression Anxiety and Stress Scale – 21 (DASS-21), Acceptance Action Questionnaire – II  
37 (AAQ-II), Cognitive Fusion Questionnaire (CFQ), Generalized Pliance Questionnaire (GPQ),  
38 and Satisfaction with Life Scale (SWLS). To analyze internal consistency, we computed  
39 Cronbach’s alpha and McDonald’s omega. A confirmatory factor analysis was conducted to test  
40 the one-factor structure of the ATQ-8. In so doing, a robust diagonally weighted least square  
41 estimation method (Robust DWLS) was adopted using polychoric correlations. Afterward, we  
42 analyzed measurement invariance across samples, gender, groupage, and education level. Lastly,  
43 we evaluated convergent construct validity by computing Pearson correlations between the  
44 ATQ-8 and the remaining instruments.

45 **Results.** The internal consistency across samples was adequate (alpha and omega = .89). The  
46 one-factor model demonstrated a good fit to the data (RMSEA = 0.10, 90% CI [0.089, 0.011],  
47 CFI = 0.98, NNFI = 0.97, and SRMR = 0.048). The ATQ-8 showed scalar metric invariance  
48 across samples, gender, groupage, and education level. The ATQ-8 scores were significantly  
49 associated with emotional symptoms (DASS-21), satisfaction with life (SWLS), dysfunctional

50 schemas (DAS-R), cognitive fusion (CFQ), experiential avoidance (AAQ-II), and generalized  
51 pliance (GPQ). In conclusion, the Spanish version of the ATQ-8 demonstrated adequate  
52 psychometric properties in Spanish samples.

53

## 54 **Introduction**

55           Unipolar depression is characterized by sadness, irritability, or anhedonia, as well as a  
56 loss of appetite, difficulty to sleep, fatigue, slowing of speech and action, and suicidal thoughts,  
57 among others (American Psychiatric Association, 2013). The cognitive model proposed by Beck,  
58 Rush, Shaw, and Emery (1979) states that the cognitive triad, integrated by a pattern of negative  
59 thinking about the world, the future, and the self, is one of the pillars of depression. Within this  
60 cognitive pattern, negative automatic thoughts play a crucial role and are defined as negative  
61 self-statements (Beck et al., 1979).

62           The Automatic Thoughts Questionnaire is one of the most extensively used instruments  
63 to measure negative automatic thoughts (ATQ; Hollon & Kendall, 1980). The ATQ is an  
64 instrument consisting of 30 items with a 5-point Likert scale that assesses the frequency of  
65 negative automatic thoughts experienced during the past week. Hollon and Kendall (1980) asked  
66 312 undergraduates to recall dysphoric experiences and to report associated cognitions.  
67 Afterward, the authors chose 100 representative cognitions and administered them to a second  
68 sample. Through a cross-validation analysis, the authors retained 30 of the 100 original items.  
69 These items significantly discriminated between clinical and nonclinical samples (Hollon &  
70 Kendall, 1980).

71           Several studies have confirmed the temporal consistency, convergent and discriminant  
72 validity, and excellent internal consistency of the ATQ (e.g., Chioqueta & Stiles, 2004; Hollon &  
73 Kendall, 1980; Hollon, Kendall, & Lumry, 1986; Kazdin, 1990). The results of exploratory  
74 factor analyses across different studies yielded factor structures with more than one factor (e.g.,  
75 Bryant & Baxter, 1997; Cano-García & Rodríguez-Franco, 2002; Chioqueta & Stiles, 2006;  
76 Deardorff, Hopkins, & Finch Jr, 1984; Ghassemzadeh, Mojtabai, Karamghadiri, &

77 Ebrahimkhani, 2005; Joseph, 1994; Kazdin, 1990; Oei & Mukhtar, 2008; Sahin & Sahin, 1992;  
78 see reviews in Netemeyer et al., 2002; Zettle, Webster, Gird, Wagener, & Burdsal, 2013). Most  
79 studies have obtained different factor solutions from the four factors shown by Hollon and  
80 Kendall (1980). Netemeyer et al. (2002) mentioned that all studies found that a large proportion  
81 of the variance was accounted for the first factor. Consequently, the results suggest that one  
82 factor could underlie the 30 items of the ATQ. Moreover, most studies have only used the overall  
83 score of the ATQ, which treats the scale as if it were only represented by one factor.

84         The extensive length of the ATQ could compromise its measurement efficiency in survey  
85 research. Accordingly, Netemeyer et al. (2002) gathered two samples ( $N = 434$  and  $N = 419$ ) to  
86 derive the 15- and 8-item reduced versions of the ATQ. Both versions of the questionnaire had a  
87 single factor, with alphas of .96 and .92, respectively. Two additional cross-validation samples  
88 ( $N = 163$  and  $N = 91$ ) also showed support for the 15- and 8-item reduced versions, which  
89 suggests that the shortened versions of the ATQ are suitable alternatives to measure automatic  
90 cognitions associated with depression (Netemeyer et al., 2002).

