Accepted final version of the article:

Ruiz, F. J., Salazar, D. M., Suárez-Falcón, J. C., Peña-Vargas, A., Ehring, T., Barreto-Zambrano, M. L., & Gómez-Barreto, M. P. (2020). Psychometric properties and measurement invariance across gender and age-group of the Perseverative Thinking Questionnaire–Children (PTQ-C) in Colombia. *Assessment*, 27(7), 1657-1667.

DOI: https://doi.org/10.1177/1073191119843580

Abstract

Recent research has found that repetitive negative thinking (RNT) is an important transdiagnostic process both in adult and child psychopathology. This finding has led some authors to design content-independent measures of RNT that can be administered across disorders. One of these instruments is the Perseverative Thinking Questionnaire (PTQ) and its version for children (PTQ-C). This study presents the Spanish translation of the PTQ-C and its psychometric analysis in a sample of 1,127 Colombian children and adolescents (8 to 18 years). All items obtained good discrimination indexes, and internal consistency was excellent (.93). A cross-validation study was conducted to analyze the factor structure of the PTQ-C, which strongly supported the one-factor structure. Measurement invariances across gender and age group (8-12 and 13-18 years old) were also found. The PTQ-C scores for older boys were lower than for younger boys, whereas the inverse pattern was found for girls. The PTQ-C showed strong correlations with measures of pathological worry, emotional symptoms, and psychological inflexibility. In conclusion, the Spanish translation of the PTQ-C appears to be a valid and reliable measure of RNT.

Key words: Repetitive negative thinking; Perseverative Thinking Questionnaire; Worry; Rumination; Psychometrics.

Psychometric properties and measurement invariance across gender and age of the Perseverative Thinking Questionnaire – Children (PTC-C) in Colombia

There is extensive evidence that repetitive negative thinking (RNT), comprising processes such as worry and rumination, is a core feature of emotional disorders and an important risk factor for their development and maintenance (Harvey, Watkins, Mansell, & Shafran, 2004). RNT is often defined as a style of thinking about current, past, or future events or experiences that are perceived as negative (Ehring & Watkins, 2008). RNT is characterized as repetitive, intrusive, difficult to disengage from, and perceived as unproductive, capturing attention, and making it difficult to engage in other kinds of behavior (Ehring et al., 2011). The two main variants of RNT that have been investigated in the literature are worry on the one hand, and rumination on the other hand. Earlier research has shown that rumination and worry show similar process characteristics and are mainly distinguished by their content or temporal orientation, respectively; worry is mainly future-oriented, whereas rumination is mainly focused on the past and/or present (for reviews, see Ehring & Behar, in press; Ehring & Watkins, 2008). Rumination has been commonly associated with depression (Nolen-Hoeksema, 1998; Treynor, Gonzalez, & Nolen-Hoeksema, 2003), whereas worry is often associated with anxiety disorders (Borkovec, Robinson, Pruzinsky, & DePree, 1983; Newman & Llera, 2011).

Worry and rumination are frequent phenomena in children and adolescents. On the one hand, studies show that over 70% of fifth- and sixth-grade children report worries about school, illness, dying, and social problems (Henker, Whalen, & O'Neil, 1995; McEvoy, Watson, Watkins, & Nathan, 2013; Păsărelu et al., 2016; Silverman, LaGreca, & Wasserstein, 1995). In nonclinical youths, high levels of worry have been associated with the presence of anxiety and panic symptoms (Leen-Feldner, Feldner, Tull, Roemer, & Zvolensky, 2006; Păsărelu et al., 2016; Weems, Silverman, & La Greca, 2000), whereas in

clinical youths, high levels of worry have been identified in generalized anxiety, separation anxiety, and social anxiety disorders (Perrin & Last, 1997; Weems et al., 2000). On the other hand, rumination in youth has been closely associated with concurrent levels of depressive symptomatology (Abela, Vanderbilt, & Rochon, 2004; Muris, Roelofs, Meesters, & Boomsma, 2004; Papadakis, Prince, Jones, & Strauman, 2006) and may predict its increase over time (Abela, Aydin, & Auerbach, 2007; Abela, Brozina, & Haigh, 2002; Burwell & Shirk, 2007; Schwartz & Koenig, 1996).

