



Trait Repetitive Negative Thinking: Psychometric Properties of the Turkish Version of the Brief Repetitive Thinking Questionnaire (RTQ-10)

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Abstract

Repetitive negative thinking (RNT) is a transdiagnostic risk factor for many psychological problems, so it is essential to measure RNT validly and reliably across different cultural contexts. The 10-item brief version of the Repetitive Thinking Questionnaire (RTQ-10) has strong psychometric properties and predicts a range of emotional symptoms. Although there are versions of the scale in different languages, it has not been adapted to Turkish. The aim of this study was to examine the psychometric properties of RTQ-10 in a Turkish-speaking community sample. A total of 310 adults ($M_{age} = 27.86$, $SD = 8.67$, 73.5% female) completed an online survey including RTQ-10, and 261 of them ($M_{age} = 27.55$, $SD_{age} = 8.56$, 72.8% female) completed scales measuring perseverative thinking, rumination, worry, and psychological symptoms. Results demonstrated that the Turkish version of the RTQ-10 had a unitary structure with high internal reliability ($\alpha = .93$), similar to the original version. The single-factor model also demonstrated measurement invariance across gender and age groups. The RTQ-10 was positively correlated with perseverative thinking, rumination, worry, depression, anxiety, and stress severities, and demonstrated incremental validity by predicting the variance in psychological distress beyond other measures of RNT. Overall, the results indicated that the Turkish version of the RTQ-10 is a reliable and valid measurement tool for the assessment of RNT.

Keywords Repetitive Negative Thinking · Repetitive Thinking Questionnaire · Transdiagnostic · Trait · Assessment

Introduction

Repetitive negative thinking (RNT) is a cognitive process that refers to individuals' constant, persistent, passive, and uncontrollable thoughts about the negative aspects of themselves and their environment (Ehring & Watkins, 2008; Segerstrom

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et al., 2003). Most studies have demonstrated the transdiagnostic nature of RNT, whereby RNT contributes to the development and maintenance of many emotional disorders (e.g., Harvey et al., 2004; McEvoy et al., 2013; Samtani et al., 2022). The Repetitive Thinking Questionnaire (RTQ; McEvoy et al., 2010) was developed to measure RNT transdiagnostically, but it is crucial to validate the RTQ across different languages and populations to facilitate cross-cultural comparisons. The current study aimed to adapt the brief, 10-item (RTQ-10) trait version of the RTQ into Turkish and to investigate its psychometric properties in a Turkish-speaking community sample.

Literature reviews have demonstrated a robust association between RNT and symptoms of a range of psychological problems and disorders including depression, obsessive–compulsive disorder, social anxiety, psychosis, and insomnia, reflecting its transdiagnostic nature (Ehring & Watkins, 2008; Harvey et al., 2004). Studies have also demonstrated that individuals diagnosed with depression and anxiety disorders have similar levels of RNT (e.g., Gökdağ et al., 2023; McEvoy et al., 2013) and that RNT prospectively mediates depression and anxiety symptoms over a five-year period (Spinhoven et al., 2019). Moreover, RNT predicts comorbidity between emotional disorders (e.g., Kaçar-Başaran & Arkar, 2023; Mahoney et al., 2012; Spinhoven et al., 2015). Psychotherapy protocols targeting RNT have also shown that reductions in RNT are associated with reductions in symptoms of emotional disorders in transdiagnostic samples (e.g., McEvoy et al., 2015; Ruiz et al., 2018; Spinhoven et al., 2018).

The 27-item RTQ was originally developed as a transdiagnostic measure of RNT by McEvoy et al. (2010) from three disorder-specific measures of RNT (the Response Styles Questionnaire, Nolen-Hoeksema & Morrow, 1991; the Penn State Worry Questionnaire, Meyer et al., 1990; the Post-Event Processing Questionnaire-Revised, McEvoy & Kingsep, 2006). The RTQ has high internal consistency in both clinical (Mahoney et al., 2012) and non-clinical samples (McEvoy et al., 2010), and is associated with emotions including general psychological distress, shame, and neuroticism (McEvoy et al., 2010). The RTQ asks individuals about their RNT with respect to a recent distressing situation; therefore, it may assess state rather than trait RNT. However, RNT is considered to generally be stable over time (i.e., trait-like), which increases vulnerability to future emotion dysregulation (McEvoy et al., 2014). Therefore, McEvoy et al. (2014) developed a brief trait version of the RTQ (the RTQ-10).

