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# Validation of the Shame Frequency Questionnaire in Turkish Medical Students

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## Abstract

**Background** This study aims to evaluate the Turkish validity and reliability of the Shame Frequency Questionnaire in Medical Students.

**Materials and methods** The authors conducted this methodological and cross-sectional study in February 2025 with 1,333 medical students from all six academic years at Ankara University Faculty of Medicine to evaluate the Turkish adaptation of the Shame Frequency Questionnaire and examine its psychometric properties.

**Results** The Turkish Version of the Shame Frequency Questionnaire in Medical Students demonstrated high internal consistency (Cronbach's  $\alpha = 0.906$ ), with corrected item-total correlations ranging from 0.532 to 0.781. Exploratory factor analysis supported a unidimensional structure, with all 12 items loading onto a single factor (loadings: 0.370–0.691) and explaining 49.75% of the total variance (KMO = 0.911; Bartlett's  $p < 0.001$ ). Item discrimination analysis showed significantly higher scores in the upper 27% group compared to the lower 27% group (Mann–Whitney  $U = 16.537$ ;  $p < 0.001$ ). Confirmatory factor analysis conducted on a separate subsample obtained by randomly splitting the original dataset revealed that the model fit indices did not meet conventional thresholds (e.g., Root Mean Square Error of Approximation = 0.19, Comparative Fit Index = 0.78).

**Conclusions** The Turkish version of the Shame Frequency Questionnaire in Medical Students is a valid psychometric instrument that assesses medicine-specific shame experiences and supports research on the emotional dimensions of medical education. Furthermore, it holds potential for research evaluating shame among other medical schools.

**Keywords** Emotion, Shame, Thought, Feeling, Shame frequency questionnaire, Reliability, Validity, Medical students, Turkey

## Introduction

Shame derives from a word root meaning “to hide” and is considered a self-conscious emotion [1, 2]. More comprehensively, shame can be defined as an emotion associated with individuals' self-evaluation or self-judgment in response to their mistakes or wrongdoings. It functions not only at a personal level but also as a socially significant and regulatory emotion [3].

Multiple theories and empirical studies examine the interrelationships among variables associated with academic motivation, emotions, and learning [4–6]. Beyond its emotional discomfort, shame has been recognized

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as a significant factor influencing students' overall well-being [7]. Although there are various theories regarding the causes of shame, a commonly emphasized underlying theme is the perception of failure [8]. According to Weiner's (1985) attribution theory related to causality, when individuals attribute their failures to internal, uncontrollable, and stable factors (e.g., "I'm not smart enough" or "I don't have the capacity to do this"), they are more likely to experience shame and lose motivation to make further effort [9]. Shame may adversely affect students' academic performance by fostering feelings of worthlessness and perceived inadequacy [3, 10]. These experiences are likely to result in shame related to the perception of failure and in the development of negative self-directed emotions among students [8].

Medical students' position at the lower end of the medical hierarchy makes them particularly vulnerable to experiencing shame [11, 12]. In a 2014 study, Bynum et al. noted that shame can undermine students' learning processes and may contribute to empathy difficulties in their future professional interactions with patients [13]. Moreover, students' willingness to initiate a task or their self-motivation may be negatively affected because of shame [14]. Building on these findings, and accepting that shame cannot be fully eliminated, Bynum et al. (2020) aimed to identify risk factors and support students by examining the triggers of shame in two main categories: interpersonal interactions and learning-related experiences [15].

Identifying the experience of shame in medical students and protecting them from its effects is challenging, as students who feel shame often engage in self-deprecating thoughts and avoidance behaviors. As a result, they tend to remain silent about these experiences, and only a small number share them with their peers [16]. Accordingly, we recognized the importance of assessing the frequency of shame experiences among medical students to inform interventions that could enhance their educational and professional growth. Moreover, the existing shame-related scales in the literature have not been specifically developed for medical students [17]. Previous studies on shame among medical students have primarily employed qualitative methods, focusing on how shame arises, what triggers it, and how it is experienced by learners [15, 16, 18–20]. Therefore, following comprehensive qualitative research, we aimed to adapt into Turkish the "Shame Frequency Questionnaire in Medical Students," a questionnaire meticulously developed by Bynum et al. (2024) to quantitatively assess how frequently students experience this emotion [21].