Traditional measures of RNT in adults and youths have been focused on either worry or rumination separately and have assessed these processes in the context of a specific diagnostic category (Bijttebier, Raes, Vasey, Bastin, & Ehring, 2015). For instance, the most commonly used measure of worry, the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) and its child version (PSWQ-C; Chorpita, Tracey, Brown, Collica, & Barlow, 1997), is focused on how this thinking process is usually presented in generalized anxiety disorder (GAD). Regarding rumination, the most commonly used measure, the Ruminative Response Scale – Short Form (RRS-SF; Treynor et al., 2003), is focused on how individuals respond to sad mood.

The emerging transdiagnostic perspective on RNT suggests that it may be additionally useful to assess the RNT *process* in a way that is not linked to specific content or disorder and can therefore be used to assess RNT across diagnostic categories. One example for such an instrument is the Perseverative Thinking Questionnaire (Ehring et al., 2011), which consists of 15 items that are responded on a 4-point Likert-type scale (4 = *almost always*; 0 = *never*). The PTQ was originally designed for adults and has been validated in several languages including German, English, Dutch, Polish, and French (Devynck et al., 2017; Ehring et al., 2011; Ehring, Raes, Weidacker, & Emmelkamp, 2012; Kornacka, Buczny, & Layton, 2016). Overall, the PTQ has shown excellent internal

consistency, convergent and divergent validity, and a hierarchical factor structure with a higher order factor and three lower order factors that are named Core Features of RNT (i.e., repetitiveness, intrusiveness, and difficult to disengage from), Unproductiveness, and RNT Capturing Mental Capacity.

Although the PTQ was developed recently, research on RNT is increasingly adopting it. For instance, Raes (2012) found that the PTQ had predictive validity in a 3-year longitudinal study of the depressive symptoms suffered by students: PTQ scores at baseline predicted depressive symptoms even when taking into account baseline symptomatology and rumination. Spinhoven, van Hemert, and Penninx (2019) found that RNT as measured by the PTQ longitudinally mediated the associations between anxiety and depression disorders and their symptoms. Also, Spinhoven, van Hemert, and Penninx (2018) found that disorder-independent RNT seems to be a more relevant predictor of depression and anxiety than measures of rumination in depression and worry in anxiety. This highlights the relevance of assessing RNT without the classical distinction between worry and rumination (Samtani & Moulds, 2017). Lastly, the PTQ has shown to be sensitive to intervention effects (e.g., Ruiz, Flórez, et al., 2018) and to act as a longitudinal mediator of the effect of RNT-focused interventions (e.g., Dereix-Calonge, Ruiz, Sierra, Peña-Vargas, & Ramírez, in press).

The PTQ was recently adapted to be used with children and adolescents by Bijttebier et al. (2015), then called the Perseverative Thinking Questionnaire – Children (PTQ-C). The items of the PTQ-C are identical to those of the PTQ except for five items whose wording was slightly changed to simplify them and enhance comprehension by children. The PTQ-C has shown excellent internal consistency (Cronbach's alpha of .95), convergent validity (strong correlations with other measures of RNT such as Penn State Worry Questionnaire – Children and the Children's Response Styles Questionnaire),

divergent validity (no significant correlations with nonrelated response styles), and criterion validity (the scores of the PTQ added additional variance to explain symptoms of depression and anxiety) (Bijttebier et al., 2015). In addition, the authors analyzed the factor structure of the PTQ-C, using a cross-validation approach. The exploratory factor analysis conducted in Sample 1 suggested that the PTQ-C was unidimensional. Next, the one-factor model and the three-factor higher order model of the original PTQ were compared in Sample 2 using confirmatory factor analysis (CFA). The one-factor model showed an adequate fit (RMSEA = .079, CFI = .98) and the three-factor higher order model showed a slightly better fit (RMSEA = .071, CFI = .98). However, the dimensions of the latter model were very strongly correlated (between .86 and .94), so the one-factor model was finally selected because of its parsimony. This factor solution has been replicated in the study by Bijttebier et al. (2018), which also showed that the PTQ-C scores longitudinally predicted depressive symptoms even when controlling baseline symptomatology.