The RTQ-10 was demonstrated to have a unitary factor structure and high internal consistency ($\alpha = 0.89$, McEvoy et al., 2014). In different studies, it was reported that the RTQ-10 is moderately or strongly correlated with a range of theoretically related constructs, such as rumination, worry, negative metacognitive beliefs, intolerance of uncertainty, and clinical perfectionism, as well as with psychological symptoms such as depression, anxiety, and disordered eating (e.g., Egan et al., 2017; Gavazzeni et al., 2019; McEvoy et al., 2014, 2018; Renjan et al., 2016). Moreover, the RTQ-10 has been shown to uniquely predict emotional symptoms after accounting for alternative disorder-specific and transdiagnostic measures of RNT (Funk et al., 2022; McEvoy et al., 2018, 2021). The RTQ-10's demonstrated capacity to predict unique variance in symptoms beyond other RNT measures, and its brevity relative to

other measures, attest to its potential utility in research and clinical practice for case formulation, treatment planning, and outcome monitoring.

Recently, the RTQ-10 has been translated into Portuguese (Rocha-Oliveira, 2021; Rocha-Oliveira & Zibetti, 2022) and Swedish (Gavazzeni et al., 2019), and is currently undergoing psychometric evaluation in German and Chinese populations, but it not been translated into Turkish. This study aimed to translate the RTQ-10 into Turkish and investigate its validity and reliability in a Turkish-speaking community sample. The first hypothesis (H_1) was that the Turkish version would replicate the unitary structure of the English version of the RTQ-10, and that it would demonstrate measurement invariance across men and women and different age groups. We predicted that the one-factor structure of the scale would also be confirmed in the Turkish version due to the fact that the original scale had robust psychometric properties and that the original structure was supported in its adaptations in different cultures (Gavazzeni et al., 2019; Rocha-Oliveira, 2021; Rocha-Oliveira & Zibetti, 2022). The second hypothesis (H_2) was that the internal consistency and test–retest reliability of the RTQ would be high in a Turkish sample. The third hypothesis (H_3) was that the Turkish version of the RTQ-10 would be significantly and positively associated with scales measuring perseverative thinking, rumination, worry, and psychological symptoms, which will support its concurrent validity. The fourth hypothesis (H_4) was that the RTQ-10 would explain variance in depression, anxiety, and stress symptoms. Lastly, we aimed to investigate the incremental validity of the RTQ-10 based on previous findings (e.g., Funk et al., 2022; McEvoy et al., 2018, 2021). The last hypothesis (H_5) was that the RTQ-10 would predict psychological distress symptoms alone and beyond other measures of transdiagnostic RNT, rumination, and worry.

Methods

Participants

Adults ($N = 310$, 73.5% female) aged between 18 and 67 ($M = 27.86$, $SD = 8.67$) voluntarily participated in the study. Most participants were single (65%), around half had bachelor's degrees (48%), and 76.8% of them lived in metropolitan. Most participants (82.9%) stated that they had never been diagnosed with a psychiatric disorder in their lives. We used all participants' data in factor analysis. Since a subgroup from the total sample ($n = 261$, $M_{age} = 27.55$, $SD_{age} = 8.56$; 72.8% female) completed all measurements, we used their data in analyzes other than factor analysis. Sixty-seven percent of those in this subgroup were single, nearly half (44.4.%) had a bachelor's degree, and the majority (78.5%) lived in metropolitan. Most of them (82%) stated that they had no psychiatric disorders. Another subgroup ($n = 103$, 82.5% female; $M_{age} = 27.23$, $SD_{age} = 6.39$) completed the survey again after three weeks to evaluate test–retest reliability. There were no significant differences in demographic variables between the samples (all p 's > 0.05).

