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Research Article

Psychometric validation of the Turkish Trypophobia Questionnaire and determinants of trypophobia symptoms in a community-based sample

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ABSTRACT

Background: Trypophobia describes aversive responses to clustered visual patterns, but its epidemiology and cross-cultural measurement remain insufficiently studied. This study evaluated the psychometric properties of the Turkish Trypophobia Questionnaire (TQ) and examined factors associated with symptom severity.

Methods: This cross-sectional study included 261 community participants aged ≥15 years. Reliability and construct validity were assessed using internal consistency measures, exploratory and confirmatory factor analyses, and parallel analysis. Independent associations with TQ scores were examined using multivariable linear regression with HC3 robust standard errors.

Results: The TQ showed high internal consistency (Cronbach's α=0.968; McDonald's ω=0.970), but 61.7% of participants had the minimum score. Parallel analysis favored one factor, whereas one-factor CFA showed poor fit (CFI=0.768, TLI=0.726, RMSEA=0.230). Higher scores were independently associated with female sex and psychiatric disorders, while age and educational level showed inverse associations.

Conclusions: The Turkish TQ showed strong internal consistency, but its structural validity remains uncertain because of the marked floor effect and poor CFA fit. Further validation using independent samples and methods appropriate for ordinal data is needed.

Keywords: trypophobia, psychometric validation, reliability, construct validity, Türkiye

Introduction

Trypophobia refers to a marked aversive response to clustered visual patterns, particularly groups of holes, bumps, pores, or similar repetitive structures. Although its name implies a fear response, affected individuals frequently describe disgust, visual discomfort, and unpleasant bodily sensations rather than fear alone (1-3). This distinction has shaped the current view of trypophobia as a perceptual–emotional phenomenon rather than a conventional specific phobia. Its associations with disgust processing, anxiety-related traits, and other forms of emotional vulnerability have also raised broader questions about how visual characteristics acquire aversive emotional significance (3-5).

Available epidemiological data suggest that trypophobic responses are not uncommon, although their reported frequency varies

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considerably. Studies in different populations have estimated prevalence at approximately 10–18%, with differences in sampling, assessment procedures, and diagnostic thresholds likely contributing to this variability (1,6,7). Demographic associations are similarly inconsistent. Some studies report greater symptom severity among women and younger individuals, but these findings have not been consistent across populations (4,7,8). Cultural context and exposure to trypophobia-related material, particularly through digital media, may further influence how people perceive and report these visual patterns (7,8).

Two main explanations have been proposed for the aversion produced by clustered patterns. One focuses on their visual properties, particularly spatial-frequency characteristics capable of producing visual discomfort (1). The other places greater emphasis on disease avoidance. From this perspective, clustered patterns may resemble visual cues associated with infection, parasites, or skin lesions and consequently evoke disgust and avoidance as part of the behavioral immune response (9-11). The latter account is supported by evidence that aversion becomes particularly strong when such patterns are presented on skin or other biologically meaningful backgrounds (12,13). Experimental work also indicates that disgust is generally more prominent than fear during exposure to trypophobic stimuli (5,11). Physiological and neurophysiological responses reported during stimulus exposure further suggest that the experience involves both perceptual and affective processes (14,15).

Trypophobia has also been associated with psychological characteristics extending beyond the immediate response to visual stimuli. Higher levels of anxiety sensitivity, trait anxiety, disgust sensitivity, neuroticism, depressive symptoms, and psychological distress have been reported among individuals with stronger trypophobic responses (4,7,16). These associations do not establish trypophobia as a psychiatric disorder, but they suggest that individual differences in emotional vulnerability may contribute to symptom severity. Understanding these relationships is therefore relevant when examining trypophobia at the population level.

