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Original Research

The Tinnitus Acceptance Questionnaire (TAQ): A Study of Validity and Reliability in Turkish

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Abstract

Objective: To create a Turkish version of the Tinnitus Acceptance Questionnaire (TAQ) and to examine its reliability and validity in an adult population.
Method: A total of 92 individuals (56 females, 36 males) with a mean age of 47.59±13.58 years and a diagnosis of tinnitus were included in this validation study. The subjects completed the Turkish version of the TAQ. The Tinnitus Handicap Inventory (THI), which has Turkish validity and reliability, was also completed. Internal consistency and reliability of the Turkish version were assessed using Cronbach's alpha. In 24 individuals, test-retest reliability was assessed. Intraclass correlation (95% confidence interval), Spearman correlation, and Cronbach's alpha coefficient were used for test-retest reliability and internal consistency. The statistical significance level was set at 0.05. Number (n), frequency (%), arithmetic mean, standard deviation, median, percentage 75, and percentage 25 were used to evaluate the data.
Results: In the reliability analysis, Cronbach's alpha coefficients of Factor 1, Factor 2, and Factor 3 for TAQ were 0.84, 0.74, and 0.65, respectively. The Cronbach's alpha coefficient of the total scale is 0.71. The model fit criteria indicate a good fit to the structure (RMSEA<0.08, CMIN/DF<3, GFI, AGFI, NFI>0.80, and CFI>0.90).
Conclusion: The TAQ has demonstrated internal consistency and construct validity for assessing tinnitus acceptability in the Turkish adult population.

Keywords: *tinnitus, inventory, reliability, validity, tinnitus acceptance questionnaire*

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Introduction

Tinnitus is defined as the perception of a sound in the absence of an external stimulus - a phantom sensation. Chronic tinnitus is a common condition affecting approximately 10% of the general population (Baguley et al., 2013; Langguth et al., 2011). People with tinnitus are known to suffer greatly from this symptom, and it affects their quality of life (Murphy, 2012; Nondahl et al., 2007). Since there is no objective method for assessing tinnitus, psychosomatic evaluation becomes crucial. Self-report scales play an important role in tinnitus assessment, as experiences vary from person to person (Ivansic et al., 2019). These scales are essential for understanding how tinnitus affects people's daily lives, how they perceive it, and for determining effective treatment plans (Meikle et al., 2008). Several questionnaires have been developed to assess tinnitus (Fackrell et al., 2016; Hallam et al., 2004; Newman et al., 1996). The Tinnitus Handicap Inventory (THI) developed by Newman et al. (Newman et al., 1996) has been validated and found to be reliable in Turkish (Aksoy et al., 2007). We decided to translate and validate the Tinnitus Acceptance Questionnaire (TAQ) in addition to the THI. We chose the THI because it is a widely used questionnaire in clinical and scientific practice that primarily measures the tinnitus problem and tests the potential reduction in the THI score as a result of the applied therapy (Langguth et al., 2011; Roland et al., 2015; Shekhawat et al., 2013). The TAQ can be used by clinicians and researchers to assess patients' acceptance of tinnitus and their approach to therapy.

The aim of this study was to validate the Turkish version of the TAQ and to analyse the relationship between the assessment of chronic tinnitus and the assessment of acceptance, thinking and cognition and the severity of disability. We believe that the lack of a validated and reliable Turkish version of the TAQ may limit its use in clinical and research applications in Turkey. In addition, the importance of acceptance-based approaches in the management of tinnitus is increasingly recognised. A Turkish version of the TAQ could be particularly useful in the assessment and implementation of acceptance-based therapies, such as Acceptance and Commitment Therapy. As the prevalence of tinnitus increases in Turkey, the availability of a tool such as the TAQ could assist individuals in improving their quality of life while living with tinnitus.

Materials and Methods

The ethics committee approval of the research was obtained on August 4, 2022, with the decision number İ07-422-22 of Ankara University Faculty of Medicine Human Research

ethics committee. Informed consent was obtained from all participants, indicating their willingness to participate in the study. Scientific research and publication ethics have been complied with.