Measurements

Repetitive Thinking Questionnaire-10 (RTQ-10, McEvoy et al., 2014)

The RTQ-10 is a brief transdiagnostic trait-based measure of RNT composed of 10 items rated on a scale of 1 (*not true at all*) and 5 (*very true*). A total score is calculated with higher scores reflecting higher general RNT tendencies. Internal consistency is high in clinical ($\alpha=0.92$, McEvoy et al., 2014) and non-clinical samples ($\alpha=0.89$, McEvoy et al., 2018), and the RTQ-10 is correlated with anxiety ($r=0.35$) and depression ($r=0.45$; McEvoy et al., 2014).

Perseverative Thinking Questionnaire (PTQ, Ehring et al., 2011)

The PTQ is a trait-based measure of RNT composed of 15 items rated on a scale from 0 (*never*) to 4 (*almost always*). It has both lower- and higher-order factors. Lower-order factors are called core characteristics, unproductiveness, and capturing mental capacity. Higher total scores on the PTQ reflect higher levels of RNT. In the original study, the PTQ had adequate levels of internal consistencies ($\alpha>0.94$) and test–retest coefficients ($r=0.69$). The Turkish version of the PTQ has good internal consistency ($\alpha=0.95$) and test–retest coefficients ($r=0.67$, Altan-Atalay & Saritaş-Atalar, 2018).

10-Item Ruminative Response Scale-10 (RRS-10, Treynor et al., 2003)

The RRS-10 is a self-report measure describing one's responses to depressed mood composed of 10 items rated on a scale from 1 (*never*) to 4 (*always*). It has both lower- and higher-order factors. Lower-order factors are called brooding and reflective pondering. Higher total scores on the RRS-10 reflect higher levels of ruminative responses. Both the original ($\alpha=0.72$) and the Turkish version ($\alpha=0.77$, Erdur-Baker & Bugay, 2010) of the RRS-10 has adequate levels of internal consistency.

Penn State Worry Questionnaire (PSWQ, Meyer et al., 1990)

The PSWQ is a self-report measure of describing individuals' trait worry severities composed of 16 items rated on a scale from 1 (*not at all typical*) to 5 (*very typical*). Higher total scores on the PSWQ reflect higher levels of worry. Both the original ($\alpha>0.91$) and Turkish versions ($\alpha>0.91$, Yılmaz et al., 2008) of the PSWQ have good internal consistency.

Depression Anxiety Stress Scale-21 (DASS-21, Henry & Crawford, 2005)

The DASS is a three-dimensional self-report scale designed to measure the severity of depression, anxiety, and stress composed of 21 items rated on a scale from 0 (*Did not apply to me at all*) to 3 (*Applied to me very much or most of the time*). Each subscale has seven items, and its total score ranges from 0 to 21 points. A higher score indicates higher symptomatology of depression, anxiety, and stress. In

the original version, Cronbach's alpha values were ≥ 0.82 . In the Turkish version, Cronbach's alphas were above ≥ 0.77 for all three subscales in both non-clinical and clinical samples (Sarıçam, 2018).

Procedure

After the ethical permission was obtained from the Pamukkale University Social and Humanities Research and Publication Ethics Committee (Protocol No: E-93803232–622.02–144,915), the RTQ-10 was translated into Turkish using Herrera et al.'s (1993) guidelines. Firstly, the first and second authors translated the items into Turkish independently, after which they collaboratively decided on only one translation for each item. The translated items were then evaluated by four psychologists in terms of clarity, equivalence, and compatibility with the original. Next, the items were reviewed by the authors and translated back into English by another psychologist fluent in both languages. Finally, the researcher who developed RTQ-10 (third author) reviewed this version.

An online survey platform was used in the data collection phase, and the survey was announced on social media platforms. Thus, we did not know exactly how many people the announcement reached and how many people did not agree to participate in the study. The participants were presented with the information sheet and online consent form, followed by the measurement tools. The questionnaires took approximately 15 min to complete. Participants were anonymous, but at the end of the survey they were asked for their email addresses for the second phase of the study (test–retest); those only who volunteered to participate in that phase shared their email addresses so they could be contacted. These individuals were independently emailed a survey containing only the RTQ-10 three weeks after their initial participation.