91         Following the study by Netemeyer et al. (2002), Ruiz, Suárez-Falcón, and Riaño-  
92 Hernández (2017) analyzed the psychometric properties of the Spanish version of the ATQ-8 in a  
93 Colombian sample of 1587 participants, including general population, a clinical sample, and  
94 undergraduates. The analysis displayed good internal consistency across samples (alpha of .89),  
95 and the one-factor model obtained an adequate fit to the data (RMSEA = 0.083, 90% CI [0.074,  
96 0.092]; CFI = .96; NNFI = .95). Additional factor analyses confirmed measurement invariance  
97 across gender and samples (i.e., clinical and nonclinical samples). Furthermore, the mean scores  
98 of the clinical sample were significantly higher than the scores of their nonclinical counterpart.

99           The results presented in Netemeyer et al. (2002) and Ruiz et al. (2017) indicate that the  
100 ATQ-8 might be an excellent alternative to the original ATQ scale. However, the factor structure  
101 and psychometric properties of the ATQ-8 have been analyzed only in two countries.  
102 Accordingly, the current study aims to analyze the validity of the ATQ-8 in Spaniard samples.  
103 This study is relevant because the original ATQ was only preliminarily validated in Spain by  
104 Cano-García and Rodríguez-Franco (2002) in a sample of 205 individuals suffering from chronic  
105 pain. Thus, there is scarce empirical evidence of the psychometric properties of the ATQ in  
106 nonclinical samples in Spain.

107           This study analyzes the factor structure and psychometric properties of the ATQ-8 in two  
108 nonclinical Spanish samples. The first sample consisted of 302 undergraduates and the second  
109 one of 846 individuals from the general population.

110

## 111 **Materials & Methods**

112           The procedures followed in the research reported in the manuscript were approved by the  
113 Bioethics Committee of Fundación Universitaria Konrad Lorenz (2016-021B). Written informed  
114 consent was obtained from all participants in this study.

### 115 **Participants**

116           *Sample 1.* This sample consisted of 302 undergraduates (age range 18-61,  $M = 26.18$ ,  $SD$   
117  $= 9.75$ , 64.6% of females) from a Spanish university. Of the overall sample, 4.3% of the  
118 participants were currently in treatment, 19.4% had received psychological or psychiatric  
119 treatment, and 3.7% were taking psychotropic medication.

120           *Sample 2.* This sample consisted of 846 participants from general population, who  
121 completed the instruments online (age range 18-72,  $M = 35.14$ ,  $SD = 11.39$ , 75.7% of females).  
122 Of the overall sample, 3.4% of participants had completed primary studies, 31% secondary

123 studies, and 55.6% were university graduates. Also, 12.8% of participants were currently in  
124 treatment, 44.6% had received psychological or psychiatric treatment, and 12.9% were taking  
125 psychotropic medication.

## 126 **Instruments**

127 *Automatic Thoughts Questionnaire – 8* (ATQ-8; Netemeyer et al., 2002; Spanish version  
128 by Cano-García & Rodríguez-Franco, 2002). The ATQ-8 is the reduced version of the ATQ.  
129 Through a Likert-type scale (5 = *all the time*; 1 = *not at all*), it measures the frequency of  
130 negative thoughts during the past week. Examples of items are “I’m so disappointed in myself,”  
131 “I feel so helpless,” “My future is bleak,” and “I can’t finish anything.”

132 *Dysfunctional Attitude Scale-Revised* (DAS-R; de Graaf, Roelofs, & Huibers, 2009;  
133 Spanish version by Ruiz et al., 2015). The DAS is a traditional instrument that measures  
134 dysfunctional schemas. Its revised version (i.e., DAS-R) has 17 items, which are responded on a  
135 7-point Likert-type scale (7 = *fully agree*; 1 = *fully disagree*), organized into two factors:  
136 Performance evaluation and Dependency/ Perfectionism. Examples of the items are: “If a person  
137 asks for help, it is a sign of weakness,” “My happiness depends more on other people than it does  
138 on me,” “If I fail at my work, then I am a failure as a person,” and “If others dislike you, you  
139 cannot be happy.” The DAS-R has shown a factor structure with two correlated factors and a  
140 second-order factor and has also demonstrated adequate psychometric properties in Spanish and  
141 Colombian samples (Ruiz, Suárez-Falcón, Barón-Rincón et al., 2016; Ruiz et al., 2015). In this  
142 study, the DAS-R presented a Cronbach’s alpha of .88 in Sample 1. According to the cognitive  
143 model of depression, medium to strong correlations were expected between the DAS-R and the  
144 ATQ-8.

145         *Depression, Anxiety, and Stress Scales – 21* (DASS-21; Lovibond & Lovibond, 1995;  
146 Spanish version by Daza, Novy, Stanley, & Averill, 2002). The DASS-21 measures negative  
147 emotional states experienced during the last week through 21 items on a 4-point Likert-type scale  
148 (3 = *applied to me very much or most of the time*; 0 = *did not apply to me at all*). Examples of the  
149 items are: “I couldn’t experience positive feeling,” “I felt close to panic,” and “I found it difficult  
150 to relax.” The DASS-21 has shown a hierarchical factor structure consisting of three first-order  
151 factors (Depression, Anxiety, and Stress) and a second-order factor. The latter can be considered  
152 as an overall indicator of emotional symptoms (Ruiz, García-Martín, Suárez-Falcón, &  
153 Odriozola-González, 2017). The DASS-21 has also presented good convergent and discriminant  
154 validity and internal consistency. Alpha values in this study for the DASS-Total were .92 and .95  
155 for Sample 1 and 2, respectively. The DASS-21 was administered because, in previous studies,  
156 emotional symptoms and not only depression have been strongly associated with the frequency  
157 of negative thoughts. Consequently, strong correlations were expected between the DASS-21  
158 subscales and the ATQ-8.

