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Research report

Cross-Cultural Adaptation and Evidence of Validity of the Perseverative Thinking Questionnaire (PTQ)

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ABSTRACT

The present study aimed to cross-culturally adapt the Perseverative Thinking Questionnaire (PTQ) to Brazilian Portuguese and gather evidence of validity based on internal structure, reliability, and relationships with other variables. The sample consisted of 350 individuals (80.3% women; M_{age}=33.9 years; SD=10.71). Four models proposed in different cultures were tested. A confirmatory factor analysis was conducted to assess the second-order model, equivalent to the original, and the results demonstrated good model fit (χ^2/df=1.01, CFI=1.000, TLI=1.000, SRMR=.051, and RMSEA=.006). Strong indicators of internal consistency were found for the PTQ total score (ω=.95) and its subscales (CC: ω=.94; UNP: ω=.81; CMC: ω=.83). Correlations with measures of worry (ρ=.67), rumination (ρ=.59), depression (ρ=.60), anxiety (ρ=.53), and stress (ρ=.61) supported the convergent and predictive validity of the PTQ. These findings indicate that the Brazilian version of the PTQ is a valid and reliable measure for assessing the construct.

Keywords: Repetitive negative thinking; worry; rumination; transdiagnosis; psychometry.

RESUMO – Adaptação Transcultural e Evidência de Validade do Questionário de Pensamento Perseverativo (PTQ)

O presente estudo teve como objetivo adaptar transculturalmente o PTQ para o português-brasileiro e reunir evidências de validade baseada na estrutura interna, precisão e relação com outras variáveis. A amostra foi composta por 350 indivíduos (80,3% mulheres; idade: M=33,9; DP=10,71). Foram testados quatro modelos propostos em diferentes culturas. Uma análise fatorial confirmatória foi realizada para avaliar o modelo de segunda ordem, equivalente original, e os resultados demonstraram adequação aos dados (χ^2/gl=1,01, CFI=1,000, TLI=1,000, SRMR=0,051 e RMSEA=0,006), além de bons indicadores de consistência interna para a pontuação total do PTQ (ω=0,95) e suas subescalas (CN: ω=0,94; IMP: ω=0,81; CCM: ω=0,83). Correlações com instrumentos que avaliam preocupação (ρ=0,67), ruminação (ρ=0,59), depressão (ρ=0,60), ansiedade (ρ=0,53) e estresse (ρ=0,61) apoiaram a validade convergente e preditiva do PTQ. Esses resultados sugerem que a versão brasileira do PTQ é uma medida válida e confiável para a avaliação do construto.

Palavras-chave: Pensamento negativo repetitivo; preocupação; ruminação; transdiagnóstico; psicometria.

RESUMEN – Adaptación transcultural y evidencias de validez del Cuestionario de Pensamiento Perseverativo (PTQ)

El presente estudio tuvo como objetivo adaptar transculturalmente el PTQ al portugués brasileño y reunir evidencias de validez basadas en la estructura interna, la consistencia interna y su relación con otras variables. La muestra estuvo compuesta por 350 individuos (80,3% mujeres; edad: M=33,9; DS=10,71). Se probaron cuatro modelos propuestos en diferentes culturas. Se realizó un análisis factorial confirmatorio para evaluar el modelo de segundo orden, equivalente al del original, y los resultados demostraron un buen ajuste a los datos χ^2/gl=1,01, CFI=1,000, TLI=1,000, SRMR=0,051 y RMSEA=0,006), además de buenos indicadores de consistencia interna para la puntuación total del PTQ (ω=0,95) y sus subescalas (CN: ω=0,94; IMP: ω=0,81; CCM: ω=0,83). Las correlaciones con instrumentos que evalúan preocupación (ρ=0,67), rumiación (ρ=0,59), depresión (ρ=0,60), ansiedad (ρ=0,53) y estrés (ρ=0,61) respaldaron la validez convergente y predictiva del PTQ. Estos resultados sugieren que la versión brasileña del PTQ es una medida válida y confiable para evaluar el constructo.

Palabras clave: Pensamiento negativo repetitivo; preocuparse; rumiación; transdiagnóstico; psicometría.