The Trypophobia Questionnaire (TQ) is widely used to quantify these responses in research settings (17). The original instrument showed good psychometric performance, and subsequent work, including a Japanese adaptation and Rasch analysis, has provided additional evidence regarding its reliability and measurement characteristics (18,19). Nevertheless, questions remain concerning its latent structure and its performance across languages and populations. Such issues are particularly important for a construct whose expression may be influenced by cultural and contextual factors.

Evidence from Türkiye remains scarce, and a Turkish version of the TQ has not been adequately evaluated in a community sample. This limits both the assessment of trypophobia within the Turkish population and comparisons with findings reported elsewhere. Therefore, the present study evaluated the psychometric properties of the Turkish TQ in a community-based sample and examined the distribution of trypophobia symptoms and their demographic and clinical correlates. We specifically assessed reliability and construct validity and explored whether symptom severity varied according to age, sex, educational level, psychiatric/neurological history, and self-reported phobia status.

Materials and Methods

Study design and participants

This cross-sectional study was conducted in Tokat Province, Türkiye, to evaluate trypophobia symptoms and the psychometric properties of the Turkish version of the Trypophobia Questionnaire (TQ). Participants

were recruited voluntarily from the community and completed a self-administered questionnaire. Individuals aged ≥15 years who could complete the questionnaire independently were eligible. Questionnaires with missing data were excluded, leaving 261 participants with complete data for analysis.

Ethical approval

The study was approved by the Clinical Research Ethics Committee of Gaziosmanpaşa University Faculty of Medicine (Approval No. 17-KAEK-158; Meeting No. 2017/16; December 12, 2017) and conducted in accordance with the Declaration of Helsinki. All participants received information about the study and provided written informed consent. Participation was voluntary and responses were anonymous.

Questionnaire

The questionnaire collected age, sex, educational level, physician-diagnosed psychiatric or neurological disorders, and self-reported phobias. Education was recorded in seven ordered categories, from illiterate to doctoral degree. Participants were also asked whether they had a specific phobia, including trypophobia. Thus, the variable "any phobia" was based on self-report and could overlap with the TQ outcome.

The 14-item TQ was completed after participants viewed standardized trypophobia-evoking images (Figure 1). Items assessed emotional and somatic responses to clustered-hole stimuli and were rated from 1 (not at all) to 5 (extremely). Total scores ranged from 14 to 70, with higher values indicating more severe trypophobia symptoms.

Statistical analysis

Analyses were performed using IBM SPSS Statistics version 29 (IBM Corp., Armonk, NY, USA), with psychometric analyses conducted in R (version 4.x). Continuous data are reported as mean ± standard deviation or median (interquartile range), as appropriate, and categorical data as numbers and percentages. Normality was assessed with the Shapiro–Wilk test. Because TQ scores were non-normally distributed, two-group comparisons used the Mann–Whitney U test, comparisons across educational categories used the Kruskal–Wallis test, and associations with age were examined using Spearman's correlation.