In this study, we aimed to address the following research questions regarding the existing scale: "Is the Shame Frequency Questionnaire valid in Turkish medical

students?" and "Is the Shame Frequency Questionnaire reliable in Turkish medical students?"

## Methods

This methodological study was conducted between February 1 and 28, 2025, among students at Ankara University Faculty of Medicine.

### Inclusion and exclusion criteria

Inclusion criteria included volunteering, studying at Ankara University Faculty of Medicine, being 18 years of age or older, and having sufficient Turkish reading and comprehension skills. Students that did not meet these criteria were not included in the study.

### Study population and sample size

The study universe consisted of 2,721 students enrolled at Ankara University Faculty of Medicine, including those in the Turkish-language program (2,276 students) and the English-language program (445 students). According to Comfrey and Lee, a sample size of 200 is considered fair, 300 is good, 500 is very good, and more than 1,000 is considered excellent for validity and reliability studies. It is also accepted that a sample of at least five times the number of items is sufficient for such analysis [22]. A total of 1,333 students participated, corresponding to 111 times the number of items.

### Content and language validity

We used translation and back-translation methods to ensure the linguistic validity of the Shame Frequency Questionnaire in Medical Students [23]. During the translation phase, we involved evaluators who had no prior access to the original version of the scale to minimize bias. Two bilingual experts with advanced proficiency in English and Turkish independently translated the scale into Turkish. Then, two different bilingual experts back-translated the Turkish version into English to ensure conceptual and linguistic equivalence. An independent bilingual reviewer evaluated semantic consistency and resolved discrepancies. We addressed any shifts in meaning through appropriate revisions. To provide a broad perspective, we selected translators from both medical and non-medical backgrounds. Cross-cultural adaptation involves not only translation but also cultural adjustment to ensure contextual relevance [24, 25]. Therefore, the cultural appropriateness of the scale items was evaluated by a panel of three experts, and necessary modifications were made. At the initial stage of data collection, the original 6-point Likert response format of the scale (never, once a month or less, a few times a month, once a week, a few times a week, nearly every day) was used. However, feedback from students indicated that the response options were too similar

and caused confusion. Therefore, the questionnaire was reviewed, and the authors of the original scale were contacted to inform them of the situation. With their permission, and to enhance cultural appropriateness and clarity, the response format was modified to a 4-point Likert scale (rarely, sometimes, often, almost always). It was concluded that the 4-point format would be more suitable for students in Turkey, and the data collection process was restarted. As no further negative feedback was received, this final version was adopted for the study.

To assess content validity, we provided explanations for each scale item and individually distributed them to a panel of 33 experts, including 16 family medicine specialists and professionals from various other medical fields. We asked each expert to rate the items as “essential,” “useful but inadequate,” or “not necessary.” Using the standard formula, we calculated the Content Validity Ratio (CVR) for each item [26]. The CVR values for each item were calculated as follows: 0.69, 0.69, 0.51, 0.69, 0.63, 0.21, 0.75, 0.81, 0.75, 0.51, 0.81, and 0.45. Since all CVR values were positive, we retained all items in the scale. We then calculated the overall Content Validity Index (CVI) by averaging the CVR values of all items.