Repetitive Negative Thinking (RNT) has gained prominence as a central transdiagnostic process in various mental disorders. Defined as intrusive, repetitive, and relatively uncontrollable thinking, RNT focuses on problems or negative experiences and is widely recognized as an umbrella phenomenon that includes specific manifestations such as worry and rumination (Ehring & Watkins, 2008; Ehring et al., 2011). While worry is oriented toward perceived future threats, rumination focuses on past events and is traditionally

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associated with generalized anxiety disorder (GAD) and major depressive disorder (MDD), respectively (McEvoy et al., 2013; Nolen-Hoeksema & Morrow, 1991). However, recent studies have shown that these types of thinking often coexist in patients with depression and anxiety, highlighting their transdiagnostic relevance (Gustavson et al., 2018).

Despite the differences regarding though *content*, different forms of RNT have been found to show similarity in the involved cognitive *process*, containing characteristics of repetitiveness, intrusiveness and difficulty in controlling stimuli perceived as negative (Ehring & Watkins, 2008). Indeed, RNT has been found to be associated with the maintenance and development of several mental disorders, such as GAD (Kircanski et al., 2015), MDD (Wahl et al., 2019) obsessive-compulsive disorder (OCD) (Abramowitz et al., 2003), eating disorders and others (Sala, et al., 2019; Sluis et al., 2017). High levels RNT can be identified in various mental disorders, especially in individuals with comorbidities (McEvoy et al., 2013). Therefore, the RNT has been considered a transdiagnostic construct with clinical and research potential (McEvoy et al., 2013).

The most widespread instruments assessing RNT are domain-specific and refer to a specific content, such as the Pennsylvania State Worry Questionnaire (PSWQ) (Meyer et al., 1990), the Ruminative Response Scale (RRS) (Nolen-Hoeksema & Morrow, 1991), and Post-Event Processing Questionnaire-Revised (PEPQ-R) (Rachman et al., 2000). However, these measures do not allow assessing RNT as a process regardless of its specific content, which can be seen as a limitation regarding the identification and evaluation of RNT across different disorders and populations.

The Perseverative Thinking Questionnaire (PTQ) was developed to filling this gap, assessing RNT as a transdiagnostic construct independent of its specific content (Ehring et al., 2011). The PTQ aims to capture the central features of RNT and thus includes three correlated factors: (a) core characteristics of RNT (repetitiveness, intrusiveness and uncontrollability), (b) perceived unproductiveness and, (c) thought capturing mental capacity. The PTQ is a 15-item questionnaire measuring how the individual typically thinks about problems or negative experiences (Ehring et al., 2011).

Originally developed with parallel versions in German and English (Ehring et al., 2011), the PTQ has been translated to different languages and applied in different cultures such French (Devynck et al., 2017), Dutch (Ehring et al., 2012), Polish (Kornacka et al., 2016), Persian (Kami et al., 2019), Turkish (Altan-Atalay & Saritas-Atalar, 2018), and portuguese from Portugal (Chaves et al., 2013). All of this adaptations demonstrate adequate psychometric properties. Of these, the adaptations to English, Dutch, Polish, Persian and Turkish maintained the factor structure of the original version, presenting a second-order model, with the RNT as a higher-order factor and three lower-order factors. It is noteworthy that some cultures presented different factorial structures. The study of French version indicated a bifactor model with RNT as a common factor and three subfactors, consisting of only 10 reorganized items. The exclusion of the 5 items from the original version was justified by the approximately equal loading between two of the three factors (Devynck et al., 2017). The version from Portugal, on the other hand, presented a factorial structure of two factors, with the first factor comprising items that represent the main characteristics of the RNT and the second factor contemplating their perceived dysfunctional effects, cognitive interference and unproductivity (Chaves et al., 2013). In Brazil, to the best of our knowledge, there are no studies on the adaptation and validation of the PTQ.

Thus, considering the relevance of evaluating the Repetitive Negative Thinking (RNT) construct as a transdiagnostic process – that is, a common factor underlying different mental disorders – the cross-cultural adaptation of the PTQ is justified. The importance of this adaptation to the Brazilian context is also emphasized, as, to date, no instruments are available for this purpose. Therefore, the objective of this study was to conduct the cross-cultural adaptation and investigate evidence of the validity of the PTQ scores in Brazil, contributing to the expansion of this research field and enabling its use in clinical settings.