Although the PTQ-C has shown very promising psychometric properties, it has been validated only in one language to date, and there is as yet no empirical evidence of its measurement invariance across different groups. Measurement invariance means that a given instrument measures the same construct across several groups (e.g., gender, cultures, age group, etc.). The importance of exploring measurement invariance has been emphasized because violations of invariance might prevent meaningful comparison of scores across groups (e.g., Greiff & Scherer, 2018).

The aim of this study was to translate the PTQ-C into Spanish and analyze the factor structure and psychometric properties of the resulting scale in Colombian children and adolescents. For this purpose, we recruited a large sample of 1,127 participants aged 8 to 18 years. We analyzed the internal consistency of the PTQ-C and conducted a cross-validation study to analyze its factor structure. Additionally, we analyzed measurement invariance

across gender and age groups. For the latter purpose, two age groups were established based on the limits of childhood (8-12 years) and adolescence (13-18 years) established by the American Academy of Pediatrics (Greydanus & Bashe, 2003). Finally, the convergent construct validity of the measure was tested. We expected that the PTQ-C would show a very strong positive correlation with pathological worry because worry is one type of RNT. Also, we expected to find a very strong positive correlation with psychological inflexibility, as previous research has shown this association (e.g., Ruiz, 2014). Lastly, we expected to find strong positive correlations with emotional symptoms in accordance to the results found by Bijttebier et al. (2015) and the extant evidence of the relationship between RNT and these symptoms (Ehring & Watkins, 2008).

Method

Participants

The sample consisted of 1,127 participants (57% females) with age ranging between 8 and 18 years (M = 11.11, SD = 2.73), enrolled in third to eleventh grade (equivalent to fourth to twelfth grade in the US). All participants were Colombian and attended private (44.1%) or public schools (55.9%). The study was conducted in nine schools (4 of them were private schools) that provided 4.8% to 25.4% of the sample. No exclusion criteria were applied.

Instruments

Perseverative Thinking Questionnaire – Children (PTQ-C; Bijttebier et al., 2015). The PTQ-C consists of 15 items with a 5-point Likert-type scale (4 = *almost always*, 0 = *never*) that measure repetitive negative thinking in children and adolescents (e.g., “The same thoughts keep going through my mind again and again¨). Its original version has shown excellent psychometric properties (α = .95), and a one-factor structure has shown a good model fit (Bijttebier et al., 2015). To translate the PTQ-C, the translation and back-

translation method was followed as described in Muñiz, Elosua, and Hambleton (2013). Additionally, one of the developers of the PTQ-C approved of the final Spanish version of the instrument.

Penn State Worry Questionnaire – Children (PSWQ-C; Chorpita et al., 1997). This questionnaire consists of 14 items, which are responded on a 5-point Likert-type scale (5 = *always*, 1 = *never*) self-report measure of worry in children and adolescents (e.g., "I worry all the time"). The PSWQ-C has excellent psychometric properties (Cronbach's alpha from .89 and .91) (Pestle, Chorpita, & Schiffman, 2008). To translate the PSWQ-C, the back-translation method was followed as described in Muñiz et al. (2013). We deleted the 3 reverse scored items because they have been shown to be difficult to understand for adult Spanish speakers when responding to the PSWQ (e.g., Ruiz, Monroy-Cifuentes, & Suárez-Falcón, 2018; Sandín, Chorot, Valiente, & Lostao, 2009). The PSWQ-C showed good psychometric properties (Cronbach's alpha of .89) and a one-factor structure.

Depression, Anxiety, and Stress Scales – 21 (DASS-21; Lovibond & Lovibond, 1995; Spanish version by Daza, Novy, Stanley, & Averill, 2002). The DASS-21 is a 21-item, 4-point Likert-type scale (3 = *applied to me very much, or most of the time*; 0 = *did not apply to me at all*) consisting of sentences describing negative emotional states. It contains three subscales (Depression, Anxiety, and Stress) and has shown good internal consistency and convergent and discriminant validity. The DASS-21 has been shown to be an appropriate measure of emotional symptoms in adolescents (Szabó, 2010), and has shown good psychometric properties in Colombian samples (Ruiz, García-Martín, Suárez-Falcón, & Odriozola-González, 2017). The DASS-21 was administered to participants aged between 13 and 18 years. In the current study, all subscales showed good internal consistency (Cronbach's alphas of .90, .88, and .87 for Depression, Anxiety, and Stress, respectively).