According to Lawshe’s technique, with 33 expert raters, the minimum acceptable CVR value for each item was determined to be 0.33. All items, except for Item 6, exceeded the acceptable CVR threshold. For the 6th item, which initially had a CVR value of 0.21, the translation was re-evaluated with experts to improve its comprehensibility. The term “room” was replaced with “place,” as it was deemed not culturally or linguistically appropriate in the Turkish context. After consultation with the original developers, a second round of expert feedback was conducted. The CVR value was recalculated and found to be 0.45, exceeding the acceptable threshold. The CVI then reached an acceptable level, and the original developer approved the final version of the scale. The validated Turkish version of the Shame Frequency Questionnaire is provided as Supplementary File 1, while the original English version of the scale and the document containing the other questions asked to participants are provided as Supplementary File 2. We conducted a pilot study with 20 medical students, which confirmed that the items were clearly understood; however, we excluded the pilot data from the final analysis.

### Validity and reliability analysis

We conducted item analysis to evaluate the contribution of each item to the Turkish version of the Shame Frequency Questionnaire. We calculated item-total correlation coefficients and compared item mean scores between the upper and lower 27% groups. The normality of the data distribution was assessed using the Shapiro–Wilk test, and since the data were not normally

distributed, the Mann–Whitney U test was applied. To assess internal consistency, we used Cronbach’s alpha. We examined construct validity through Exploratory Factor Analysis (EFA). We evaluated the adequacy of the sample and the suitability of the correlation matrix for EFA by calculating the Kaiser–Meyer–Olkin (KMO) coefficient and performing Bartlett’s test of sphericity. Factor extraction was conducted using the principal component method, and the factor structure was determined based on the scree plot. A KMO value between 0.90 and 1.00 is considered “excellent,” 0.80–0.89 “very good,” 0.70–0.79 “good,” 0.60–0.69 “fair,” 0.50–0.59 “poor,” and below 0.50 “unacceptable.” [27]. We conducted confirmatory factor analysis using LISREL 8.71 for Windows (Scientific Software International Inc., Lincolnwood, IL), and analyzed the data using IBM SPSS Statistics for Windows, Version 20.0 (IBM Corp., Armonk, NY, USA).

### Scoring of the Turkish version of shame frequency questionnaire in medical students

The questionnaire consists of 12 items, each rated on a 4-point Likert scale ranging from 1 (rarely) to 4 (almost always). The total score ranges from 12 to 48, with no predefined cutoff value. Higher scores indicate a greater frequency of experiencing shame.

### Measures

In the original study by Bynum et al. (2024), the Shame Frequency Questionnaire demonstrated strong psychometric properties, with a single-factor structure supporting construct validity and an internal consistency reliability of  $\alpha = 0.95$ . No specific cut-off point was identified in the original study.

### Results

Of the study group, 53.9% ( $n = 719$ ) were females. Participants’ ages ranged from 17 to 39 years, with a mean  $\pm$  SD of  $20.9 \pm 2.2$ . Among the students, 26.2% ( $n = 350$ ) reported being in the first year of medical school, and 80.3% ( $n = 1071$ ) stated that their family income level was moderate, as presented in Table 1.

The scores obtained from the Turkish version of the Shame Frequency Questionnaire in Medical Students indicated a mean total score of  $20.74 \pm 7.12$ , with a median of 19.

In the study, item analysis of the Turkish version of the Shame Frequency Questionnaire in Medical Students revealed that the corrected item–total correlation coefficients, which indicate the degree to which each item is related to the total score of the scale, ranged from 0.532 to 0.781.

We observed that the removal of any item did not improve internal consistency, with the overall Cronbach’s alpha remaining at 0.906. In the EFA, the results of the

**Table 1** Sociodemographic characteristics of the study group

| Characteristics        |                   | n (%)        |
|------------------------|-------------------|--------------|
| Gender                 | Female            | 719 (53.9)   |
|                        | Male              | 606 (45.5)   |
|                        | Prefer not to say | 8 (0.6)      |
| Age                    | 18                | 238 (17.9)   |
|                        | 19                | 200 (15.0)   |
|                        | 20                | 170 (12.7)   |
|                        | 21                | 169 (12.6)   |
|                        | 22                | 217 (16.3)   |
|                        | 23                | 193 (14.5)   |
|                        | 24 and above      | 146 (11.0)   |
| Year of medical school | Year 1            | 350 (26.2)   |
|                        | Year 2            | 202 (15.2)   |
|                        | Year 3            | 195 (14.6)   |
|                        | Year 4            | 192 (14.4)   |
|                        | Year 5            | 224 (16.8)   |
|                        | Year 6            | 170 (12.8)   |
| Income level           | Low               | 163 (12.2)   |
|                        | Middle            | 1071 (80.3)  |
|                        | High              | 99 (7.5)     |
| Total                  |                   | 1333 (100.0) |