Method

Participants

350 subjects participated in this study (80.3% women), aged between 18 and 64 years (M=33.9; SD=10.71) belonging to 13 from 27 Brazilian states (including Federal District). Of these, 44% were single, 45.8% married or in a stable relationship, 8.6% separated or divorced, 0.6% widowed and 1.1% others. A total of 26.6% self-reported having a history of mental disorder (n=93).

In a second moment, a retest was performed with 127 participants (36.29% of the sample). These participants were 81.9% women (n=104), aged between 18 and 62 years (M=33.9; SD=10.71). In the retest, a total of 39 individuals reported having a history of mental disorder (30.7% of the sample). In both stages, the sample consisted of volunteers who completed an online questionnaire. To participate in the study, the only inclusion criteria were an age over 18 and being Brazilian.

Instruments

Sociodemographic and Health Status Questionnaire: designed to survey sample demographics. Among these, information was requested such as gender, age, marital status, city, state of residence, and presence of diagnosed mental disorder.

Perseverative Thinking Questionnaire (PTQ - Ehring et al., 2011): The PTQ aims to evaluate the transdiagnostic construct of RNT. It consists of 15 items, measured using a five-point Likert-type scale, "(0) Never" and "(4) Almost always". It is designed as a content-independent measure assessing three aspects of RNT: 1. core characteristics (repetitive, intrusive, and relatively uncontrollable), 2. unproductiveness, and 3. thoughts capturing mental capacity. The factorial structure still has a higher-order factor (General Factor) due to the correlation of these subfactors. In its originals version, consisting of three samples (online, non-clinical and clinical), it presented, respectively, excellent internal consistency for the General Factor (α=.95; α=.94; α=.95) and good internal consistency for the main characteristic subscales (α=.92 - .94), non-productivity (α=.77 - .87) and mental capacity capture (α=.82 - .90).

Short version of the Ruminative Response Scale (RRS - Nolen-Hoeksema & Morrow, 1991; adapted for brazilian Portuguese by Zanon et al., 2018). The RRS assesses ruminative tendencies in response to depressed mood. It is an instrument composed of 7 items, which uses a four-point Likert-type scale, "(1) Almost never" and "(4) Almost always". The scale has two distinct factors: Brooding and Reflection. Brooding represents maladaptive rumination, while Reflection is associated with a more adaptive response style. In brazilian cross-cultural adaptation were find acceptable internal consistency for Brooding (α=.69) and for Reflection (α=.63) (Zanon et al., 2018). In the present study sample, internal consistency was acceptable for Brooding (ω=.77) and Reflection (ω=.76).

Penn State Worry Questionnaire (PSWQ – Meyer et al., 1990; adapted for brazilian portuguese by Castillo et al., 2010): The questionnaire assesses the severity and frequency of worrying. It is a 16 items five-point Likert-type scale, "(1) Not at all typical" and "(5) very typical". The scores obtained vary between 16 and 80 and the higher scores are related to frequency and intensity of worries. The internal consistency of the Brazilian adaptation showed (α=.84). In the present study sample, internal consistency was excellent (ω=.93).

Depression, Anxiety and Stress Scale (DASS-21 – Lovibond & Lovibond, 1995; adapted for brazilian Portuguese by Vignola, 2013): The questionnnaire assesses symptoms of depression, anxiety and stress. It consists of 21 items, divided into 3 subscales (depression, anxiety and stress). It uses a four-point Likert-type scale, "(0) Did not apply to me at all" and "(3) Applied to me very much or most of the time". In the validation study, the internal consistency of the Brazilian adaptation was reported to be α=.92 for depression, α=.86 for anxiety and α=.90 for stress. In the present study sample, the internal consistency of the scales ranged from good to excellent, with ω=.90 for depression, ω=.90 for anxiety and ω=.89 for stress.