Participants

The study included 92 participants whose primary complaint was tinnitus and who were followed up at Ankara University Ibni Sina Hospital. The mean age of the participants was 47.44±14.24 years, and all participants were asked to complete the THI and TQA. Participants who agreed to participate in the retest study (n=24) were instructed to complete a second TAQ 7–14 days following the first session.

Tinnitus Handicap Inventory (THI)

The THI (Newman et al., 1996) is a 25-item scale divided into three subscales: functional (11 items measuring functional aspects of tinnitus such as social, occupational and physical functioning), catastrophic (five items reflecting depression and sleep disturbance due to tinnitus) and emotional (nine items representing emotional responses to tinnitus). Each item has one response: 'yes' (four points), 'sometimes' (two points) and 'no' (zero points). Scores are calculated for the total THI scale (range 0-100) and for three subscales: functional (THIf), catastrophic (THIc) and emotional (THIe) (range 0-44, 0-20 and 0-36, respectively). In 2007, Aksoy et al. conducted its Turkish validity and reliability (Aksoy et al., 2007).

Tinnitus Acceptance Questionnaire (TAQ)

The TAQ was developed on the basis of pain acceptance questionnaires (McCracken et al., 2004). The tested questionnaire consisted of 12 items scored on a seven-point Likert scale ranging from never true to always true [0 (never true), 1 (very rarely true), 2 (rarely true), 3 (sometimes true), 4 (often true), 5 (almost always true) and 6 (always true)]. Eight items are reverse scales, and the total score ranges from 0 to 72, with higher scores indicating greater acceptance. It is a questionnaire that examines the role of acceptance of tinnitus and the problems caused by tinnitus. The TAQ has a two-factor structure: 'Activity engagement' and 'Tinnitus suppression'. Activity engagement was associated with behavioural activation and also assessed whether or to what extent a person continued to engage in activities of daily living regardless of tinnitus. Tinnitus suppression' measured the control of tinnitus-related cognitions and emotions, providing a measure of avoidance (Weise et al., 2013).

Translation-re-translation of the TAQ

The forward translation was carried out by bilingual translators. One of the translators had a medical background, and his mother tongue was Turkish. The other bilingual translator

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with no medical background did the back translation. A team of experts, consisting of one of the researchers and an experienced bilingual translator, reviewed the first version of the TAQ. The test was administered to a randomly selected sample of patients to ensure face validity. After completing the inventory, all patients participated in a structured interview where we asked if they had any comments on the content or layout of the inventory. Based on the feedback received during the interviews and the face validity assessments, we finalized the Turkish version of the TAQ after making minor adjustments.

Statistical Analysis

In this validation study, the minimum sample size was determined to be 84 through statistical power analysis, and a total of 96 participants were included in the study. Because this number met the COSMIN guideline criteria for "very good" (7 times the number of items and at least 84) (Mokkink et al. 2019)

The data obtained from the participants were analysed on a computer using IBM SPSS 21 (Statistical Package for Social Sciences Version 23) and evaluated using AMOS 23. Number (n), frequency (%), arithmetic mean, standard deviation, median, 75 per cent and 25 per cent were used to summarise the data. For the Turkish adaptation of the scale, initial validity and reliability analyses were conducted.

Before conducting exploratory factor analysis, KMO and Bartlett's tests were conducted to assess the suitability of the sample size for factor analysis. The factor structure of the scale was used for the exploratory factor analysis using varimax rotation. In factor analysis, factors with eigenvalues >1 for items meeting the criterion of item common variance value >0.30 were accepted as a separate factor. Model fit criteria of RMSEA<0.08, CMIN/DF<3, GFI, AGFI, NFI>0.80 and CFI>0.90 were accepted as indicators of good fit.

The reliability of the scale and its sub-dimensions was assessed using Cronbach's alpha coefficient. Then, intraclass correlation (95% confidence interval), Spearman correlation and Cronbach's alpha coefficient were used for test-retest reliability and internal consistency. The statistical significance level was set at 0.05.

Results

The study included 92 participants. The mean age of all participants was 47.59±13.58 years, 47.44±14.24 years for men and 47.68±13.28 years for women. Demographic and clinical characteristics are shown in Table 1. There were more female participants (56, 60.9%) than male participants (36, 39.1%).