**Table 2** Item analysis results and factor loadings

| Items   | Turkish Version of the Shame Frequency Questionnaire in Medical Students |                                  |                    |                |
|---------|--------------------------------------------------------------------------|----------------------------------|--------------------|----------------|
|         | Corrected Item-Total Correlation                                         | Cronbach's Alpha if Item Deleted | Observed Item Mean | Factor Loading |
| Item 1  | 0.630                                                                    | 0.899                            | 2.23               | 0.489          |
| Item 2  | 0.582                                                                    | 0.901                            | 1.53               | 0.425          |
| Item 3  | 0.650                                                                    | 0.898                            | 1.59               | 0.518          |
| Item 4  | 0.560                                                                    | 0.902                            | 1.52               | 0.400          |
| Item 5  | 0.532                                                                    | 0.904                            | 1.87               | 0.370          |
| Item 6  | 0.627                                                                    | 0.899                            | 1.36               | 0.484          |
| Item 7  | 0.616                                                                    | 0.899                            | 1.81               | 0.472          |
| Item 8  | 0.781                                                                    | 0.890                            | 1.85               | 0.691          |
| Item 9  | 0.749                                                                    | 0.892                            | 2.01               | 0.649          |
| Item 10 | 0.733                                                                    | 0.893                            | 1.79               | 0.625          |
| Item 11 | 0.618                                                                    | 0.899                            | 1.39               | 0.466          |
| Item 12 | 0.543                                                                    | 0.903                            | 1.51               | 0.382          |

**Table 3** Exploratory factor analysis results and internal consistency coefficient

| Validity Analysis             |       |
|-------------------------------|-------|
| EFA                           |       |
| KMO                           | 0.911 |
| Bartlett's Test of Sphericity | 0.001 |
| Explained Variance            | 0.498 |
| Reliability Analysis          |       |
| Cronbach's alpha              | 0.906 |

EFA Exploratory Factor Analysis, KMO Kaiser–Meyer–Olkin

**Table 4** Comparison of upper and lower 27% groups

| Questionnaire                 |                 | Questionnaire score |                               | Statistical analysis z; p |
|-------------------------------|-----------------|---------------------|-------------------------------|---------------------------|
|                               |                 | Mean (SD)           | Median (25th–75th percentile) |                           |
| Shame Frequency Questionnaire | Upper 27% Group | 29.76 (5.24)        | 29.0 (26.0–32.0)              | 16.537; 0.001             |
|                               | Lower 27% Group | 13.32 (1.13)        | 13.0 (12.0–14.0)              |                           |

SD Standard Deviation

KMO and Bartlett's test of sphericity indicated that the data were appropriate for factor analysis. The analysis revealed that all 12 items loaded onto a single factor, with factor loadings ranging from 0.370 to 0.691. The item analysis and factor loadings of the Turkish Version of the Shame Frequency Questionnaire in Medical Students are presented in Table 2, while the results of the EFA and the internal consistency coefficient are shown in Table 3.

One of the commonly used methods in item analysis is the comparison of item mean scores between the upper and lower 27% groups. In our study, the scores obtained from the Turkish version of the Shame Frequency Questionnaire in Medical Students were compared between the upper and lower 27% groups. As expected, the upper 27% group scored higher. The comparison of these groups is presented in Table 4.