Data Analysis

We conducted analyses using SPSS-25 (Statistical Package for Social Science) and AMOS-21 (Analysis of Moment Structures). The psychometric properties of the Turkish version of RTQ-10 were tested with a one-factor confirmatory factor analysis (CFA for structure validity), multigroup CFA (for measurement invariance), Cronbach alpha values (for internal reliability), Pearson correlations and regression (for convergent validity and test–retest reliability), and hierarchical regressions (for incremental validity). In the investigation of convergent validity, we examined the relationships between the RTQ-10 and scales assessing perseverative thinking, rumination, worry, and psychological distress. Also, we tested the predictive power of the RTQ-10 for emotional symptom severities by conducting regression analysis. In the hierarchical regression analyses, we followed a dual method in which we investigated how much the RTQ-10 could contribute to explaining the variance of psychological distress beyond other scales and vice versa.

Since we utilized one of the online platforms for the data collection phase, there were no missing data in the dataset. The sample size was also sufficient. Hence, a

considerable number of authors recommend using SEM with Maximum Likelihood estimation with a sample size of 5 or 10 cases per parameter (see for an overview Kline, 2011, p. 11–12). Prior to the analysis, we tested the univariate (z -scores in the range of ± 3) and multivariate (the Mahalanobis distance with a significance level of 0.001) normality assumptions. To examine the potential common method variance, we utilized Harman's single-factor as we heavily relied on self-report measures in our study. Harman's single-factor technique requires all items to load on a single factor when running an exploratory factor analysis. Common method variance is said to be present when the percentage variance extracted from the single factor exceeds 50% (Podsakoff et al., 2012). In our study, Harman's single-factor results indicated the single factor explains 37.38% of the total variance, so common method variance did not appear to be an issue in the present study.

The indices used to assess goodness of fit for the CFA were Chi-square statistics and degrees of freedom ($\chi^2 < 3$ good, < 5 acceptable), the comparative fit index (CFI > 0.95 good, > 0.90 acceptable), the goodness of fit index (GFI > 0.95 good, > 0.90 acceptable), root mean square error of approximation (RMSEA < 0.05 good, < 0.10 acceptable), and the standardized root mean square residual (SRMR < 0.10 acceptable) (Browne & Cudeck, 1992; Schermelleh-Engel et al., 2003). We also conducted multiple-group CFAs to test the measurement invariance of the RTQ-10 by gender (women [$n = 229$] vs. men [$n = 81$]) and age (< 26 years [$n = 161$] vs. > 26 years [$n = 149$] using median split). In these analyses, the configurational, metric, and scalar invariance models were compared. For model comparison, used change in CFI value of > 0.01 (Cheung & Rensvold, 2002) and significant differences in chi-square values as criteria for rejecting measurement invariance. All participants' data were used in CFAs, but 49 were excluded from other analyses as they did not complete all scales (remaining $n = 261$, 190 female). Correlation coefficients were interpreted based on Schober et al.'s (2018) coefficients. A correlation coefficient value of less than 0.10 was defined as negligible correlation; 0.10 to 0.39, weak correlation; 0.40 to 0.69, moderate correlation, 0.70 to 0.89, strong correlation; and 0.90 to 1.00, very strong correlation. Cicchetti (1994) defined test-retest coefficients of between 0.4 to 0.59 as fair, 0.60 to 0.74 as good, and above 0.75 as excellent.

Results

Descriptive Statistics, Confirmatory Factor Analysis, and Measurement Invariance

To examine the construct validity of the RTQ-10 in the Turkish sample, the one-factor structure proposed by McEvoy et al. (2010) was tested with CFA. Results confirmed that the single-factor solution was acceptable for all the fit indices, $\chi^2(35, N = 310) = 137.53, p < 0.001, \chi^2/df = 3.92, CFI = 0.95, GFI = 0.92, RMSEA = 0.097$ (90% CI: 0.081–0.115), SRMR = 0.05. In this model, all modification indices were lower than 16. Factor loadings were in the range of 0.58 to 0.86 (all p 's $< .01$). Factor loadings and descriptive statistics were presented in Table 1.