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Table 1. Demographic and Clinical Characteristics

		n	%
Gender	Female	56	60.9
	Male	36	39.1
Degree of hearing loss (right)	Normal	39	44.8
	Slight	30	34.5
	Mild	14	16.1
	Moderate	2	2.3
	Moderate-severe	1	1.1
	Severe	1	1.1
	Profound	0	0
Degree of hearing loss (left)	Normal	37	42.5
	Slight	24	27.6
	Mild	20	23
	Moderate	2	2.3
	Moderate-severe	1	1.1
	Severe	0	0
	Profound	3	3.4
Tinnitus location	Right	11	12.8
	Left	28	32.6
	Both ears	47	54.7
Duration of tinnitus	6 months-1 year	43	49.4
	1-2 years	14	16.1
	2 years and more	30	34.5
THI grade	Slight	13	14.1
	Mild	17	18.5
	Moderate	22	23.9
	Severe	22	23.9
	Catastrophic	18	19.6

When analysing the items of the TAQ, the highest mean is item 9 with 4.4. The lowest mean is item 11, with 2.73 (Table 2).

Table 3 shows the factor structure of the TAQ. Principal component analysis was performed using varimax rotation with an eigenvalue of 1 for the 12 items. The Bartlett's sphericity test ($\chi 2$) value was 420.683 ($p<0.001$), and the Kaiser-Meyer-Olkin coefficient was 0.70. The explanatory factor analysis yielded a three-factor structure explaining 62.769% of the total variance. The Cronbach's alpha coefficients of Factor 1, Factor 2, and Factor 3 were 0.84, 0.74 and 0.65, respectively. The Cronbach's alpha coefficient of the total scale was 0.71. The Scree plot of the three-factor TAQ is shown in Figure 1.

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Table 2. Descriptive Statistics of the Tinnitus Acceptance Questionnaire

	Mean	Standard Deviation	Percentile 75	Median	Percentile 25
Item1	3.29	1.90	5.0	3.5	2.0
Item2	4.05	1.74	6.0	4.0	3.0
Item3	3.20	1.89	4.0	3.0	2.0
Item4	2.88	2.0	5.0	2.0	1.0
Item5	3.91	1.8	5.0	4.0	3.0
Item6	4.2	1.67	6.0	4.0	3.0
Item7	2.55	1.99	4.0	2.0	1.0
Item8	4.08	1.8	6.0	4.0	3.0
Item9	4.4	1.82	6.0	5.0	3.0
Item10	3.46	2.07	5.0	4.0	2.0
Item11	2.73	1.94	4.0	3.0	1.0
Item12	3.41	2.00	5.0	3.5	2.0

Table 3. Factor Loads, Eigenvalues, Variances and Cronbach's Alpha Values

Items	Factor1	Factor2	Factor3	Communality
Item1	0.771			0.688
Item3	0.731			0.647
Item5	0.821			0.778
Item6	0.867			0.758
Item2		0.618		0.469
Item8		0.731		0.579
Item9		0.81		0.675
Item10		0.563		0.468
Item12		0.672		0.494
Item4			0.831	0.723
Item7			0.719	0.656
Item11			0.683	0.494
Eigenvalues	2.835	2.699	1.999	
Variances	23.621	22.495	16.653	
Cronbach's Alpha values	0.84	0.74	0.65	

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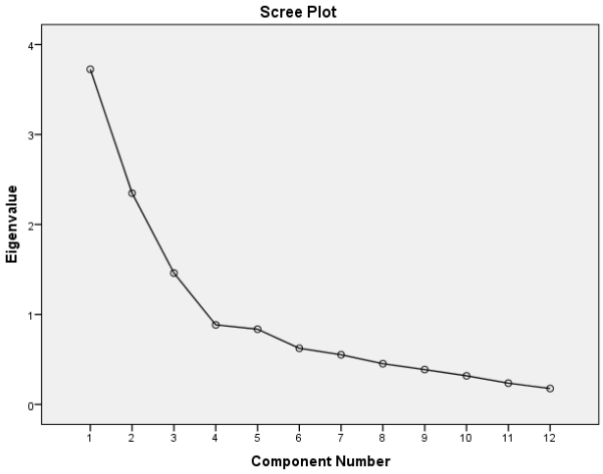

Figure 1. Scree Plot of Three-Factor TAQ

The confirmatory factor analysis model for the TAQ is shown in Figure 2. The TAQ items show good standardised factor weights and sufficient item reliability. The results of the confirmatory factor analysis show the value of the goodness of fit indices X2/df = 1.494 (<3), RMSEA = 0.074 (<0.08), CFI = 0.945 (>0.90), NFI = 0.859 (>0.80), GFI = 0.898 (>0.8), AGFI = 0.811 (>0.80). The Turkish version of the TAQ, consisting of three factors with 12 items, seems to fit the data.