159         *Satisfaction with Life Scale* (SWLS; Diener, Emmons, Larsen, & Griffin, 1985; Spanish  
160 version by Atienza, Pons, Balaguer, & García-Merita, 2000). The SWLS measures self-perceived  
161 well-being through 5 items, graded with a 7-point Likert-type scale (7 = *strongly agree*; 1 =  
162 *strongly disagree*). Examples of items are “If I could live my life over, I would change almost  
163 nothing,” “In most ways, my life is close to my ideal,” and “The conditions in my life are  
164 excellent.” The SWLS has demonstrated adequate convergent validity and psychometric  
165 properties. Alpha values in the study were .84 and .89 for Samples 1 and 2, respectively.  
166 Previous research has demonstrated that the frequency of negative thoughts is negatively

167 associated with life satisfaction (Ruiz et al., 2017). Medium to strong negative correlations were  
168 expected between the SWLS and the ATQ-8.

169 *Acceptance and Action Questionnaire – II* (AAQ-II; Bond et al., 2011; Spanish version by  
170 Ruiz, Langer, Luciano, Cangas, & Beltrán, 2013). The AAQ-II measures general experiential  
171 avoidance through 7 items and a 7-point Likert-type scale (7 = *always*; 1 = *never true*). The  
172 items evaluate the reluctance to experience unwanted emotions and thoughts as well as the  
173 inability to be in the present moment and behave towards value-directed actions when  
174 experiencing psychological discomfort. Examples of items are: “Emotions cause problems in my  
175 life,” “I worry about not being able to control my worries and feelings,” and “It seems like most  
176 people are handling their lives better than I am.” The Spanish version by Ruiz et al. (2013)  
177 demonstrated a one-factor structure and good psychometric properties in Spanish samples with  
178 an overall alpha of .88. Alpha values in this study were .91 for both Sample 1 and Sample 2. The  
179 AAQ-II was administered because prior research has obtained strong positive correlations  
180 between ATQ scores and the AAQ-II (e.g., Ruiz & Odriozola-González, 2016).

181 *Cognitive Fusion Questionnaire* (CFQ; Gillanders et al., 2014; Spanish version by Ruiz,  
182 Suárez-Falcón, Riaño-Hernández, & Gillanders, 2017). The CFQ measures cognitive fusion as  
183 averaged across contexts through 7 items and a 7-point Likert-type scale (7 = *always*; 1 = *never*  
184 *true*), where higher scores indicate a higher degree of cognitive fusion. Examples of the items  
185 are: “I over-analyze situations to the point where it’s unhelpful to me,” “I get upset with myself  
186 for having certain thoughts,” and “I struggle with my thoughts.” The English validation of the  
187 CFQ has demonstrated to have good reliability, temporal stability, sensitivity to treatment  
188 effects, a one-factor structure, and convergent, divergent, and discriminant validity. The Spanish  
189 translation has proven to have similar psychometric properties (alpha = .92) and factor structure

190 to the original version (Ruiz, Suárez-Falcón, Riaño-Hernández, & Gillanders, 2017). In this  
191 study, the CFQ obtained alphas of .90 and .93 for Samples 1 and 2, respectively. Medium to  
192 strong positive correlations between the CFQ and the ATQ-8 were expected.

193 *Generalized Pliance Questionnaire* (GPQ; Ruiz, Suárez-Falcón, Barbero-Rubio, & Flórez,  
194 2019). The GPQ is a questionnaire consisting of 18 items, graded on a 7-point Likert-type scale  
195 (7 = *always true*; 1 = *never true*) that measures generalized pliance, defined as a pattern of rule-  
196 governed behavior in which the individual's primary source of reinforcement is social whim.  
197 Examples of the items are: "I care a lot about what my friends think of me," "My main goal in  
198 life is to be recognized and respected by those around me," and "My decisions are very much  
199 influenced by other people's opinions." In this study, the GPQ obtained an alpha of .92 and .95 in  
200 Samples 1 and 2, respectively. Medium to strong positive correlations were expected between  
201 the GPQ and the ATQ-8.

## 202 **Procedure**

203 For Sample 1, the instruments package was administered in the classrooms during a  
204 regular class. In Sample 2, participants answered an online survey that was advertised through  
205 social media (e.g., Facebook, institutional webpages, etc.). In both samples, participants provided  
206 written informed consent. Participants in Sample 1 responded to the following instruments:  
207 ATQ-8, DAS-R, DASS-21, SWLS, AAQ-II, CFQ, and GPQ. Participants in Sample 2 responded  
208 to the same questionnaires except for the DAS-R. Once the participants completed the study, the  
209 aims of the study were debriefed, and they were also thanked for their participation. No  
210 incentives were provided to the participants.