After completing the validity and reliability analysis of the Turkish version of the Shame Frequency Questionnaire in Medical Students, Confirmatory Factor Analysis (CFA) was conducted on a separate subsample obtained by randomly splitting the original dataset. A first-order confirmatory factor model was specified, in which items were loaded onto their respective latent constructs. The fit indices calculated for the scale, Chi-square/degrees of freedom ( $\chi^2/df$ ), Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), Comparative Fit Index (CFI), Goodness of Fit Index (GFI), and Adjusted Goodness of Fit Index (AGFI), did not meet the acceptable thresholds, indicating poor model fit. Modification indices were examined to identify possible areas of misfit; however, no theoretically meaningful error covariances were added, and the misfit was interpreted as structural rather than methodological. Following the CFA, the model fit indices and the proposed measurement model for the Turkish version of the Shame Frequency Questionnaire in Medical Students are presented in Table 5, Figs. 1 and 2, respectively.

Specifically, the results confirmed that the Shame Frequency Questionnaire is both valid and reliable among Turkish medical students.

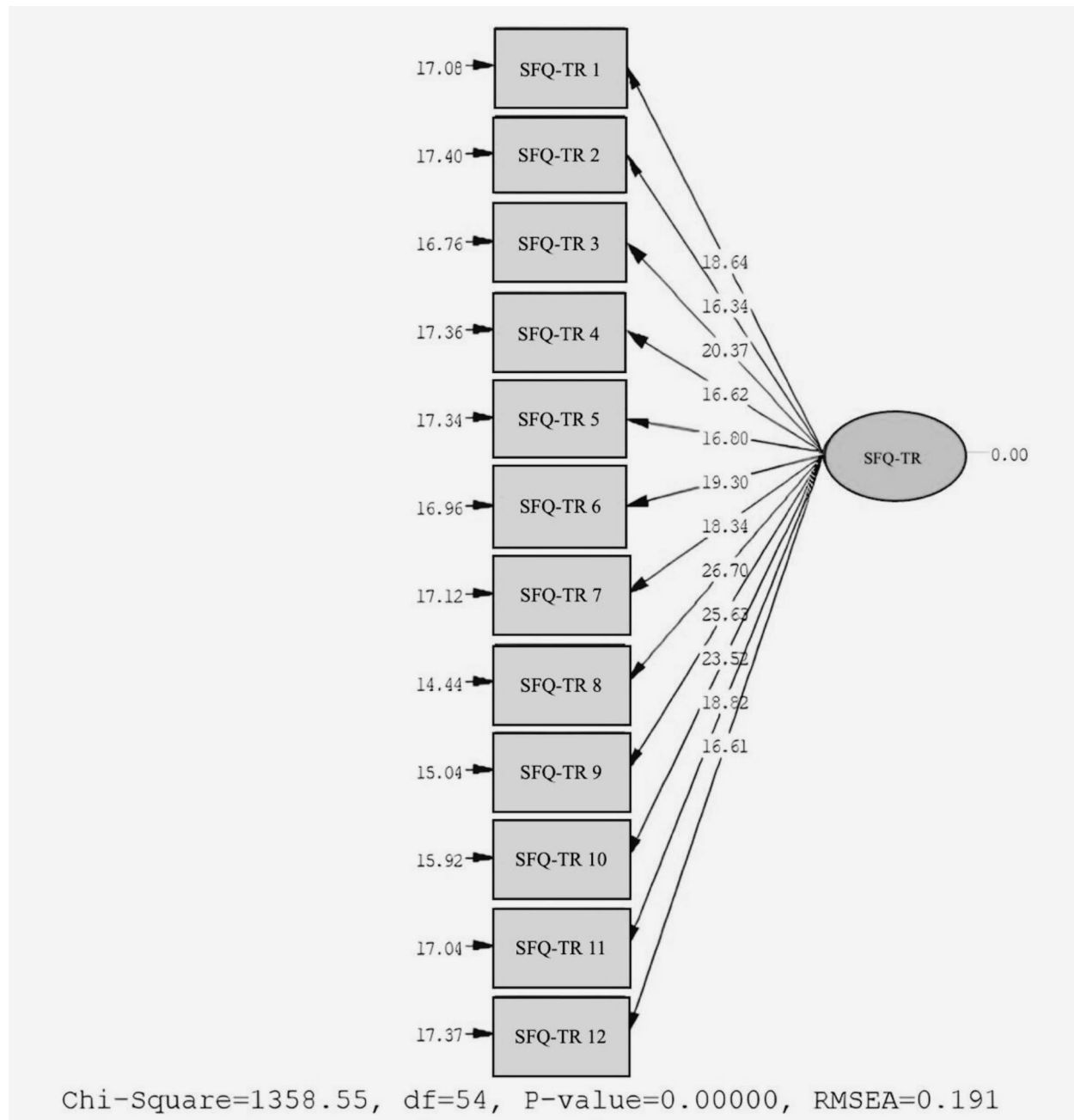
**Table 5** Model fit indices based on confirmatory factor analysis