Procedures

Cross-cultural Adaptation

In order to adapt the PTQ for use in Brazilian Portuguese, guidelines suggested by the International Test Commission (ITC, 2010), adapted by Borsa, et al. (2012) were applied: 1. triple translation of the instrument from the original language to the target language (in this case from English to Brazilian Portuguese), 2. synthesis of translated versions, 3. evaluation of the synthesis by experts, 4. evaluation of the instrument by the target population 5. reverse translation and approval by the author of the original version, and 6. pilot study. Initially, the questionnaire was translated by three independent professionals fluent in the English and Brazilian Portuguese (two with knowlege in psychology and one a language teacher). The next step was the synthesis of the translations, carried out by the main author of the study and members of the research team (DO and MRZ). At this stage, some semantic, idiomatic and conceptual adjustments were made.

The synthesis was sent to a committee of three experts (with extensive experience and/or training in psychological assessment, cognitive-behavioral therapy and psychometrics). The committee considered the adequacy of the items to the construct, in addition indicated the language clarity and relevance of each item. At the end of this phase, the first translated version of the instrument was obtained.

The evaluation by the target audience was carried out. Three individuals (who self-reported a history of psychiatric disorder and are currently undergoing psychotherapy) performed a qualitative evaluation of the questionnaire, indicating whether the content of the items was understandable and adequate for its use. Next, there was a reverse translation – back-translation, performed by two translators fluent in English (both with experience in psychometrics). The back translation was finally synthesized, seeking to maintain the conceptual equivalence of each item and prioritizing any differences from the original version. This version was sent to the author of the instrument (TE), who, in turn, suggested changes to Item 7, indicating the expression "without my will", instead of "against my will", as he understands that the second expression could indicate an attempt to suppress the thought. Thus, the questionnaire moved to its last adjustment phase, the pilot study.

Nine individuals (graduate students in psychology) participated in the pilot phase, in which participants were asked to fill out the questionnaire, paying attention to instructions and items that could present errors or inconsistencies for possible adjustments. After all steps were completed, the instrument was ready to be used for data collection.

Data Collection

Data collection took place online, through a form in which participants had to agree with the Informed

Consent form to continue in the survey. The invitation to participate in the study was distributed via social media describing the general objective and inclusion criteria of the study, together with the provision of a link to access the form. The snowball sampling method allowed access to other participants from the initial disclosure. Later, in a second moment, the retest was performed. For this, in an interval M=39 days (SD=2.18), all participants who answered the first stage received a new invitation via contacts previously informed by the participant. This study was approved by the Research Ethics Committee of the University of Vale do Rio dos Sinos (UNISINOS) (Register 40555420.0.0000.5344). Thus, it complies with the guidelines of Resolution 510/2016 of the Brazilian National Health Council.

Data Analysis

For data analysis were used the statistical softwares Statistical Package for the Social Sciences (SPSS - version 22.0), JASP (version 0.14.1) and RStudio (version 4.0.4) Descriptive analyzes were performed to characterize the sample. Subsequently, inferential analyzes sought to present evidence of validity based on the content of the test, the internal structure, its relationships with other variables and reliability (American Educational Research Association [AERA], American Psychological Association [APA], & National Council on Measurement in Education [NCME], 2014).

The validity evidences based on the test content were indicated by the Fleiss Kappa analysis and the Content Validity Coefficient (CVC). The Fleiss Kappa evaluated the agreement among experts regarding the adequacy of the items to the factors (core characteristics, unproductiveness and capture of mental capacity), using a measure ranging from -1 to 1 (complete absence of agreement to total agreement) (Alexandre & Coluci, 2011). The CVC, on the other hand, sought to evaluate the relevance and clarity of the items judged by the expert committee, through a four-point Likert-type scale, "(0) It is not at all clear/relevant" and "(3) It is quite clear /relevant. The cut point of CVC was >.80 (Hernández-Nieto, 2002).

Confirmatory factor analyzes (CFA) were performed to verify evidence of validity based on the internal structure. We have tested four different models proposed in other cultures (Chaves et al., 2013; Devynck et al., 2017; Ehring et al., 2011). Then, a multigroup confirmatory factor analysis (MCFA) was performed in the final model investigating the invariance of the PTQ among clinical and non-clinical groups.