## 211 **Statistical and Psychometric Analysis**

212 Before conducting factor analyses, the data from both samples were examined to find  
213 missing values. However, no missing data were found. Corrected item-total correlations were  
214 computed on SPSS 25<sup>©</sup> to find items that should be removed due to a low discrimination item  
215 index (i.e., values below .30). McDonald's omega and Cronbach's alpha were conducted to  
216 explore the ATQ-8 internal consistency with total sample (N = 1148) and providing percentile  
217 bootstrap confidence intervals (CI) (Viladrich, Angulo-Brunet, & Doval, 2017). The MBESS  
218 package in R was used to compute these coefficients (Kelley & Lai, 2012; Kelley &  
219 Pornprasertmanit, 2016).

220 Because the ATQ-8 is responded on a 5-point Likert-type scale, an estimation method  
221 appropriate for ordinal data was selected to conduct the CFA. Accordingly, a robust diagonally  
222 weighted least square estimation method (Robust DWLS) was adopted using polychoric  
223 correlations. These analyses were conducted with LISREL <sup>©</sup> (version 8.71, Jöreskog & Sörbom,  
224 1999). For the one-factor model, the chi-square test and the following goodness of fit indexes  
225 were calculated: (a) the root mean square error of approximation (RMSEA), (b) the comparative  
226 fit index (CFI), (c) the non-normed fit index (NNFI), and (d) the standardized root mean squared  
227 residual (SRMR). SRMR values below 0.05 reflect a very good fit to the data and values of 0.08  
228 reflect a good fit to the data (Hu & Bentler, 1999; Kelloway, 1998). Kelloway (1998) suggested  
229 that values of RMSEA of 0.10 represent an acceptable or modest fit, whereas Hu and Bentler  
230 reduced the value to 0.08. Nevertheless, both guidelines suggest that a value of 0.05 reflects a  
231 very good fit to the data. Regarding the CFI and NNFI, values above .95 show a good fit to the  
232 data and above .90 indicate adequate-fitting models.

233 Following Jöreskog (2005) and Millsap and Yun-Tein (2004), additional CFAs were  
234 conducted to assess for metric and scalar invariances across samples, gender, groupage (younger

235 or equal to 35 years and older than 35 years), and education level (primary and secondary studies  
236 vs. university studies). Metric invariance means that item factor loadings are invariant across  
237 samples, gender, groupage, and education level, whereas scalar invariance involves that item  
238 intercepts are also invariant. Consequently, a comparison was conducted among the relative fits  
239 of three increasingly restrictive models: the scalar invariance model, the metric invariance  
240 model, and the multiple-group baseline model. In so doing, we compared the relative fit of three  
241 increasingly restrictive nested models: the multiple-group baseline model (it allowed the  
242 unstandardized factor loadings to vary across groups), the metric invariance model (it placed  
243 equality of factor loadings across groups), and the scalar invariance model (it placed equality in  
244 both the factor loadings and the item intercepts across groups). For the comparison model, the  
245 indices of the CFI, NNFI, and RMSEA were compared among the nested models. Regarding the  
246 selection of a model, the more constrained model was carefully chosen (i.e., second model versus  
247 the first model, and third model versus the second model) if the following criteria proposed by  
248 Cheung and Rensvold (2002) and Chen (2007) was fulfilled: (a) the difference in RMSEA  
249 ( $\Delta$ RMSEA) was lower than .01; (b) the differences in CFI ( $\Delta$ CFI) and NNFI ( $\Delta$ NNFI) were  
250 higher or equal to -.01.

251 Descriptive data were also calculated. To explore gender differences in ATQ-8 scores, an  
252 independent *t*-test was computed. Lastly, to evaluate convergent construct validity, Pearson  
253 correlations between the ATQ-8 and the other instruments were calculated.

254

## 255 **Results**

### 256 **Descriptive data and psychometric quality of the items**

257 Table 1 displays the Spanish translation of the items of ATQ-8 with their corrected item-  
258 total correlations for each sample and descriptive data. The eight items presented corrected item-  
259 total correlation ranging from .55 to .74 for the overall sample and good discrimination indices.

260 INSERT TABLE 1 ABOUT HERE

261 Table 2 presents the alpha and omega coefficients of the ATQ-8 for Samples 1 and 2. The  
262 alpha of the overall sample was .89 (95% CI [.88, .90]), whereas the omega was also .89 (95%  
263 CI [.88, .90]). Table 2 also shows the descriptive data of the ATQ-8. There were no statistically  
264 significant differences on the ATQ-8 scores between genders in Sample 1 (women:  $M = 16.54$ ,  
265  $SD = 6.92$ ; men:  $M = 15.16$ ,  $SD = 6.40$ ). However, in Sample 2, women showed higher scores on  
266 the ATQ-8 than men (women:  $M = 14.39$ ,  $SD = 5.44$ ; men:  $M = 14.58$ ,  $SD = 5.35$ ).

267 INSERT TABLE 2 ABOUT HERE

## 268 **Validity evidence based on internal structure**

### 269 *Dimensionality*

270 The one-factor model obtained an adequate fit according to the goodness-of-fit indexes<sup>1</sup>:  
271  $\chi^2 (20) = 251.202$ ,  $p < .01$ ; RMSEA = 0.10, 90% CI [0.089, 0.112], CFI = 0.98, NNFI = 0.97,  
272 and SRMR = 0.0483. Figure 1 presents the results obtained from the completely standardized  
273 solution of the one-factor model.