Depression, Anxiety, and Stress Scale – Children (DASS-C; Szabó, submitted). The DASS-C is an adaptation of the DASS-21 for children. It consists of 24 items that are responded on the same 4-point Likert-type scale as the DASS-21. The DASS-C has shown good psychometric properties with children and a three-factor structure. The back-translation method was followed as described in Muñiz et al. (2013) to translate the DASS-C. The DASS-C was administered to participants under the age of 13. Cronbach's alphas in this study were acceptable (.78, .79, and .69).

Avoidance and Fusion Questionnaire – Youth (AFQ-Y; Greco, Lambert, & Baer, 2008; Spanish version by Salazar et al., in press). The AFQ-Y consists of 17 items that are responded on a 5-point Likert-type scale (4 = *very true*; 0 = *not at all true*). It was designed to measure psychological inflexibility, and its items reflect the processes of experiential avoidance and cognitive fusion. The AFQ-Y showed an excellent internal consistency and a one-factor structure in the original study (Greco et al., 2008). Similar results were found for the AFQ-Y in Colombia (Salazar et al., in press). Cronbach's alpha in this study was excellent (.90).

Procedure

The procedure of this study was approved by the institutional Ethics Committee. Participants were recruited from public and private schools from Bogotá (Colombia) and surrounding areas. The researchers presented the study to the school principals of nine education institutions based on personal contacts and/or previous collaborations with the universities involved in this research. All school principals contacted agreed to participate in the study, and the research was presented to the teachers.

Teachers gave a document presenting the research and an informed consent to the parents or legal guardians of potential participants approximately one week before the application of the instruments (approximately 80% signed the informed consent). Only children and adolescents with a signed informed consent were invited to participate in the study. All participants signed the informed assent and agreed to collaborate with the research.

The data collection was group-based and was conducted by a trained psychologist during regular lessons in the classrooms. Participants under the age of 13 were given the DASS-C instead of the DASS-21 because previous evidence showed that measures of emotional symptoms in children do not show an equivalent factor structure (Szabó & Lovibond, 2006). The DASS-C was designed to solve this discordance. The administration of the questionnaire package took approximately 15-20 minutes. Participants were allowed to cease participating at any given time.

As compensation for participating in the study, reports of the participants' results were sent to the parents or legal guardians if they had indicated in the informed consent that they would like to receive feedback of their children's results. Additionally, the psychological counseling services of the schools were sent a general report describing the results obtained.

Data analysis

Prior to conducting the statistical analyses, data were examined searching for missing values. The data of 21 participants with missing values in all the PTQ-C items were deleted. The remaining missing data were imputed using the matching response pattern of LISREL© (version 8.71, Jöreskog & Sörbom, 1999), which it is suitable for ordinal variables (Jöreskog, 2005). In this imputation method, the value to be substituted for the missing value of a single case is obtained from another case (or cases) having a similar

response pattern over the remaining items of the test. Ninety-eight values were successfully imputed. According to Jöreskog, Olsson, and Wallentin (2016), listwise deletion was applied with cases that were not successfully imputed. This procedure led to the deletion of the data from 27 participants. In conclusion, the sample size after imputation was 1,079 participants, with 0.6% of values imputed.

The sample was then randomly divided into two subsamples using SPSS 19©. In the first random sample (N = 525), we conducted an exploratory factor analysis (EFA) using Factor 10.5 (Lorenzo-Seva & Ferrando, 2006). We selected the robust diagonally weighted least square estimation method (Robust DWLS) with Direct Oblimin rotation using polychoric correlations. This estimation method is especially suited for ordinal data such as the Likert-type items of the PTQ-C. The number of factors to retain from the EFA was determined by means of the optimal implementation of parallel analysis based on minimum rank factor analysis (PA; Timmerman & Lorenzo-Seva, 2011) and the Hull method based on robust CFI and robust RMSEA (Lorenzo-Seva, Timmerman, & Kiers, 2011). An assessment of unidimensionality was conducted by computing Unidimensional Congruence (UniCo), Explained Common Variance (ECV), and Mean of Item Residual Absolute Loadings (MIREAL) indexes. Values larger than .95 and .85 in UniCo and ECV, respectively, suggest that data can be treated as essentially unidimensional; whereas for the MIREAL, a value lower than .30 suggests unidimensionality (Ferrando & Lorenzo-Seva, 2018). Lastly, corrected item-total correlations were obtained to analyze the discrimination item index.