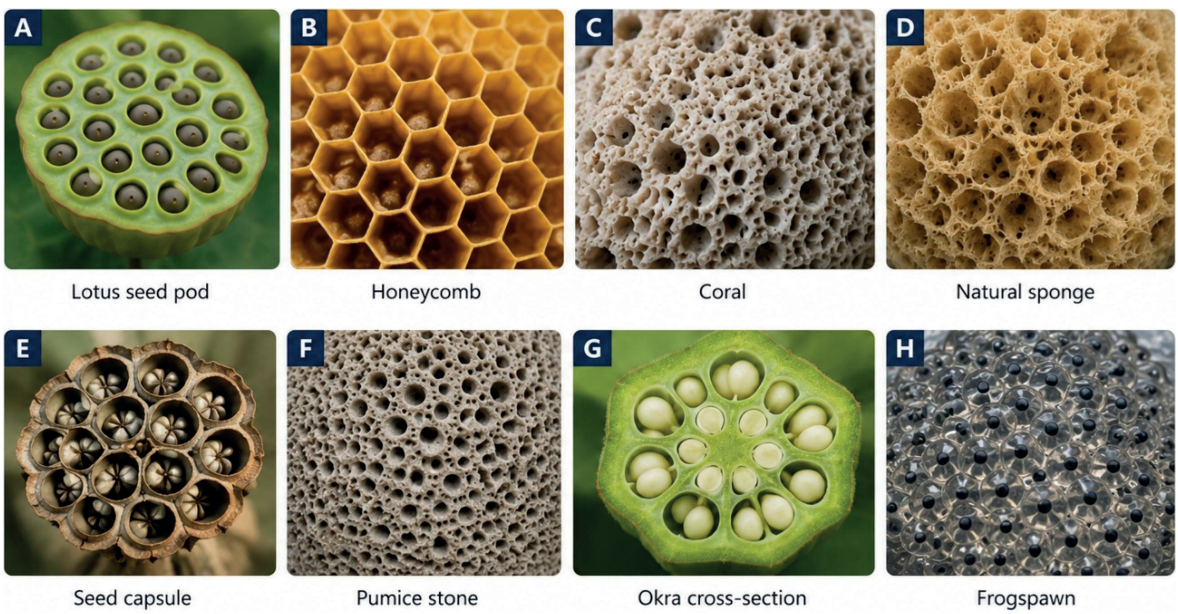

Figure 1. Representative clustered visual stimuli used to illustrate trypophobia-related patterns.

Internal consistency was evaluated with Cronbach's alpha, McDonald's omega, corrected item–total correlations, and alpha if item deleted. Construct validity was examined using the Kaiser–Meyer–Olkin measure, Bartlett's test of sphericity, parallel analysis, exploratory factor analysis (EFA), and one-factor confirmatory factor analysis (CFA). CFA fit was evaluated using the Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR).

A multivariable linear regression model was used to examine associations of age, sex, educational level, physician-diagnosed psychiatric/neurological disorders, and self-reported phobia with total TQ scores. Education was entered as an ordered seven-level variable. Because model residuals showed heteroscedasticity and non-normality, HC3 heteroscedasticity-consistent robust standard errors were used. Results are reported as unstandardized coefficients (B), robust standard errors, 95% confidence intervals, variance inflation factors, and p-values.

Results

Participant characteristics

A total of 261 participants with complete data were included in the study. The mean age of the participants was 36.62 ± 12.54 years, with a median age of 36 years (IQR: 26–44; range: 15–74). Of the participants, 147 (56.3%) were male and 114 (43.7%) were female. At least one psychiatric disorder was reported by 25 participants (9.6%), and 56 participants (21.5%) reported at least one phobia (Table 1).

Distribution of scale scores

The mean total TQ score was 20.57 ± 11.98, with a median of 14 (IQR: 14–22) and an observed range of 14–66 (Figure 2). A total of 161 of 261 participants (61.7%) obtained the minimum possible total score of 14, constituting a pronounced observed floor effect and indicating limited discrimination at the low-symptom end in this sample. The Shapiro–Wilk test indicated that normality was not met ($W = 0.623$, $p < 0.001$); therefore, non-parametric methods were used for group comparisons.

Table 1. Demographic and clinical characteristics of the participants.

Variable	Category	n	%	Mean ± SD	Median (IQR)	Range
Age (years)	Overall	261	—	36.62 ± 12.54	36 (26–44)	15–74
Sex	Male	147	56.3	—	—	—
	Female	114	43.7	—	—	—
Educational level	Illiterate	11	4.2	—	—	—
	Primary school	58	22.2	—	—	—
	High school	43	16.5	—	—	—
	Associate degree	28	10.7	—	—	—
	Bachelor's degree	109	41.8	—	—	—
	Master's degree	9	3.4	—	—	—
	Doctoral degree	3	1.1	—	—	—
Psychiatric disorder	No	236	90.4	—	—	—
	Yes	25	9.6	—	—	—
Any phobia	No	205	78.5	—	—	—
	Yes	56	21.5	—	—	—

SD, standard deviation; IQR, interquartile range.