274 INSERT FIGURE 1 ABOUT HERE

### 275 *Measurement invariance*

276 Table 3 displays the results of the analysis of the scalar and metric invariance. Changes in  
277 RMSEA, CFI, and NNFI were lower than .01 in all cases. Therefore, parameter invariance was  
278 supported at both the scalar and metric levels across samples, gender, groupage, and education  
279 level.

280 INSERT TABLE 3 ABOUT HERE

281 **Validity evidence based on relationships with other variables**

282 Table 4 shows that the ATQ-8 presented correlations with all of the other constructs that  
283 were assessed in the expected direction: it presented positive correlations with dysfunctional  
284 schemas (DAS-R), experiential avoidance (AAQ-II), emotional symptoms (DASS-21),  
285 generalized pliance (GPQ), and cognitive fusion (CFQ); and negative correlations life  
286 satisfaction (SWLS).

287 INSERT TABLE 4 ABOUT HERE

288  
289 **Discussion**

290 While the ATQ has already been validated in Spain, to our best knowledge, no study has  
291 analyzed the factor structure and psychometric properties of the ATQ-8 with Spanish samples.  
292 This version has two main advantages over the original ATQ. Firstly, the factor structure of the  
293 ATQ-8 is more simple and stable than the one of the original ATQ. Secondly, the ATQ-8 is  
294 better suited to survey research and provides a considerably briefer assessment than the original  
295 ATQ. Accordingly, this study aimed to explore the psychometric properties of the ATQ-8 in two  
296 Spanish samples.

297 The analyses indicated that the Spanish version of the ATQ-8 showed good psychometric  
298 properties in Spain. Concerning internal consistency, the ATQ-8 displayed an alpha of .89, and  
299 the items had corrected item-total correlations ranging from .38 to .74. Confirmatory factor  
300 analyses showed that the one-factor model presented a good fit to the data as in the previous  
301 studies by Netemeyer et al. (2002) and Ruiz, Suárez-Falcón, et al. (2017). Also, the ATQ-8  
302 showed metric and scalar measurement invariance across the type of sample (undergraduates and  
303 general online population), gender, groupage (younger or equal than 35 years vs. older than 35

304 years), and education level (primary and secondary studies vs. university studies). These  
305 analyses indicate that the ATQ-8 scores can be compared across these variables. Additionally,  
306 the ATQ-8 demonstrated convergent validity, given the positive correlations found with  
307 emotional symptoms, dysfunctional schemas, generalized pliance, experiential avoidance and  
308 cognitive fusion, and the negative correlations with life satisfaction.

309         It is worth to mention some limitations of this study. Firstly, we did not collect data from  
310 a clinical sample. This is a significant limitation because the ATQ was mainly designed to assess  
311 clinical participants. Accordingly, further studies should analyze the psychometric properties of  
312 the ATQ-8 in a clinical sample and, as in Ruiz, Suárez-Falcón, et al. (2017), to explore the  
313 measurement invariance across clinical and nonclinical samples. Secondly, as this study did not  
314 include a clinical sample, we were not able to analyze if the ATQ-8 can be used as a screening  
315 measure to detect unipolar depression. Thirdly, the psychometric properties of the ATQ-8 were  
316 analyzed in two convenience samples. Thus, the representativeness of the samples is uncertain.  
317 Accordingly, further studies should be conducted with other Spaniard samples to confirm the  
318 results of the current study. Fourthly, we did not explore the sensitivity to treatment. However,  
319 note that the study by Ruiz, Suárez-Falcón, et al. (2017) showed that the ATQ-8 was sensitive to  
320 treatment in a clinical study conducted in Colombia. Lastly, the percentage of women was  
321 significantly higher than the percentage of men in the composition of the samples. However, the  
322 finding of measurement invariance across gender reduces this limitation.

## 323 **Conclusions**

324         The findings of the current study are consistent with previous studies by Netemeyer et al.  
325 (2002) and Ruiz, Suárez-Falcón, et al. (2017). Importantly, this study adds empirical evidence of  
326 the adequate fit of the one-factor structure of the ATQ-8 and its measurement invariance across

327 gender, age, and education level. Further studies should try to replicate these findings in other  
328 Spanish-speaking countries and analyze the measurement invariance of the ATQ-8 across  
329 different cultures and countries. In conclusion, the ATQ-8 was a reliable and valid instrument in  
330 a Spanish sample. Therefore, it seems the ATQ-8 can be used in Spain as a less time-consuming  
331 measure of negative automatic thoughts than the original ATQ.

332

333

334

### 335 **Acknowledgments**

336

337

### 338 **References**

339 American Psychiatric Association. 2013. *Diagnostic and statistical manual of mental disorders*

340 (DSM-5®). American Psychiatric Pub.