Table 1 Descriptive statistics of the RTQ-10

Item Number	Factor Loadings	Skewness	Kurtosis	Total Sample (N=310)		Females (n=229)		Males (n=81)		Gender Comparison
				Mean	SD	Mean	SD	Mean	SD	
1	.58	-.10	-.75	3.38	1.15	3.42	1.16	3.17	1.18	1.61
2	.74	-.24	-.82	3.63	1.09	2.73	1.11	3.41	1.02	2.28*
3	.66	.11	-1.11	2.89	1.33	2.99	1.35	2.56	1.24	2.53*
4	.77	-.25	-.75	3.41	1.14	3.53	1.15	3.06	1.10	3.19**
5	.85	.03	-1.01	3.00	1.27	3.17	1.27	2.67	1.26	3.05**
6	.78	-.24	-.89	3.52	1.14	3.61	1.15	3.26	1.13	2.39*
7	.82	-.14	-.76	3.25	1.16	3.40	1.18	2.88	1.07	3.51**
8	.82	.15	-1.05	2.92	1.31	3.01	1.34	2.70	1.12	1.82
9	.81	-.01	-1.10	3.10	1.31	3.27	1.32	2.78	1.23	2.91**
10	.74	-.29	-1.03	3.44	1.27	3.56	1.26	3.20	1.29	2.19*
Total Score of RTQ-10				32.68	9.64	33.68	9.82	29.68	8.39	3.26**

* $p < .05$ ** $p < .01$

We conducted two multigroup CFAs to verify the robustness of the factor model across gender and age subgroups (see Table 2). In both analyses, the difference in CFI values of the models was not greater than 0.01. Adding metric invariance to the configurational invariance did not lead to significantly worse fit for gender or age and the CFIs did not change more than 0.01. Moreover, adding scalar invariance did not lead to significant differences for age ($p = 0.07$), but it did for gender ($p = 0.03$). However, the CFIs did not change by more than 0.01, leading to the conclusion that measurement invariance was achieved across gender and age groups.

Table 2 Multigroup CFA results

Invariance model	χ^2 (df)	$\Delta\chi^2$ (df)	p	CFI	GFI	RMSEA (90% CI)
Gender: Women ($n = 229$) vs men ($n = 81$)						
Configurational invariance model	204.99 (79)	5.66 (9)	.77	.94	.89	.072 (.06—0.084)
Metric invariance model	207.91 (80)	2.92 (1)	.09	.94	.89	.072 (.06—0.084)
Scalar invariance model	228.55 (90)	20.64 (10)	.03	.93	.87	.071 (.059—0.082)
Age: Younger ($n = 161$) vs older ($n = 149$)						
Configurational invariance model	200.42 (79)	5.44 (9)	.79	.94	.89	.071 (.059—0.083)
Metric invariance model	200.74 (80)	0.32 (1)	.57	.94	.89	.070 (.058—0.082)
Scalar invariance model	217.75 (90)	17.01 (10)	.07	.93	.88	.068 (.056 -0.079)

N=310

Internal Consistency and Test–Retest Reliability

The reliability of the RTQ-10 was examined by calculating internal consistency coefficients and test–retest correlation coefficients. The internal consistency coefficient of the RTQ-10 was very high ($\alpha=0.93$). The three-week test–retest correlation was good ($r=0.74$).

Convergent Validity

The convergent validity of the RTQ-10 was examined by evaluating the correlations between the PTQ, RRS-10, PSWQ, and DASS-21. All the correlation coefficients were significant (all p 's < 0.01). The correlations with the RRS-10, PSWQ and DASS-21 were moderate (all r 's ≥ 0.62), and the correlation with PTQ total score was strong ($r=0.87$). Expectedly, RTQ-10 scores were also strongly correlated with all three PTQ subscale scores: core features ($r=0.86$), unproductiveness ($r=0.78$) and mental capacity ($r=0.74$). The correlation coefficients between the DASS-21 total and RTQ-10 ($r=0.62$) and PTQ ($r=0.66$), which are measures of similar constructs, were also similar. Table 3 reports all bivariate correlations.

To investigate the prediction utility of the RTQ-10 for depression, anxiety, and stress symptoms, three separate linear regression analyses were also performed. In these analyses, the RTQ-10 predicted depression, anxiety, and stress subscales of the DASS-21. According to the results, the RTQ-10 significantly predicted anxiety symptoms, $R^2=0.35$, $F(1, 259)=142.51$, $p < 0.001$. Approximately one-third of the variance of anxiety symptoms was explained by the RTQ-10. The RTQ-10 also predicted depression, $R^2=0.26$, $F(1, 259)=95.07$, $p < 0.001$ and stress symptoms, $R^2=0.33$, $F(1, 259)=130.02$, $p < 0.001$, accounting for around one-quarter and one-third of the variance, respectively.