In the second subsample (N = 554), the Robust DWLS estimation method using polychoric correlations was adopted to conduct the CFA using LISREL©. We computed the Satorra-Bentler chi-square test and the following goodness-of-fit indexes for the one- and three-factor higher order models: (a) the root mean square error of approximation

(RMSEA), (b) the comparative fit index (CFI), and (c) the non-normed fit index (NNFI), (d) the standardized root mean square residual (SRMR), (e) the expected cross-validation index (ECVI), and (f) the parsimony normed fit index (PNFI). According to Hu and Bentler (1999), RMSEA values of .08 represent a good fit, and values below .05 represent a very good fit to the data. For the SRMR, values below .08 represent a reasonable fit, and values below .05 indicate a good fit. With respect to the CFI and NNFI, values above .90 indicate well-fitting models, and values above .95 represent a very good fit to the data. Lastly, lower ECVI values indicate better fit to the model, and higher PNFI values indicate a more parsimonious model.

Additional CFAs were performed with the whole sample (N = 1,079) to test for metric and scalar invariances across gender and age group, following Jöreskog (2005), and Millsap and Yun-Tein (2004). In other words, we analyzed whether the item factor loadings and items intercepts are invariant across boys and girls and across age groups (8-12 years and 13-18 years). In this way, the relative fit of three increasingly restrictive models was compared: the multiple-group baseline model, the metric invariance model, and the scalar invariance model. The multiple-group baseline model allowed the unstandardized factor loadings to vary across groups and the factor structure (the number of factors and pattern of item-factor loadings) is identical across groups (configural invariance). The metric invariance model, which was nested within the multiple-group baseline model, placed equality of factor loadings across groups (i.e., weak factorial invariance). Lastly, the scalar invariance model, which was nested within the metric invariance model, is tested by constraining the factor loadings and the item intercepts to be the equal across groups. Equality constraints were not placed on estimates of the factor variances because these are known to vary across groups even when the indicators are measuring the same construct in a similar manner (Kline, 2005). For the model comparison, the RMSEA, CFI, and NNFI

indices between nested models were compared. The more constrained model was selected (i.e., second model versus first model, and third model versus second model) if the following criteria suggested by Cheung and Rensvold (2002) and Chen (2007) were met: (a) the difference in RMSEA (ΔRMSEA) was lower than .01; (b) the differences in CFI (ΔCFI) and NNFI (ΔNNFI) were equal to or greater than -.01.

To explore the internal consistency of the PTQ-C, Cronbach's alpha and McDonald's omega were computed providing percentile bootstrap 95% confidence intervals (CI) with the whole sample (N = 1,079) (Viladrich, Angulo-Brunet, & Doval, 2017). In order to calculate these coefficients, the MBESS package in R was used (Kelley & Lai, 2012; Kelley & Pornprasertmanit, 2016). Descriptive data were calculated with SPSS 19©. A two-way analysis of variance (ANOVA) was computed to analyze differences in the PTQ-C scores across gender and age. Lastly, Pearson correlations between the PTQ-C and other scales were calculated to assess convergent construct validity. Correlations were interpreted according to the guidelines provided by Cohen (1988): r between .10 and .30, small correlation; r between .30 to .50, medium correlation; and r > .50, strong correlation. Values of r greater than .70 were considered very strong correlations and necessary to establish convergent validity (Chmielewski, Sala, Tang, & Baldwin, 2016).