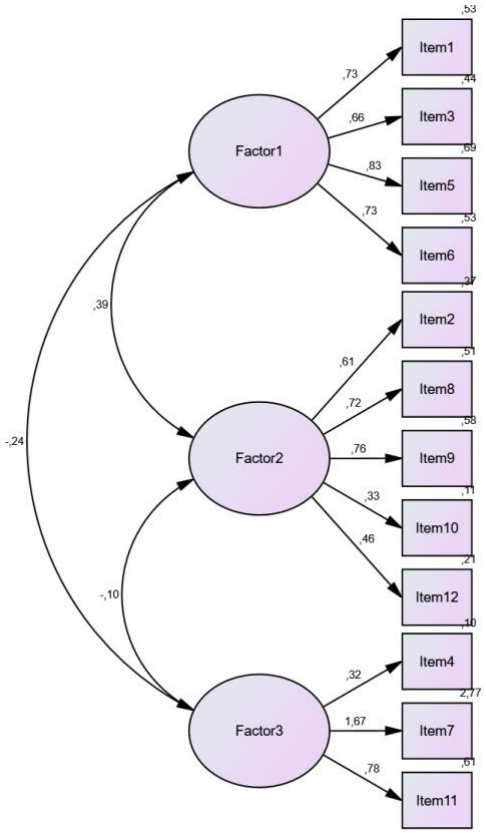

Figure 2. Path Diagram of 12-Item TAQ with Three Sub-dimensions

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In addition, the correlation analysis between TAQ and THI was evaluated using the Spearman correlation coefficient. The correlation coefficient was found to be -0.687 (Figure 3).

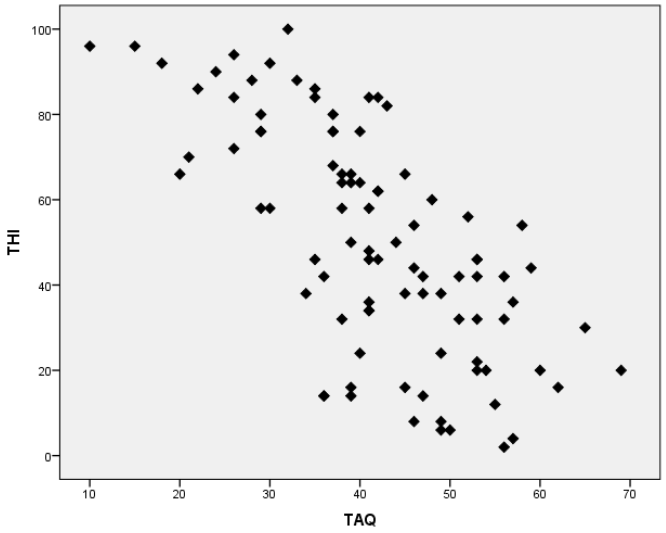

Figure 3. Scatterplot Between THI and TAQ

In Table 4, the intraclass correlation coefficient, Spearman correlation coefficient and Cronbach's alpha were calculated for test-retest reliability. For the test-retest, 24 participants were included in the study. As can be seen from the table, the values for test-retest reliability are quite high. In this case, the test-retest reliability is guaranteed.