Incremental Validity

To test the incremental validity of the RTQ-10 for predicting psychological distress, a series of hierarchical linear regression analyses was conducted in which the DASS-21 total score was treated as a dependent variable, and the additional predictive utility of the RTQ-10 was tested by entering it after the PTQ, RRS-10, and PSWQ in separate models. Adding the RTQ-10 significantly increased the proportion of variance in psychological distress, explaining an additional 1% to 11%. The hierarchical regression analyses were then reversed to examine the unique variance in psychological distress explained by the RRS-10, PTQ, and PSWQ beyond the RTQ-10. Adding the PTQ, RRS-10, and PSWQ significantly increased the proportion of variance in psychological distress each model explained by 5% to 16% (see Table 4 and 5).

Table 3 Correlations among the variables, and Cronbach's alpha coefficients

	α	1	2	3	4	5	6	7	8	9	10	11	12
1. RTQ-10	.93	-											
2. PTQ-Core Features	.95	.86	-										
3. PTQ-Unproductiveness	.78	.78	.82	-									
4. PTQ-Mental Capacity Captured	.89	.74	.80	.76	-								
5. PTQ-Total	.96	.87	.97	.90	.88	-							
6. PSWQ	.91	.62	.64	.64	.54	.66	-						
7. RRS-10-Brooding	.77	.65	.59	.55	.55	.61	.58	-					
8. RRS-10-Reflection	.74	.45	.44	.39	.38	.45	.40	.58	-				
9. RRS-10-Total	.83	.62	.58	.53	.52	.59	.89	.89	.88	-			
10. DASS-21 Depression	.86	.51	.54	.55	.50	.57	.45	.61	.51	.63	-		
11. DASS-21 Anxiety	.85	.59	.59	.56	.51	.60	.52	.61	.47	.61	.64	-	
12. DASS-21 Stress	.82	.57	.60	.56	.47	.60	.60	.65	.48	.64	.69	.77	-
13. DASS-21 Total	.93	.62	.64	.62	.55	.66	.58	.70	.54	.70	.88	.89	.91

N = 261, All correlation coefficients significant at .001

RTQ-10 Repetitive Thinking Questionnaire Short Version, PTQ Perseverative Thinking Questionnaire, PSWQ Penn-State Worry Questionnaire, RRS-10 10-Item Ruminative Response Scale, DASS-21 Depression Anxiety Stress Scale

Table 4 The hierarchical regression results above RTQ-10 in predicting psychological distress

	Variable	B	95% CI for B		SE B	β	R^2	ΔR^2
			LL	UL				
Analysis 1	Step I						.44	.43***
	Constant	16.32***	12.73	19.90	1.82			
	PTQ Total	0.57***	0.49	0.65	0.04	0.66***		
	Step II						.45	.44*
	Constant	14.56***						
	PTQ Total	0.41***	0.25	0.57	0.08	0.47***		
Analysis 2	Step I						.49	.49***
	Constant	6.33***	1.89	10.78	2.26			
	RRS-10 Total	1.51***	1.32	1.70	0.09	0.70***		
	Step II						.55	.55***
	Constant	3.26	-1.05	7.56	2.19			
	RRS-10 Total	1.09***	0.86	1.31	0.12	0.50***		
Analysis 3	Step I						.34	.34***
	Constant	11.86***	6.82	16.90	2.56			
	PSWQ Total	0.56***	0.47	0.66	0.05	0.59***		
	Step II						.46	.45***
	Constant	7.63**	2.90	12.37	2.40			
	PSWQ Total	0.31***	0.20	0.42	0.06	0.32***		
	RTQ-10	0.54***	0.39	0.68	0.07	0.43***		

$N=261$ * $p < .05$, ** $p < .01$, *** $p < .001$

Discussion

The aims of this study were to examine (H_1) whether the unitary structure of the English version of the RTQ would be replicated using a Turkish version and demonstrate measurement invariance across gender and age, (H_2) the internal consistency and test–retest reliability of the RTQ-10, (H_3) the convergent validity of the RTQ-10 by evaluating the correlations with the PTQ, RRS-10, PSWQ, and DASS-21, (H_4) the power of the RTQ-10 to explain emotional symptoms, and (H_5) incremental validity by examining the extent to which different measures of repetitive thinking explain psychological distress above and beyond the RTQ-10.