The CFA were implemented using the Robust Diagonally Weighted Least Squares (RDWLS) estimation method, which allows treating the data as ordinals and does not require the normality of the data as an assumption (DiStefano & Morgan, 2014; Li, 2016). As adjustment indices, the following were used: the chi-square test and the ratio between the chi-square and degrees of freedom (χ^2 and χ^2/df); the Comparative Fit Index (CFI); the Tucker-Lewis Index (TLI); the Standardized Root Mean Residual (SRMR) and the Root Mean Square Error of Approximation (RMSEA). The following criteria were adopted for the evaluation of the adjustment quality model and its residuals: χ^2 statistically non-significant (p>.05); the ratio of χ^2/df preferably < than/to 3; CFI and TLI values >.95; SRMR values <.08; RMSEA values <.06, with an upper limit of the confidence interval <.10 (Brown, 2015). The invariance has been tested in three models: configural, metric and scalar. This measurement was performed using the CFI difference test (ΔCFI, Cheung & Rensvold, 2002). It is indicated that if, when setting a parameter, there is a significant reduction in the CFI indices (ΔCFI >.01), the invariance of the measure cannot be accepted (Cheung & Rensvold, 2002).

The reliability was estimated through test-retest correlations and McDonald's Omega. The McDonald's Omega values indicate good internal consistency when they are above .80 (Dunn et al., 2014). Finally, evidence of validity based on relationships with other variables (convergent and predictive validity) was indicated through Spearman correlations (abnormal distribution of data, evaluated using the Shapiro-Wilk test) between the PTQ and the PSWQ, the RSS (Broading and Reflection subscales) and DASS-21 (Depression, Anxiety and Stress subscales). Correlations with values above .70 indicate a strong relationship, between .50 and .70 indicate a moderate relationship, and values below .30 indicate a weak relationship (Field, 2013).

Results

Evidence based on test content

Fleiss' kappa indicated moderate reliability between evaluators κ=.74 (95% CI [.537-.945]), indicating moderate to strong agreement in its three factors: core characteristics κ=.73 (95% CI [.438 -1.022]), improductivity κ=.72 (95% CI [.430-1.014]) and capture of mental capacity κ=.87 (95% CI [.579-1.164]). All indexes proved to be statistically significant, p<.001. Content Validity Coefficient (CVC) indicated high agrément between experts on the clarity and relevance of items in both aspects (.90).

Evidence based on internal structure

Four models were tested using confirmatory factor analysis (CFA). Model 1 represented a unidimensional model, in which all 15 PTQ items load on a single RNT factor. Model 2 is a second-order model, comprising the RNT as a higher-order factor and three lower-order factors (core characteristics, unproductiveness and mental capacity capture), which represents the model proposed by the original PTQ validation study (Ehring et al.,

2011). Model 3 is equivalent to the structure found off the Portuguese version of the PTQ, namely a two-factor model: repetitive thoughts (seven items) and cognitive interference and non-productivity (eight items) (Chaves et al., 2013). Finally, Model 4 represented a bifactor model, in which a general factor from all items is extracted whilst simultaneously modeling each of the three specific factors included in Model 2, whereby the proportion of variance in scale scores captured by the general and the specific factors to be calculated (for a similar model used in the validation study of the French PTQ, see Devynck et al., 2017).