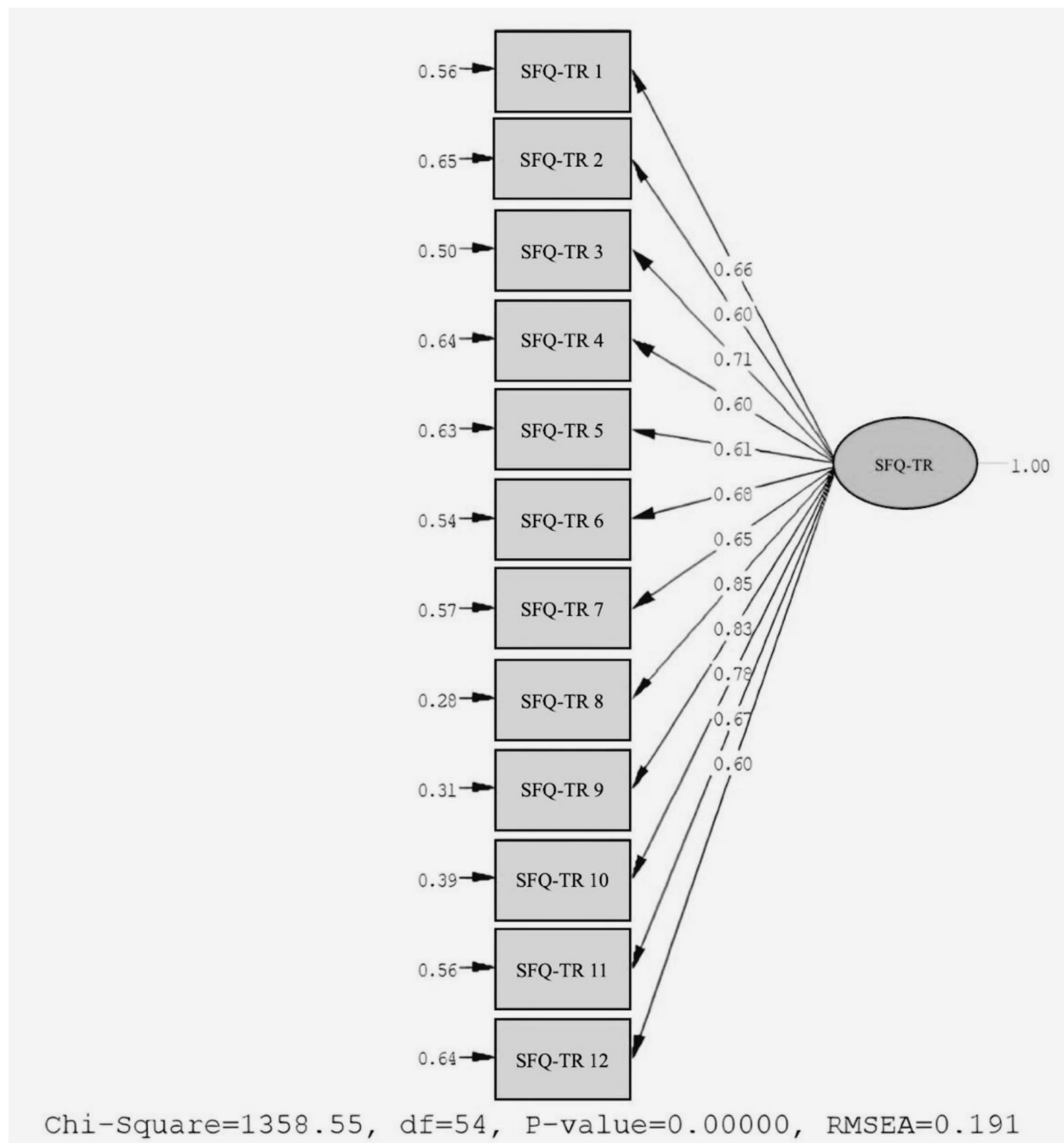
| Fit Index   | Value (Acceptable Threshold) |
|-------------|------------------------------|
| $\chi^2/df$ | 25.15 ( $\leq 5$ )           |
| RMSEA       | 0.19 ( $\leq 0.08$ )         |
| SRMR        | 0.090 ( $\leq 0.08$ )        |
| CFI         | 0.78 ( $\geq 0.90$ )         |
| GFI         | 0.74 ( $\geq 0.90$ )         |
| AGFI        | 0.63 ( $\geq 0.90$ )         |