Results

Psychometric quality of the items

Table 1 shows the items of the PTQ-C, their translation into Spanish, and the corrected item-total correlations found with the first random sample (N = 525). All items showed good discrimination, with corrected item-total correlations ranging from .62 (Item 3) to .73 (Item 12). Cronbach's alpha was .93 (95% CI [.92, .93]), whereas McDonald's omega coefficient was .93 (95% CI [.92, .94].

INSERT TABLE 1 ABOUT HERE

Dimensionality

The first random sample was used to conduct the EFA on the PTQ-C. The Bartlett's statistic was statistically significant, 4172.4(105), $p < .001$, and the result of the Kaiser-Meyer-Olkin (KMO) test was very good (.97). The PA suggested extracting only one factor, which accounted for 60.5% of the variance. The Hull method based on robust CFI and RMSEA also suggested to retain only one factor (CFI = .99, RMSEA = .042). Table 1 also shows that factor loadings were good for all items: from .70 (Item 3) to .81 (Items 7, 10, and 12). Values of UniCo (.99), ECV (.94) and MIREAL (.16) strongly supported the unidimensionality of the PTQ-C. We also analyzed the three-factor solution as in Bijttebier et al. (2015), but the EFA did not lead to an interpretable solution. In conclusion, the results of the conducted EFAs suggested that the PTQ-C can be treated as a unidimensional measure.

As the EFA previously conducted indicated that the PTQ-C seems to be a unidimensional measure, the CFA was conducted with the second random sample (N = 554) to analyze the fit of a one-factor model. The overall fit of the one-factor model in the PTQ-C was good: $\chi 2_{S\text{-}B}(90) = 194.70$, $p < .05$; RMSEA = .046, 90% CI [.037, .055], CFI = .99, NNFI = .99, SRMR = .038, ECVI = .46, PNFI = .85. We also conducted a CFA to analyze the fit of the three-factor higher order model of the original PTQ for adults (i.e., a higher-order factor called Perseverative Thinking and three-lower order factors called Core Characteristics, Perceived Unproductivenees, and Mental Capacity). The fit of this model was also adequate: $\chi 2_{S\text{-}B}(84) = 103.13$, $p < .05$; RMSEA = .020, 90% CI [.000, .033], CFI = .99, NNFI = .99, SRMR = .035, ECVI = .317, PNFI = .80 Although the fit of the hierarchical model was better than the one-factor model, the resulting dimensions were very highly correlated (r between .93 and .99), and the one-factor model proved to be more parsimonious than the hierarchical model (i.e., PNFI = .85 vs. .80).

Based on the combined results of the EFAs and CFAs, the one-factor model was retained for further analyses. Figure 1 depicts the results of the completely standardized solution of the one-factor model of the PTQ-C.

INSERT FIGURE 1 ABOUT HERE

Measurement invariance

Table 2 shows the results of the metric and scalar invariance analyses for the PTQ-C. Measurement invariance was supported at both the metric and scalar levels across gender and age (8-12 and 13-18 years old) because changes in RMSEA, CFI, and NNFI were lower than .01.

INSERT TABLE 2 ABOUT HERE

Scores across gender and age

Descriptive data on the PTQ-C are presented in Table 3. The two-way ANOVA revealed statistically significant effects for gender (girls showed higher scores than boys), $F = 19.83$, $p < .001$, $\eta^2 = .02$, but not for age group, $F = 0.231$, $p = .63$, $\eta^2 < .001$, on the PTQ-C scores. In addition, a significant Gender x Age interaction effect emerged, $F = 8.22$, $p = .004$, $\eta^2 = .008$: older boys showed lower PTQ-C scores as compared with younger boys, whereas older girls showed higher scores than younger girls.

INSERT TABLE 3 ABOUT HERE

Convergent construct validity

The correlations obtained by the PTQ-C with other relevant constructs were theoretically coherent (see Table 4). The PTQ-C showed very strong positive correlations with pathological worry as measured by PSWQ-C. The PTQ-C also showed strong correlations with emotional symptoms as measured by the subscales of the DASS-C and the DASS-21 for adolescents. Lastly, the PTQ-C showed strong positive correlations with psychological inflexibility as measured by the AFQ-Y.