Table 2. Descriptive statistics and reliability of the trypophobia scale.

Measure	n	Mean ± SD	Median (IQR)	Range	Cronbach's α	McDonald's ω	Distribution
Total score	261	20.57 ± 11.98	14 (14–22)	14–66	0.968	0.970	Non-normal; Shapiro–Wilk W = 0.623, p < 0.001
Mean item score	261	1.47 ± 0.86	1.00 (1.00–1.57)	1.00–4.71	—	—	—

SD, standard deviation; IQR, interquartile range.

Table 3. Item analysis and one-factor solution results.

Item	Mean	SD	Corrected item–total correlation	Cronbach's α if item deleted	Factor loading	Communality	Interpretation
Something crawling on my skin	1.460	0.930	0.766	0.967	0.768	0.590	Strong
Desire to scratch	1.650	1.160	0.805	0.966	0.792	0.628	Strong
Feeling uncomfortable	1.660	1.190	0.802	0.967	0.795	0.632	Strong
Disgust	1.640	1.160	0.883	0.965	0.878	0.771	Strong
Fear	1.490	1.040	0.857	0.965	0.869	0.755	Strong
Itching sensation	1.460	0.950	0.831	0.966	0.843	0.711	Strong
Shivering	1.380	0.900	0.848	0.966	0.872	0.760	Strong
Goosebumps	1.570	1.090	0.832	0.966	0.841	0.707	Strong
Irritability	1.380	0.940	0.811	0.966	0.842	0.709	Strong
Anxiety	1.420	0.980	0.842	0.966	0.865	0.748	Strong
Nausea	1.410	0.980	0.824	0.966	0.834	0.696	Strong
Feeling like going crazy	1.300	0.830	0.843	0.966	0.874	0.763	Strong
Panic	1.300	0.830	0.827	0.966	0.854	0.729	Strong
Avoiding objects with holes	1.460	1.130	0.729	0.968	0.744	0.554	Strong

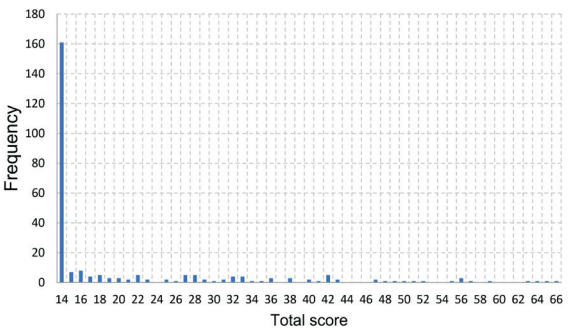

Figure 2. Distribution of total Trypophobia Scale scores.

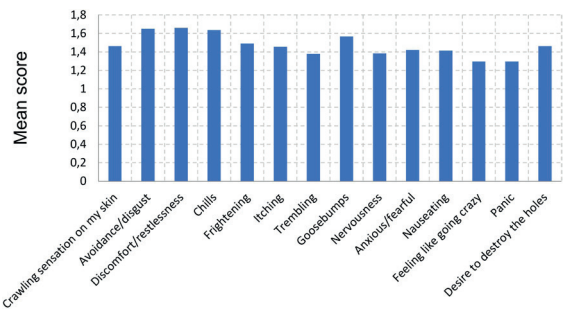

Figure 3. Mean scores of the questionnaire items.

Reliability and item analysis

The scale demonstrated excellent internal consistency (Cronbach's α = 0.968; McDonald's ω = 0.970). Corrected item–total correlations ranged from 0.729 to 0.883, factor loadings in the one-factor solution ranged from 0.744 to 0.878, and communalities ranged from 0.554 to 0.771. Removal of any individual item did not increase Cronbach's α coefficient (Table 2, Table 3, and Figure 3).