341 Atienza, F. L., Pons, D., Balaguer, I., & García-Merita, M. 2000. Propiedades psicométricas de

342 la Escala de Satisfacción con la vida en adolescentes [Psychometric properties of the

343 Satisfaction with Life Scale in adolescents]. *Psicothema*, 12, 314–319.

344 Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. 1979. *Cognitive therapy of depression*. New

345 York, NY: Guilford Press.

346 Bond, F. W., Hayes, S. C., Baer, R. A., Carpenter, K. M., Guenole, N., Orcutt, H. K., ... Zettle,

347 R. D. 2011. Preliminary psychometric properties of the Acceptance and Action

348 Questionnaire – II: A revised measure of psychological inflexibility and experiential

349 avoidance. *Behavior Therapy*, 42, 676–688. <https://doi.org/10.1016/j.beth.2011.03.007>

350 Bryant, F. B., & Baxter, W. J. 1997. The structure of positive and negative automatic cognition.

351 *Cognition & Emotion*, 11, 225-258. <https://doi.org/10.1080/026999397379908>

- 352 Cano-García, F. J., & Rodríguez-Franco, L. 2002. Evaluación del lenguaje interno ansiógeno y  
353 depresógeno en la experiencia de dolor crónico [Assessment of anxious and depressive  
354 self-talk in chronic pain experience]. *Apuntes de Psicología*, 20, 329–346.
- 355 Chen, F. F. 2007. Sensitivity of goodness of fit indexes to lack of measurement invariance.  
356 *Structural Equation Modeling: A Multidisciplinary Journal*, 14, 464–504.  
357 <https://doi.org/10.1080/10705510701301834>
- 358 Cheung, G. W., & Rensvold, R. B. 2002. Evaluating goodness-of-fit indexes for testing  
359 measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal*, 9,  
360 233–255. [https://doi.org/10.1207/S15328007SEM0902\\_5](https://doi.org/10.1207/S15328007SEM0902_5)
- 361 Chioqueta, A. P., & Stiles, T. C. 2004. Norwegian version of the automatic thoughts  
362 questionnaire: a reliability and validity study. *Cognitive Behaviour Therapy*, 33, 79–82.  
363 <https://doi.org/10.1080/16506070310016031>
- 364 Chioqueta, A. P., & Stiles, T. C. 2006. Factor structure of the dysfunctional attitude scale (Form  
365 A) and the automatic thoughts questionnaire: An exploratory study. *Psychological*  
366 *Reports*, 99, 239–247. <https://doi.org/10.2466/pr0.99.1.239-247>
- 367 Daza, P., Novy, D. M., Stanley, M., & Averill, P. 2002. The Depression Anxiety Stress Scale-21:  
368 Spanish translation and validation with a Hispanic sample. *Journal of Psychopathology*  
369 *and Behavioral Assessment*, 24, 195–205. <https://doi.org/10.1023/A:1016014818163>
- 370 Deardorff, P. A., Hopkins, L. R., & Finch, A. J., Jr. 1984. Automatic Thoughts Questionnaire: A  
371 reliability and validity study. *Psychological Reports*, 55, 708–710.  
372 <https://doi.org/10.2466/pr0.1984.55.3.708>

- 373 de Graaf, L. E., Roelofs, J., & Huibers, M. J. 2009. Measuring Dysfunctional Attitudes in the  
374 General Population: The Dysfunctional Attitude Scale (form A) Revised. *Cognitive*  
375 *Therapy and Research*, 33, 345–355. <https://doi.org/10.1007/s10608-009-9229-y>
- 376 Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. 1985) The satisfaction with Life Scale.  
377 *Journal of Personality Assessment*, 49, 71–75.  
378 [https://doi.org/10.1207/s15327752jpa4901\\_13](https://doi.org/10.1207/s15327752jpa4901_13)
- 379 Ghassemzadeh, H., Mojtabai, R., Karamghadiri, N., & Ebrahimkhani, N. 2005. Psychometric  
380 properties of a Persian-language version of the Automatic Thoughts Questionnaire: ATQ-  
381 Persian. *International Journal of Social Psychiatry*, 52, 127–137.  
382 <https://doi.org/10.1002/da.20070>
- 383 Gillanders, D. T., Bolderston, H., Bond, F. W., Dempster, M., Flaxman, P. E., Campbell, L., &  
384 Remington, B. 2014. The development and initial validation of the Cognitive Fusion  
385 Questionnaire. *Behavior Therapy*, 45, 83–101.  
386 <http://dx.doi.org/10.1016/j.beth.2013.09.001>
- 387 Hollon, S. D., & Kendall, P. C. 1980. Cognitive self-statements in depression: Development of  
388 an automatic thoughts questionnaire. *Cognitive Therapy and Research*, 4, 383–395.  
389 <https://doi.org/10.1007/BF01178214>
- 390 Hollon, S. D., Kendall, P. C., & Lumry, A. 1986. Specificity of depressotypic cognitions in  
391 clinical depression. *Journal of Abnormal Psychology*, 95, 52–59.  
392 <https://doi.org/10.1037/0021-843X.95.1.52>
- 393 Hu, L. T., & Bentler, P. M. 1999. Cutoff criteria for fit indexes in covariance structure analysis:  
394 Conventional criteria versus new alternatives. *Structural equation modeling: a*  
395 *multidisciplinary journal*, 6, 1-55. <https://doi.org/10.1080/10705519909540118>