Table 1
Fit Indexes of Tested Models for the PTQ

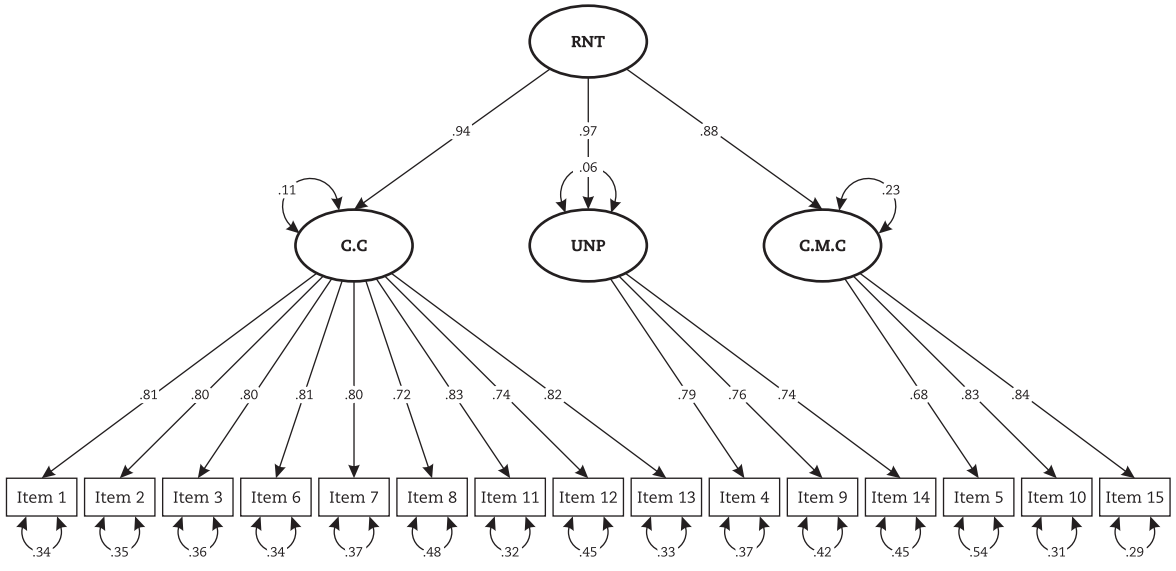
Models	$\chi^2(df)$	$\chi^2(df)$	*p*	CFI	TLI	SRMR	RMSEA (90% CI)
1	114.331 (90)	1.27	.043	.998	.997	.058	.028 (.005 – .042)
2	88.181 (87)	1.01	.444	1.000	1.000	.051	.006 (.000 – .030)
3	73.205(89)	.82	.887	1.000	1.002	.046	.000 (.000 – .014)
4	24.861(69)	.36	1.000	1.000	1.007	.027	.000 (.000 – .000)

Note. 1=uni-dimensional model; 2=second-order model; 3=two-factor model; 4=bifactor model. χ^2=chi-squared; *df*=degrees of freedom; p=statistical test; CFI=Comparative Fit Index; TLI=Tucker–Lewis Index; SRMR=Standardized Root Mean Square Residual; RMSEA=Root Mean Square Error of Approximation

Results of the CFAs showed that Model 1 (uni-dimensional model) showed the worst fit. The hierarchical model stemming from the original validation study (Model 2) showed a good fit, as did Model 3. Model 4 (the bifactor model) showed the best fit. In sum, CFA results suggest that the original PTQ model (Model 2) shows adequate fit also for the Brazilian Portuguese version of the measure, which is why this model is used in the remainder of the Results section to explore reliability and validity of the total score as well as the subscale scores (see also Figure 1). However, for some applications, Model 4 may be preferable.

The factor loads show how much a factor explains a variable. Note that in the present model these were shown to be high, mostly ≥.80. The smallest factor load was presented by item 5, even so >.60.

Figure 1
PTQ second-order model



Note. C.C=core characteristics; UNP=unproductiveness; C.M.C=capture of mental capacity

The MCFA showed the configurable, metric and scalar invariance of the PTQ (Table 2). Based on these results, it is shown that this is a comparable measure between the clinical and non-clinical groups.

Table 2
Multigroup Confirmatory Factor Analysis (PTQ)

Invariance	Goodness-of-fit indexes				
PTQ	RMSEA (90% CI)	SRMR	TLI	CFI	ΔCFI
Clinical and Non-Clinical					
Configural	.000 (.000 – .000)	.058	1.009	1.000	-
Metric	.000 (.000 – .026)	.071	1.001	1.000	.000
Scalar	.000 (.000 – .022)	.068	1.002	1.000	.000

Note. RMSEA=Root Mean Square Error of Approximation; SRMR=Standardized Root Mean Square Residual; TLI=Tucker–Lewis Index; CFI=Comparative Fit Index; ΔCFI=CFI difference