Our first hypothesis was (H_1) that the Turkish version of the RTQ-10 would have a unitary structure. In support of this prediction, all RTQ-10 items loaded onto one factor. This result is consistent with studies confirming the single-factor structure of the RTQ-10 in both adolescent (McEvoy et al., 2019) and adult samples (McEvoy et al., 2014). Consistent with our first hypothesis (H_1), the single-factor model was invariant across gender (women vs. men) and age groups (above vs below 26 years). The RTQ-10 was found to perform consistently regardless of gender and age. These

Table 5 The hierarchical regression results beyond RTQ-10 in predicting psychological distress

	Variable	B	95% CI for B		SE B	β	R^2	ΔR^2
			LL	UL				
Analysis 1	Step I						.39	.39***
	Constant	15.30***	11.26	19.34	2.05			
	RTQ-10	0.79***	0.67	0.90	0.06	0.63***		
	Step II						.45	.44***
	Constant	14.56***	10.69	18.44	1.97			
	RTQ-10	0.27*	0.03	0.50	0.12	0.21*		
Analysis 2	PTQ Total	0.41***	0.25	0.57	0.08	0.47***		
	Step I						.39	.39***
	Constant	15.30***	11.26	19.34	2.05			
	RTQ-10	0.79***	0.67	0.90	0.06	0.63***		
	Step II						.55	.55***
	Constant	3.25	-1.05	7.56	2.18			
Analysis 3	RTQ-10	0.39***	0.26	0.52	0.07	0.31***		
	RRS-10 Total	1.09***	0.86	1.31	0.12	0.50***		
	Step I						.39	.39***
	Constant	15.30***	11.26	19.34	2.05			
	RTQ-10	0.79***	0.67	0.90	0.06	0.63***		
	Step II						.46	.45***
Analysis 3	Constant	7.63**	2.90	12.37	2.40			
	RTQ-10	0.54***	0.39	0.68	0.07	0.43***		
	PSWQ Total	0.31***	0.20	0.42	0.06	0.32***		

$N=261$ * $p < .05$, ** $p < .01$, *** $p < .001$

findings indicate that both women and men and, and older and younger people, interpret and respond to the RTQ-10 items in a consistent manner. This finding is consistent with a study demonstrating that the Swedish version that RTQ-10 has a stable structure across age and gender (Gavazzeni et al., 2019). Another study confirmed the structural invariance of the English version of the RTQ-10 across diagnostic groups in a clinical sample (Shihata et al., 2021).

Consistent with our second hypothesis, the reliability analyses showed that the scale's internal consistency reliability was excellent, and the test–retest reliability was good. RTQ-10 scores in this study were therefore relatively stable (trait-like), they did fluctuate to some degree. Also, it is essential to note that just because RNT is considered a trait, it does not mean that it cannot change. In one study, McEvoy et al. (2015) found large treatment effects (Cohen's $d > 2.00$) on the RTQ-10 from a relatively brief, group-based intervention. It would be useful to investigate the RTQ-10's sensitivity to change cross-culturally, along with mediators and moderators of change.

In line with our third hypothesis, the RTQ-10 demonstrated convergent validity by being positively, significantly, and moderately to strongly correlated with

alternative measures of RNT (RRS-10, PSWQ, PTQ). Also, as hypothesized, the RTQ-10 was significantly and moderately associated with depression, anxiety, and stress symptoms. In order to test the fourth hypothesis of the study, we examined the predictive power of RTQ-10 on depression, anxiety, and stress symptoms. The regression results confirmed that RTQ-10 contributed significantly to these three psychological distress symptoms, supporting the transdiagnostic nature of the RNT (*see* Harvey et al., 2004; McEvoy et al., 2013, 2018).