Construct validity

The Kaiser–Meyer–Olkin (KMO) measure was 0.926, indicating excellent sampling adequacy, and Bartlett's test of sphericity was statistically significant [$\chi^2(91) = 4567.30$, $p < 0.001$]. With 261 participants for 14 items, the achieved sample size corresponded to approximately 18.6 participants per item. Parallel analysis suggested a single-factor structure, with the first factor explaining 72.1% of the total variance (Figure 4). The reported one-factor CFA used a Pearson/maximum-likelihood approach and showed inadequate fit [$\chi^2(77) = 1137.71$; CFI = 0.768, TLI = 0.726, RMSEA = 0.230], whereas SRMR was acceptable (0.072) (Table 4). Because the items are ordinal and responses showed a pronounced floor effect, these results should be regarded as an internal structural evaluation rather than independent confirmation. Independent validation using polychoric correlations with WLSMV or ESEM is warranted.

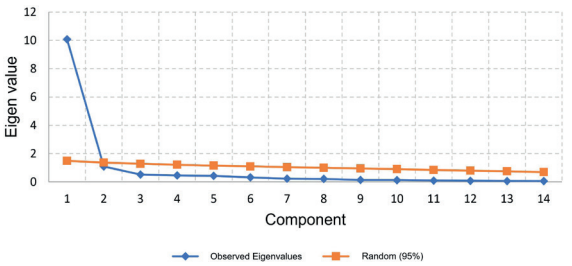

Figure 4. Results of the parallel analysis.

Group comparisons

Women had significantly higher total scores than men [median (IQR): 14 (14–30) vs. 14 (14–17); U = 6863.5, p = 0.004, r = −0.181]. Participants with a psychiatric disorder had significantly higher scores than those without a psychiatric disorder [27 (14–40) vs. 14 (14–19); U = 4259.0, $p < 0.001$, r = 0.444]. Likewise, participants reporting any phobia had higher total scores than those without a phobia [14 (14–33) vs. 14 (14–18); U = 6896.0, p = 0.008, r = 0.201]. No significant differences were observed among educational groups (H = 9.560, p = 0.144), and no significant correlation was found between age and the total score ($\varrho = -0.021$, p = 0.732) (Table 5).

Table 4. Construct validity and factor analysis results.

Indicator	Value	Interpretation	CFA index	Value	Recommended threshold	Result	Note
KMO	0.926	Excellent sampling adequacy	χ^2 (df = 77)	1137.71	p < 0.001	Significant	Pearson/ML confirmatory analysis
Bartlett's test	$\chi^2(91) = 4567.30$; p < 0.001	Suitable for factor analysis	CFI	0.768	≥ 0.90	Poor fit	
Parallel analysis	One factor	A unidimensional structure was suggested	TLI	0.726	≥ 0.90	Poor fit	
First eigenvalue	10.089	Explained 72.1% of the total variance	RMSEA	0.230	≤ 0.08	Poor fit	
			SRMR	0.072	≤ 0.08	Acceptable	

Although the parallel analysis suggested a one-factor structure, the overall fit of the one-factor confirmatory factor analysis (CFA) was poor. For ordinal Likert-scale items, CFA based on polychoric correlations using the weighted least squares mean and variance adjusted (WLSMV) estimator or exploratory structural equation modeling (ESEM) is recommended in an independent sample. Performing both exploratory factor analysis (EFA) and CFA on the same sample does not constitute independent validation evidence.

Table 5. Group comparisons and correlation analysis of total Trypophobia Questionnaire scores.