Reliability

To establish the test-retest reliability of the PTQ, a subgroup of the total sample (n=127) filled the instrument again after an interval of M=39 days (SD=2.18). The test-retest correlations showed results from moderate to strong, with the PTQ total score (r=.83; p<.001) and its subscales, core characteristics (r=.83; p<.001), unproductiveness r=.66; p<.001) and capture of mental capacity (r=.77; p<.001). The internal consistency of the PTQ in the first collection was evaluated using the McDonald's Omega with excellent results for the general factor PTQ (ω=.95 [CI 95%=.94 - .96]) and the subscale core characteristics (ω=.94 [CI 95%=.93 - .95]) and good results for the unproductivity scales (ω=.81 [CI 95% = .78 - .84]) and capture of mental capacity (ω=.83 [CI 95% = .80 - .86]). Considering the bifactorial structure test, the hierarchical Omega for general factor (Hω=.95) and Percent of Uncontaminated Correlations (PUC=.60) were also calculated (Dueber, 2017).

Evidence based on relationships with other variables

Convergent validity

Correlations were performed between the PTQ and other RNT measures (rumination and worry). The total score and its subscales correlated moderately and positively with the measures of RSS (Broading subscale) and PSWQ. It should be noted that, as expected, the RRS Reflection subscale presented weak correlations with the total score and the PTQ subscales (Table 3).

Predictive validity

To verify the predictive validity of the instrument, correlations were performed between the PTQ and symptoms of depression, anxiety and stress, assessed by DASS-21. Correlations between the DASS-21 (depression, anxiety and stress) and other measures of RNT, the RRS (Broading subscale) and the PSWQ were performed, also indicating positive and moderate correlations, as shown in Table 3.

Table 3
Correlations between PTQ Factors and other Variables

ρ *de Spearman*	1	2	3	4	5	6	7	8	9	10
1. PTQ – Total	-									
2. PTQ – CC	.973	-								
3. PTQ – UNP	.879	.798	-							
4. PTQ – CMC	.829	.725	.681	-						
5. RRS – Brooding	.589	.562	.562	.480	-					
6. RRS – Reflection	.309	.305	.228	.309	.337	-				
7. PSWQ	.673	.666	.582	.550	.614	.271	-			
8.DASS-Depression	.602	.593	.552	.472	.557	.296	.506	-		
9. DASS – Anxiety	.526	.524	.474	.408	.461	.277	.532	.678	-	
10. DASS – Stress	.608	.611	.516	.493	.574	.293	.677	.706	.775	-

Note. All correlations were statistically significant at p<.001. PTQ=Perseverative Thinking Questionnaire; RRS=Ruminative Response Scale; PSWQ=Pennsylvania State Worry Questionnaire; DASS=Depression, Anxiety, and Stress Scale

Discussion

This study aimed to cross-culturally adapt the PTQ to Brazilian Portuguese and gather evidence of validity based on internal structure, reliability, and its relationship with other variables. Of note, the process of translation, adaptation and obtaining evidence of validity of the instrument considered the guidelines of the International Test Commission (ITC, 2010), using some adaptations indicated by Borsa et al. (2012). There was evidence

of content validity because of high rates of agreement among expert, in terms of construct adequacy, clarity and relevance, with indexes considered moderate or strong.

Four different models were tested, based on previous studies carried out in other cultures. Results did not support a uni-dimensional model with one factor only (Model 1), and it was the only model tested with a significant χ^2. However, both the hierarchical model used for the original PTQ (Model 2), as well as the two-factors (Model 3) reported for the Portuguese version both showed good model fit. The best model fit was found to the bifactor model Model 4 consisting of a general RNT factor as well as three specific factors, whereby all items load on both the general factor and specific factors simultaneously (see also Devynck et al., 2017, for a similar finding for the French PTQ).