- 396 Jöreskog, K. G. 2005. *Structural equation modeling with ordinal variables using LISREL*.  
397 Lincolnwood, IL: Technical report.
- 398 Jöreskog, K. G., & Sörbom, D. 1996. *PRELIS 2 user's reference guide: A program for*  
399 *multivariate data screening and data summarization: A preprocessor for LISREL*.  
400 Chicago, IL: Scientific Software International. Scientific Software International, Inc.
- 401 Jöreskog, K. G., & Sörbom, D. 1999. *LISREL 8.30*. Chicago, IL: Scientific Software  
402 International.
- 403 Joseph, S. 1994. Subscales of the automatic thoughts questionnaire. *The Journal of Genetic*  
404 *Psychology, 155*, 367–368. <https://doi.org/10.1080/00221325.1994.9914786>
- 405 Kazdin, A. E. 1990. Evaluation of the Automatic Thoughts Questionnaire: Negative cognitive  
406 processes and depression among children. *Psychological Assessment: A Journal of*  
407 *Consulting and Clinical Psychology, 2*, 73–79. <https://doi.org/10.1037/1040-3590.2.1.73>
- 408 Kline, R. B. 2005. *Principles and practice of structural equation modeling*. New York, NY:  
409 Guilford Press.
- 410 Lovibond, P. F., & Lovibond, S. H. 1995. The structure of negative emotional states:  
411 Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression  
412 and Anxiety Inventories. *Behaviour Research and Therapy, 33*, 335–343.  
413 [https://doi.org/10.1016/0005-7967\(94\)00075-U](https://doi.org/10.1016/0005-7967(94)00075-U)
- 414 Millsap, R. E., & Yun-Tein, J. 2004. Assessing factorial invariance in ordered-categorical  
415 measures. *Multivariate behavioral research, 39*, 479-515.  
416 [https://doi.org/10.1207/S15327906MBR3903\\_4](https://doi.org/10.1207/S15327906MBR3903_4)
- 417 Netemeyer, R. G., Williamson, D. A., Burton, S., Biswas, D., Jindal, S., Landreth, S., ...  
418 Primeaux, S. 2002. Psychometric properties of shortened versions of the Automatic

- 419 Thoughts Questionnaire. *Educational and Psychological Measurement*, 62, 111–129.  
420 <https://doi.org/10.1177/0013164402062001008>
- 421 Oei, T. P. S., & Mukhtar, F. 2008. Exploratory and confirmatory factor validation and  
422 psychometric properties of the automatic thoughts questionnaire for Malays (ATQ-  
423 Malay) in Malaysia. *Hong Kong Journal of Psychiatry*, 18, 92–100.
- 424 Ruiz, F. J., Langer, A. I., Luciano, C., Cangas, A. J., & Beltrán, I. 2013. Measuring experiential  
425 avoidance and psychological inflexibility: The Spanish translation of the Acceptance and  
426 Action Questionnaire. *Psicothema*, 25, 123–129.  
427 <https://doi.org/10.7334/psicothema2011.239>
- 428 Ruiz, F. J., & Odriozola-González, P. 2016. The role of psychological inflexibility in Beck's  
429 cognitive model of depression. *Anales de Psicología*, 32, 441–447.  
430 <https://doi.org/10.6018/analesps.32.2.214551>
- 431 Ruiz, F. J., Suárez-Falcón, J. C., Barbero-Rubio, A., & Flórez, C. L. 2019. Development and  
432 initial validation of the Generalized Pliance Questionnaire. *Journal of Contextual  
433 Behavioral Science*, 12, 189–198. <https://doi.org/10.1016/j.jcbs.2018.03.003>
- 434 Ruiz, F. J., Suárez-Falcón, J. C., Barón-Rincón, D., Barrera-Acevedo, A., Martínez-Sánchez, A.,  
435 & Pena, A. 2016. Factor structure and psychometric properties of the Dysfunctional  
436 Attitude Scale Revised in Colombian undergraduates. *Revista Latinoamericana de  
437 Psicología*, 48, 81–87. <https://doi.org/10.1016/j.rlp.2015.10.002>
- 438 Ruiz, F. J., Suárez-Falcón, J. C., Odriozola-González, P., Barbero-Rubio, A., López-López, J. C.,  
439 Eisenbeck, N., ... & Gil, E. 2015. Factor structure and psychometric properties of the  
440 Spanish version of the "Dysfunctional Attitude Scale-Revised". *Psicología Conductual*,  
441 23, 287–303.

- 442 Ruiz, F. J., Suárez-Falcón, J. C., & Riaño-Hernández, D. 2017. Validity evidence of the Spanish  
443 version of the automatic thoughts questionnaire–8 in Colombia. *The Spanish Journal of*  
444 *Psychology*, 20, e12. <https://doi.org/10.1017/sjp.2017.7>
- 445 Ruiz, F. J., Suárez-Falcón, J. C., Riaño-Hernández, D., & Gillanders, D. 2017. Psychometric  
446 properties of the Cognitive Fusion Questionnaire in Colombia. *Revista Latinoamericana*  
447 *de Psicología*, 49, 80–87. <http://dx.doi.org/10.1016/j.rlp.2016.09.006>
- 448 Sahin, N. H., & Sahin, N. 1992. Reliability and validity of the Turkish version of the Automatic  
449 Thoughts Questionnaire. *Journal of Clinical Psychology*, 48, 334–340.  
450 [https://doi.org/10.1002/1097-4679\(199205\)48:3<334::AID-JCLP2270480311>3.0.CO;2-](https://doi.org/10.1002/1097-4679(199205)48:3<334::AID-JCLP2270480311>3.0.CO;2-)  
451 [P](#)
- 452 Zettle, R. D., Webster, B. K., Gird, S. R., Wagener, A. L., & Burdsal, C. A. 2013. Factor  
453 structure of the Automatic Thoughts Questionnaire in a clinical sample. *International*  
454 *Journal of Cognitive Therapy*, 6, 280–291. <https://doi.org/10.1521/ijct.2013.6.3.280>