Comparison	Group 1	Group 2	Test	Statistic	p	Effect size	Interpretation
Sex	Male: 14 (14–17)	Female: 14 (14–30)	Mann–Whitney U	U = 6863.5	0.004	r = −0.181	Higher scores in females
Psychiatric disorder	Yes: 27 (14–40)	No: 14 (14–19)	Mann–Whitney U	U = 4259.0	<0.001	r = 0.444	Moderate effect size
Any phobia	Yes: 14 (14–33)	No: 14 (14–18)	Mann–Whitney U	U = 6896.0	0.008	r = 0.201	Small effect size
Educational level	Seven groups	—	Kruskal–Wallis	H = 9.560	0.144	—	Not significant
Age vs. total score	—	—	Spearman's correlation	ϱ = −0.021	0.732	—	Not significant

Table 6. Multivariable determinants of total Trypophobia Questionnaire scores: Linear regression with HC3 robust standard errors.

Variable	B	Robust SE	z	p	95% CI	VIF	Interpretation
Age (years)	−0.112	0.054	−2.091	0.037	−0.217 to −0.007	3.43	Negative association
Female (reference: male)	3.315	1.491	2.223	0.026	0.392 to 6.237	1.79	Positive association
Educational level (1–7)	−1.649	0.558	−2.956	0.003	−2.743 to −0.556	3.75	Negative association
Psychiatric disorder (yes)	10.157	3.569	2.846	0.004	3.161 to 17.153	1.14	Strongest positive association
Any phobia (yes)	3.840	2.102	1.827	0.068	−0.280 to 7.959	1.39	Borderline; not statistically significant

Model summary: n = 261; R^2 = 0.158; adjusted R^2 = 0.141; F = 6.384; p < 0.001.
The model identifies statistical associations and should not be interpreted as demonstrating causality.

Multivariable analysis

The multivariable linear regression model using HC3 robust standard errors was statistically significant (F = 6.384, p < 0.001) and explained 15.8% of the variance in the total score (R^2 = 0.158; adjusted R^2 = 0.141). Age (B = −0.112, 95% CI: −0.217 to −0.007; p = 0.037) and educational level (B = −1.649, 95% CI: −2.743 to −0.556; p = 0.003) were independently associated with lower total scores. Female sex (B = 3.315, 95% CI: 0.392–6.237; p = 0.026) and the presence of a psychiatric disorder (B = 10.157, 95% CI: 3.161–17.153; p = 0.004) were independently associated with higher total scores. The presence of any phobia did not reach statistical significance (B = 3.840, 95% CI: −0.280 to 7.959; p = 0.068) (Table 6).

Main findings

In this sample, the trypophobia scale demonstrated excellent internal consistency and a strong common factor structure. However, the pronounced floor effect and the poor fit of the one-factor CFA model suggest that the construct validity of the scale should be re-evaluated in an independent sample using ordinal analytical approaches. Female sex and the presence of a psychiatric disorder were independently associated with higher trypophobia scores.

Discussion

The present study evaluated the Turkish version of the TQ in a community sample and examined factors associated with trypophobia symptoms. The distribution of scores was notably uneven, with 61.7% of participants

obtaining the minimum possible score and a smaller group reporting substantially greater symptoms. Despite this pronounced floor effect, the questionnaire showed excellent internal consistency and a strong dominant factor in exploratory analyses. The one-factor CFA, however, showed poor fit. These findings suggest that the TQ items capture closely related experiences, but they also show that high reliability should not be taken as evidence of a satisfactory underlying structure.

Reported rates of trypophobia differ across populations and study methods (1,6-8). We did not use a diagnostic cut-off, so our data cannot be used to estimate prevalence. Notably, 61.7% of participants had the minimum TQ score, whereas higher scores were concentrated in a much smaller group. This strong floor effect also suggests limited discrimination among individuals with few or no symptoms.

Women had higher TQ scores than men, and this association remained significant after adjustment. Similar sex differences have been reported in previous studies, although the pattern has not been consistent across populations (4,7,8). Psychiatric/neurological disorders showed an even stronger relationship with TQ scores. Participants reporting such a diagnosis had substantially higher scores, in line with previous studies linking trypophobia with anxiety sensitivity, depressive symptoms, psychological distress, disgust sensitivity, and neuroticism (4,7,16). This association may indicate that trypophobic responses occur alongside broader emotional vulnerability, although the cross-sectional design does not allow the direction of this relationship to be determined.