INSERT TABLE 4 ABOUT HERE

Discussion

RNT has been identified as a risk factor and a core feature of emotional disorders both in adults and children (Bijttebier et al., 2015; Ehring & Watkins, 2008). The aim of this study was to translate the PTQ-C as a transdiagnostic measure of RNT into Spanish and analyze its psychometric properties and factor structure.

The PTQ-C showed excellent internal consistency, with a Cronbach's alpha of .93. The results of the correlational analyses supported the convergent validity of the questionnaire. Specifically, the PTQ-C showed very strong correlations with pathological worry (r = .76) and psychological inflexibility (r = .75). In addition, the PTQ-C was significantly correlated with symptoms of anxiety and depression (from r = .58 to .74).

We also tested whether the one-factor structure found in the validation study of the original PTQ-C (Bijttebier et al., 2015) could be replicated. Our findings indeed provided strong evidence for the one-factor structure of the PTQ-C. Specifically, the EFA suggested the extraction of one factor that accounted for 60.5% of the variance, and the unidimensionality indexes strongly supported the one-factor solution. Similarly, the one-factor model showed good fit with the data in the subsequent CFA. Note that, although the three-factor higher order model showed a better fit, these factors were very strongly correlated and the one-factor model proved to be more parsimonious. According to these findings, it is recommended to obtain only an overall score of the PTQ-C.

The PTQ-C showed scalar (or strong) measurement invariance across gender and age group (children and adolescents). To our knowledge, this is the first study testing factorial equivalence of the PTQ-C with regard to these key variables. The finding of measurement invariance across these variables is important because it opens the door to analyze the developmental trajectories and gender differences in RNT. In this sense, the current study

replicated the finding by Bijttebier et al. (2015) concerning girls' higher scores compared to boys. In addition, our study extended the findings of the earlier study in important ways. First, using a larger age range than the Bijttebier et al. study (8 to 18 years vs. 9 to 15 years), we tested the interaction between gender and age group on RNT scores. Interestingly, gender differences were significantly greater during adolescence (13 to 18 years) than during childhood (8 to 12 years), whereby RNT scores significantly increased from childhood to adolescence in girls, but not in boys. Second, the validity of our findings regarding gender effects on the PTQ-C is supported by the prior confirmation of scalar measurement invariance.

Some limitations of the current study are worth mentioning. Firstly, the PTQ-C was only correlated with other self-report measures, which may have inflated the correlations that were found. Future studies are needed to test concurrence of PTQ-C scores with scores derived from clinician-based instruments and to test discriminant validity (e.g., by analyzing the PTQ scores in participants who meet the criteria for an emotional disorder vs. participants who do not meet the criteria). Secondly, some of the instruments used to explore the convergent validity of the PTQ-C lacked formal validation in Colombian samples (PSWQ-C and DASS-C). Reassuringly, however, their internal consistencies were adequate and similar to the ones obtained in the validation studies. Thirdly, we did not include a sample of clinical participants to explore the psychometric properties of the PTQ-C among them. To our knowledge, there is no evidence about the factorial equivalence of the PTQ-C in clinical and nonclinical participants, which makes it difficult to compare their scores. Further studies should analyze this issue with children and adolescents using the PTQ-C. Lastly, we did not counterbalance the administration of the questionnaires used in this study, which could be an issue because young children usually experience a decrease in their motivation when applying long surveys.

In conclusion, the current study showed that the Spanish version of the PTQ-C showed excellent psychometric properties and a one-factor structure that is invariant across gender and age group. The development of a measure of RNT in children and adolescents can be useful in many ways for Spanish-speaking researchers and practitioners. Firstly, researchers can use the PTQ-C to analyze the role of RNT in children's development and psychopathology. Secondly, the PTQ-C can be used to analyze the effect of psychological interventions to reduce RNT in children and to test this reduction as a potential mediator of the intervention effect. The PTQ-C can also be used for practitioners to identify children's RNT pattern and monitor its evolution during therapy.

Compliance with Ethical Standards

All authors declare that they have no conflict of interest.

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 was obtained from all individual participants included in the study.

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Compliance with Ethical Standards

All authors declare that they have no conflict of interest.

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 was obtained from all individual participants included in the study

Table 1

Item Description of the PTQ-C (Spanish), the PTQ-C (English), Corrected Item-Total Correlations and Factor Loadings from EFA with the First Random Sample.