Based on the CFA results, we recommend the second-order model (Model 2) as the model to be used for the Brazilian version of the PTQ – especially when used in clinical contexts or individual assessment – for several reasons. First, Model 2 presented excellent fit indexes. Second, it is in line with the original English and German versions of the PTQ, increasing international comparability of findings. Third, the model allows using the instrument's total score as well as the three subscale scores established in the literature. Finally, Model 2 maintains theoretical aspects underlying the construction of the instrument (Ehring et al., 2011) (Ehring et al., 2011; Ehring et al., 2012; Kornacka et al., 2016). Model 3, on the other hand, does not present any advantage over Model 2, but carries the disadvantage of reduced comparability to other language versions. However, as Model 4 showed the best fit and as bifactor models of RNT measures have recently received considerable interest in the literature on RNT (McEvoy et al., 2018; Topper et al., 2014), authors may consider using this model in research studies, where the relative contribution of a general RNT factor vs. more specific aspects of this process are of interest. The hierarchical omega and percentage of uncontaminated correlations also support a bifactorial structure. In addition, the factorial structure of the Brazilian PTQ remains tentative until more research with larger samples have been conducted.

Further analyses showed that the instrument's invariance was maintained for the use in clinical and non-clinical groups. This means that the Brazilian version of PTQ can be used as a valid measure for the evaluation of RNT in different contexts, whether in a clinical setting or in the general population (Cheung & Rensvold, 2002). Reliability analyses were also performed for the Brazilian PTQ. Test-retest correlations showed moderate to strong results, demonstrating the stability of their scores over time. The internal consistencies of the total score and its three subfactors, on the other hand, presented good to excellent results, adding to the validity evidence for the PTQ.

Another source of evidence validity was based on the relationships between the PTQ and external variables, being divided into convergent and predictive validity. Convergent validity was indicated by moderate positive correlations between the PTQ and other RNT measures, evaluating rumination and worry. It should be noted that there was an exception, the positive and weak correlation between the RSS (Reflection subscale) and the PTQ, in its total score and its subscales. Low Correlation between the PTQ and the Reflection factor (from the RRS) were expected and corroborate previous studies. Specifically, the PTQ and its scales focus on measuring a maladaptive thinking process, while the RRS Reflection subscale presents a measure of a more adaptive cognitive process. Zanon et al. (2018) explain that thinking about yourself with the intention of understanding your mood can be a more adaptive form of rumination. So reflection can be a promoter of changes and, although it has characteristics of negative thoughts, the feeling of unproductive thought and capture of mental capacity is possibly lower (McEvoy et al., 2013).

As for the predictive validity, all PTQ scores positively and moderately predicted symptoms of depression, anxiety and stress. These also showed positive and moderate correlations with measures of rumination and worry. The results of convergent and predictive validity support the understanding of the PTQ as an instrument capable of evaluating RNT also indicating it as a valid measure for dysfunctional types of RNT related to symptoms of depression, anxiety and stress. We particularly highlight this result since transdiagnostic measures such as the PTQ can assist in the development of process-based interventions that are in accordance with new dimensional models of psychopathology (Dalgleish et al., 2020).

Some limitations of the present study are noteworthy. First, the identification of clinical individuals (those with a history of mental disorders) was performed solely through self-report. Future studies should assess diagnoses more thoroughly, ideally using structured clinical interviews. Additionally, the sample size was modest. Therefore, increasing the sample size is suggested. On the other hand, the rigorous process of translation, adaptation, and obtaining evidence of validity can be seen as a clear strength. In future studies, complementary analyses, such as criterion validity, may be used.

This study presented evidence of validity of PTQ indicating that is a useful, valid and reliable to use its scores for RNT assessment in brazilian sample. The RNT is a transdiagnostic process present in several psychopathologies, as well as in non-clinical individuals. Future studies with an expanded sample and subsequent testing of current theoretical models may substantiate the adoption of the most suitable model for the Brazilian population. Thus, the Brazilian version of the PTQ adds, demonstrating itself as an independent measure of

a specific content, enabling the expansion of studies in the area, in addition to its availability for use in clinical contexts and in the general population.

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Authors' contributions

We declare that all the authors participated in the elaboration of the manuscript. Specifically, all authors participated in the initial wording of the study - conceptualization, investigation, visualization, all authors participated in the data analysis, and all the authors participated in the Final Writing of Work - Review and Editing.

Availability of data and materials

All data and syntax generated and analyzed during this research will be treated with complete confidentiality due to the Ethics Committee for Research in Human Beings requirements. However, the dataset and syntax that support the conclusions of this article are available upon reasonable request to the principal author of the study.

Competing interests

The authors declare that there are no conflicts of interest.

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