To test the fifth hypothesis, the present study also examined the contributions of the RTQ-10, PTQ, RRS-10, and PSWQ to explaining unique variance in psychological distress. The contribution of the RTQ-10 to the variance of psychological distress beyond the PTQ was small but significant (1%), as was the contribution of the PTQ over the RTQ-10 (5%). The finding that the RTQ-10 and PTQ explained a small proportion of unique variance in psychological distress was unsurprising given that the PTQ and RTQ-10 were both developed as transdiagnostic trait measures of repetitive thinking. The unique contributions of the RRS-10 and PSWQ to explaining psychological distress beyond the RTQ-10 were also significant (15% and 6%, respectively), as was the RTQ-10 to explaining unique variance beyond RRS-10 and PSWQ (6% and 11%, respectively). The RTQ-10 contains items expressing difficulty in stopping thinking at a general level for repetitive thinking. In contrast, the scale items of the RRS-10 contain statements such as “Think “Why do I have problems other people don’t have?”. The RRS-10 items differ in that it includes mental processes, such as the difficulty in understanding and making sense of why the experiences happen to that person, as well as the mental processes. These content and wording differences may account for their unique contribution to predicting psychological distress. However, while each measure of RNT explained unique variance in the dependent variable the incremental variance for some models was relatively small, so the meaningfulness of this additional variance and therefore the value of administering multiple measures of RNT is unclear. The RTQ or PTQ appear to explain similar proportions of variance in psychological distress, so either could be used. The main advantage of the RTQ-10 is brevity. Including the PSWQ or RRS may add predictive utility if the aim is to estimate psychological distress, but in practice one measure is likely to be sufficient to estimate the degree to which an individual is engaging in RNT and whether treatment effectively modifies this mechanism.

These findings have several implications. First, the RTQ-10 can be used to measure the trait repetitive thinking in the Turkish sample. Second, the Turkish version of RTQ-10 appears cross-sectionally predictive of psychological distress with respect to depression, anxiety, and stress. Third, the brevity of the RTQ-10 may be useful in clinical practice compared to longer measures, although future research needs to validate the Turkish version with clinical samples.

This study had several limitations. The first limitation is that most of the sample consisted of women and undiagnosed adults, so studies with more diverse and clinical samples are required. Although the participants came from the community sample, the sample’s representativeness of the broader Turkish population is unclear. Further studies should focus on the psychometric qualities of the scale in clinical populations and balanced samples in terms of demographic characteristics. Although common method variance results indicated that this issue might not be a limitation for our

study, validating the RTQ-10 with experimental measures of repetitive negative thinking (e.g., Reilly et al., 2018) would be informative in future studies. Third, this study did not measure symptoms other than depression, anxiety, and stress, so future studies should investigate a broader array of negative emotions (e.g., shame). Such limitations should be considered alongside some notable strengths. The first strength of the research is that it was carried out in a relatively large sample. Second, a comprehensive assessment of reliability and validity, including test–retest reliability and measurement invariance, was conducted. Third, during the adaptation phase, a robust and comprehensive method of translation was carried out. Fourth, this study assessed relationships between the RTQ-10 and other disorder-specific and transdiagnostic measures of repetitive thinking (RRS-10, PSWQ, and PTQ) validated in a Turkish sample.

In conclusion, this study aimed to translate the RTQ-10, which assesses transdiagnostic trait repetitive thinking, into Turkish and comprehensively assess its psychometric properties. The Turkish version of the RTQ-10 demonstrated robust structural, convergent, and incremental validity, internal consistency, and test–retest reliability. With the confirmation of the psychometric properties of the Turkish version of the RTQ-10, we believe that researchers and clinicians will have access to a brief trait measurement of RNT. The findings related to RNT in the Turkish context will contribute to international RNT literature and will allow for future cross-cultural research. Although it was an adaptation study, our aim in publishing this research in an international journal was to pave the way for possible future cross-cultural studies and to reveal the scale’s psychometric properties in different cultures to a broader audience.

Data availability The datasets generated during and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics Approval The Pamukkale University Social and Humanities Research and Publication Ethics Committee (Protocol No: E-93803232–622.02–144915) granted the relevant approval for this study. All procedures performed in studies involving human participants were following the ethical standards of the institutional and/or national research committees and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Consent to Participate Informed consent was obtained from all individual participants.

Competing Interests The authors have no competing interests.

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