Items	Corrected item-total correlation	Factor loading EFA
1. Los mismos pensamientos se mantienen en mi mente una y otra vez [The same thoughts keep going through my mind again and again.]	.66	.73
2. No puedo hacer nada para evitar que lleguen mis pensamientos [My thoughts come on and I can't do anything against it]	.66	.74
3. No puedo dejar de pensar en ellos [I can't stop thinking about it]	.62	.70
4. Pienso sobre muchos problemas sin resolver ninguno [I think about many problems without solving any one of them]	.66	.74
5. No puedo hacer nada más cuando estoy pensando en mis problemas [I can't do anything else while thinking about my problems]	.68	.76
6. Mis pensamientos se repiten [The same thoughts return into my mind]	.72	.79
7. Los pensamientos vienen a mi mente aunque yo no quiera [Thoughts come into my mind without me wanting them to]	.72	.81
8. Me atasco y me parece difícil parar mis pensamientos cuando pienso en ciertas cosas [When I am thinking about certain things, I get stuck and find it difficult to stop these thoughts]	.70	.78
9. Sigo haciéndome las mismas preguntas sin encontrar una respuesta [I keep asking myself questions without finding an answer]	.69	.76
10. Mis pensamientos me impiden centrarme en otras cosas [My thoughts prevent me from focusing my attention on other things]	.72	.81
11. Sigo pensando sobre el mismo asunto todo el tiempo [I keep thinking about the same things all the time]	.70	.78
12. Los pensamientos se meten en mi mente [Thoughts just pop into my mind]	.73	.81
13. Me siento como si debiera seguir pensando en las mismas cosas [I feel as if I must keep thinking about the same things]	.65	.74
14. Mis pensamientos son de poca ayuda [My thoughts are not much help to me]	.64	.72
15. Mis pensamientos absorben toda mi atención [My thoughts take up all my attention]	.67	.76

Table 2

Metric and Scalar Invariance across Gender and Age of the PTQ-C (N = 1,079)

Model	RMSEA	ΔRMSEA	CFI	ΔCFI	NNFI	ΔNNFI
Measurement invariance across gender (boys: *N* = 462; girls: *N* = 617)						
MG Baseline model	.0491		.993		.991	
Metric invariance	.0503	-.0012	.992	-.001	.991	.000
Scalar invariance	.0491	.0012	.991	-.001	.991	.000
Measurement invariance across age (children: *N* = 664; adolescents: *N* = 284)						
MG Baseline model	.0491		.991		.989	
Metric invariance	.0496	-.0005	.990	-.001	.989	.000
Scalar invariance	.0486	.0010	.990	.000	.990	.001

Note. CFI = Comparative Fit Index; NNFI = Non-Normed Fit Index; RMSEA = Root Mean Square Error of Approximation.

Table 3

Descriptive Data of the PTQ-C

Gender	Age	*M*	*SD*
Boys	8-12 years	22.00	14.30
	13-18 years	19.45	14.63
Girls	8-12 years	23.69	14.63
	13-18 years	27.27	17.81
Overall	8-18 years	23.16	15.21

Table 4

Pearson Correlations between the PTQ-C and Other Relevant Self-Report Measures

Measures	*r* with PTQ-C
PSWQ-C	.76***
DASS-C – Depression[a]	.58***
DASS-21 – Depression[b]	.74***
DASS-C – Anxiety[a]	.62***
DASS-21 – Anxiety[b]	.65***
DASS-C – Stress[a]	.59***
DASS-21 – Stress[b]	.67***
AFQ-Y	.75***

Note. [a]Participants aged between 8 and 13 years, [b]Participants aged between 14 and 18 years. AFQ-Y = Avoidance and Fusion Questionnaire – Youth; DASS-C = Depression, Anxiety, and Stress Scale - Children; DASS-21 = Depression, Anxiety, and Stress Scale – 21; PSWQ-C = Penn State Worry Questionnaire – Children; PTQ-C = Perseverative Thinking Questionnaire – Children.

***$p < .001$.

Figure 1. Completely standardized solution of the one-factor model of the PTQ-C.