**Table 1** (on next page)

*Item Description, Corrected Item-Total Correlations, Descriptive Data*

1 Table 1.

2 *Item Description, Corrected Item-Total Correlations, Descriptive Data*

Item number and description	Corrected item-total correlation		
	Sample 1 Undergraduates	Sample 2 General population online	Overall Sample
1. No soy Bueno [I'm no good].	.51	.58	.56
2. ¡Soy tan decepcionante hasta para mí mismo! [I'm so disappointed in myself].	.72	.74	.74
3. ¿Qué es lo que funciona mal en mí? [What's wrong with me?].	.67	.75	.72
4. Soy un inútil, no valgo para nada [I'm worthless].	.62	.71	.70
5. Me siento tan impotente, tan desamparado [I feel so helpless].	.53	.74	.70
6. Algo tiene que cambiar [Something has to change].	.58	.71	.67
7. Mi future es un desierto [My future is bleak].	.48	.70	.66
8. No consigo terminar nada de lo que empiezo [I can't finish anything].	.38	.59	.55

3

4

**Table 2** (on next page)

*Coefficient Alpha and Omega, and Descriptive Data across Samples*

1 Table 2.

2 *Coefficient Alpha and Omega, and Descriptive Data across Samples*

	Sample 1: Undergraduates ( <i>N</i> = 302)	Sample 2: General population online ( <i>N</i> = 846)	Overall Sample ( <i>N</i> = 1148)
Alpha [95% CI]	.83 [.80, .85]	.90 [.89, .91]	.89 [.88, .90]
Omega [95% CI]	.83 [.78, .86]	.90 [.89, .91]	.89 [.88, .90]
Mean score ( <i>SD</i> )	14.46 (5.40)	16.22 (6.80)	15.76 (6.50)

3

4

**Table 3** (on next page)

Table 3

Table 3. *Metric and Scalar Invariance across Sample, Gender, Group Age, and Education Level*

1 Table 3.

2 *Metric and Scalar Invariance across Sample, Gender, Group Age, and Education Level*

3	Model	RMSEA	$\Delta$ RMSEA	CFI	$\Delta$ CFI	NNFI	$\Delta$ NNFI
4	Measurement invariance across sample						
5	MG Baseline model	.0983		.982		.975	
6	Metric invariance	.1000	-.0017	.978	-.004	.974	-.001
7	Scalar invariance	.0984	.0016	.976	-.002	.975	.001
8	Measurement invariance across gender						
9	MG Baseline model	.101		.980		.973	
10	Metric invariance	.0915	.0095	.981	.001	.977	.004
11	Scalar invariance	.0903	.0120	.979	-.002	.978	.001
12	Measurement invariance across group age						
	MG Baseline model	.1001		.979		.971	
	Metric invariance	.1047	-.0046	.973	-.006	.968	-.003
	Scalar invariance	.1089	-.0042	.966	-.007	.965	-.003
	Measurement invariance across education level						
	MG Baseline model	.1013		.981		.974	
	Metric invariance	.1046	-.0033	.976	-.005	.972	-.002
	Scalar invariance	.1033	.0013	.974	-.002	.973	.001

**Table 4** (on next page)

*Pearson Correlations between the ATQ-8 Scores and Other Relevant Self-report Measures*

1 Table 4.

2 *Pearson Correlations between the ATQ-8 Scores and Other Relevant Self-report Measures*

Measure	S	N	r with ATQ-8
DAS-R	1	302	.43*
DASS – Total	1	302	.60*
	2	846	.74*
DASS – Depression	1	302	.61*
	2	846	.78*
DASS – Anxiety	1	302	.47*
	2	846	.56*
DASS – Stress	1	302	.49*
	2	846	.62*
AAQ-II	1	302	.59*
	2	846	.70*
CFQ	1	302	.63*
	2	846	.65*
GPQ	1	302	.31*
	2	846	.48*
SWLS	2	846	-.63*

3 *Note.* AAQ-II: Acceptance and Action Questionnaire – II; ATQ-8: Automatic Thoughts Questionnaire – 8; CFQ =  
 4 Cognitive Fusion Questionnaire; DAS-R: Dysfunctional Attitude Scale – Revised; DASS: Depression, Anxiety, and  
 5 Stress Scales – 21; GPQ = Generalized Pliance Questionnaire; SWLS: Satisfaction with Life Scale. \* $p < .001$ .

6

7

# Figure 1

Completely standardized solution of the ATQ-8 one-factor model.