Table 4. Test-retest Reliability of TAQ and Its Sub-dimensions

	Intraclass Correlation	**Spearman Correlation**	**Internal consistency**
	Coefficient(%95 CI)	**Coefficient**	**(Cronbach's alpha)**
Factor1	0.991 (0.978-0.996)	0.982	0.995
Factor2	0.996(0.992-0.998)	0.994	0.998
Factor3	0.992(0.981-0.996)	0.989	0.996
TAQ total	0.997(0.992-0.999)	0.995	0.998

Discussion

The main aim of our study was to provide clinicians and researchers with the validity and reliability of the TAQ questionnaire, which could facilitate the potential evaluation of therapeutic outcomes in tinnitus patients. According to the results of the study, valid and reliable Turkish versions of the TAQ questionnaire have been established. The TAQ was found to be highly successful in terms of construct and criterion validity. It can be used by clinicians

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working with individuals with tinnitus and by academics conducting international scientific research. In addition, the TAQ can be used to guide therapy for individuals. Researchers working in the field of tinnitus can use the scores and subscores to guide their approach to patients and identify factors that may influence the results of their research.

In a previous study (Weise et al., 2013) in particular, the internal consistency was similar (α = .91; tinnitus suppression: α = .68). The mean TAQ was higher in the present sample (M = 42.90, SD = 12.70 vs. M = 40.24, SD = 12.23). The results of the present study also showed that the TAQ model is psychometrically strong. The level of internal consistency, the item-total correlation coefficients and Cronbach's alpha internal consistency coefficients between the items of the TAQ were analysed, and, accordingly, the total internal consistency coefficient of the scale was 0.71. It was shown that the coefficient has a reliability coefficient above 0.70, which meets the acceptable reliability criterion established by Nunnally (Nunnally & Bernstein, 1978). The confirmatory factor analysis model for the TAQ is shown in Figure 2. The TAQ items showed well-standardised factor weights and adequate item reliability. The results of the confirmatory factor analysis show that the goodness of fit indices are X2/df = 1.494 (<3), RMSEA = 0.074 (<0.08), CFI = 0.945 (>0.90), NFI = 0.859 (>0.80), GFI = 0.898 (>0.8), AGFI = 0.811 (>0.80). It can be seen that the Turkish version of the TAQ, consisting of 12 items and three factors, is suitable for the data. In addition, the correlation analysis between TAQ and THI was evaluated using Spearman's correlation coefficient. The correlation coefficient was found to be -0.687. Intraclass correlation coefficient, Spearman correlation coefficient and Cronbach's alpha were calculated for test-retest reliability. For the test-retest, 24 participants were included in the study, and according to the results of the analysis, the test-retest reliability values were quite high. In this case, test-retest reliability was achieved.

A study (Takabatake et al., 2022) showed a strong correlation between TAQ and THI in assessing criterion and construct validity, similar to our study. The correlation coefficient was -0.687. The results showed a rather high correlation with the TAQ. Significant correlations were found between the TAQ and measures of anxiety and depression, as hypothesised when correlations with more than one variable other than the THI were evaluated. These results indicate that the Turkish version of the TAQ is as suitable as the original version for assessing tinnitus-specific acceptance.

In this study, we conducted an extensive literature review to examine data from other validity and reliability studies. For example, when we compared the TAQ with similar questionnaires, we found that factor analysis produced similar results (Takabatake et al., 2022;

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Weise et al., 2013). Examining the relationship between the data you obtained and other surveys helped you to build a more solid context for the validity and reliability of the TAQ.

We believe that TAQ's acceptance-oriented approach offers significant benefits to people living with tinnitus, as well as providing guidance to clinicians and facilitating treatment planning. The specific focus that TAQ provides may help individuals cope with their condition, resulting in a more effective recovery process. This is an important advantage for clinical applications and can contribute to the development of the field.

Conclusion

In conclusion, the factorial structure of the Turkish version of the TAQ was confirmed in this study. The results underline the importance of the concept of acceptance for tinnitus patients. In terms of clinical practice, the results suggest that it may be important to focus more on tinnitus acceptance in order to improve individual outcomes. Therefore, the use of acceptance questionnaires such as the TAQ during tinnitus assessment, tinnitus treatments or therapies will be necessary. Further research in this area should investigate tinnitus acceptance and tinnitus avoidance in individuals with tinnitus and whether and how tinnitus acceptance can be influenced by specific interventions.

The variability of participants' mood or tinnitus symptoms during the period of the survey may affect the results. Participants' experiences of tinnitus and their attitudes towards the condition may differ, which may lead to differences in the interpretation of the results. We consider these to be the limitations of our study.

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Conflict of Interest

No conflicts of interest were reported by the authors for this study.

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