One possible explanation involves disgust and disease avoidance. Clustered patterns may resemble visual signs associated with skin disease, parasites, or contamination and may therefore evoke avoidance responses related to the behavioral immune system (9-11). Experimental studies reporting stronger aversion when clustered patterns appear on human skin or other biologically relevant backgrounds support this possibility (12,13). However, disgust sensitivity, anxiety, physiological responses, and behavioral immune activation were not directly measured in the present study. These mechanisms therefore remain possible explanations rather than conclusions that can be drawn from our data.

The psychometric findings deserve particular attention. Cronbach's alpha (0.968) and McDonald's omega (0.970) showed excellent internal consistency, while parallel analysis identified a dominant factor explaining 72.1% of the variance. In contrast, the one-factor CFA showed poor fit, particularly for CFI, TLI, and RMSEA. This apparent discrepancy is not necessarily unexpected because internal consistency and structural validity reflect different measurement properties (20,21). Highly correlated items can produce high reliability even when a strict unidimensional model does not adequately represent the response structure. The pronounced floor effect may also have contributed to the poor CFA performance because strongly skewed ordinal responses can affect conventional covariance-based estimation (22,23). The present findings therefore support the presence of a strong common component but do not confirm strict unidimensionality. Future validation using polychoric correlations and estimators appropriate for ordinal data, such as WLSMV, would provide a more appropriate test of the scale structure.

Age and education require more cautious interpretation. Age was not associated with TQ scores in the unadjusted analysis but showed a small inverse association after adjustment, making a simple age effect difficult to establish. Higher education was also independently associated with lower scores, although the highest educational categories included relatively few participants. Possible explanations involving habituation, cognitive appraisal, or sociocultural exposure cannot be tested with the present data. Interpretation of

the self-reported "any phobia" variable is also complicated by the inclusion of trypophobia itself in this category. Although participants reporting any phobia had higher scores in the unadjusted analysis, the association did not remain statistically significant in the multivariable model. A strength of the study is that these relationships were examined together rather than relying solely on unadjusted comparisons. The community-based sample, item-level psychometric assessment, complementary measures of reliability and factor structure, and use of robust standard errors further strengthen the analysis.

Limitations

This study has several limitations. Participants were volunteers from a single province, which may limit generalizability, and psychiatric and neurological diagnoses were self-reported. The cross-sectional design prevents causal interpretation. In addition, the available records did not allow full reconstruction of the translation/adaptation process or all details of stimulus presentation. The pronounced floor effect may have reduced discrimination at the lower end of the scale and affected the factor-analytic results. Finally, EFA and CFA were conducted in the same sample, and the one-factor CFA showed poor fit. The Turkish TQ therefore requires confirmation in an independent sample using methods appropriate for ordinal data.

Conclusion

The Turkish TQ showed excellent internal consistency, although its structural validity remains uncertain because of the marked floor effect and poor one-factor CFA fit. TQ scores were higher among women and participants with self-reported psychiatric/neurological disorders, while age and education showed inverse associations after adjustment. Further validation in independent samples using ordinal psychometric methods is needed.

Ethical approval

The study was approved by the Clinical Research Ethics Committee of Gaziosmanpaşa University Faculty of Medicine (Approval No. 17-KAEK-158; Meeting No. 2017/16; December 12, 2017).

Author contribution

The authors confirm contribution to the paper as follows: Study conception and design: HA; data collection: SSG,HA; analysis and interpretation of results: SSG; draft manuscript preparation: HA. All authors reviewed the results and approved the final version of the manuscript.

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Conflict of interest

The authors declare that there is no conflict of interest.

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