$\chi^2/df$  Chi-square/degrees of freedom, *RMSEA* Root Mean Square Error of Approximation, *SRMR* Standardized Root Mean Square Error, *CFI* Comparative Fit Index, *GFI* Goodness of Fit Index, *AGFI* Adjusted Goodness of Fit Index

## Discussion

In this study, the Turkish validity and reliability of the Shame Frequency Questionnaire in Medical Students were examined, revealing high internal consistency ( $\alpha = 0.906$ ) and a single-factor structure. However, the CFA did not yield acceptable fit indices. Overall, the scale showed promising psychometric properties and may serve as a useful tool for assessing shame among medical students, although further refinement of its factor structure is warranted.

**Fig. 1** Proposed measurement model of the questionnaire



**Fig. 2** Standardized structural model of the questionnaire

A review of shame-related scales in the Turkish literature shows that most assess shame together with guilt and are not specific to professional or healthcare contexts. The Guilt and Shame Scale developed by Şahin (1992) includes items related to behavioral and social situations rather than the individual's self-directed thoughts (Şahin NH, as cited in Al S. [28]). The psychometric properties of the Trait Shame and Guilt Scale, which focuses on persistent feelings of shame, guilt, and pride, were

examined by Bugay et al. (2011). Unlike our scale, it is not domain-specific (e.g., healthcare) [29]. The Other as Shamer Scale-2, studied by Yıldırım et al. (2021), focuses on external shame, is intended for the general population, and does not include subjective internal evaluation [30]. The Offence-related Feelings of Shame and Guilt Scale, adapted into Turkish by Sarıçam et al. (2012), assesses feelings of shame experienced after making a mistake and concerns about how one is perceived by others [31]. The

Compass of Shame Scale, whose Turkish version was psychometrically evaluated by Akıncı et al. (2020), focuses on individuals' coping strategies related to shame [32].

Due to the lack of structurally and content-valid instruments for assessing domain-specific shame in medical students, this study aimed to validate the Turkish version of the Shame Frequency Questionnaire in Medical Students, developed by Bynum et al., and introduce it to the literature [21].

### Item analysis

Item-level analysis showed that all items had factor loadings above the acceptable threshold of 0.30 [26], suggesting an adequate representation of the underlying construct. We observed a statistically significant difference between the upper and lower 27% groups, providing evidence for the item validity of the scale [26]. The factor loadings, including subscales, reported in Turkish versions of similar domain-specific scales are as follows: the Trait Shame and Guilt Scale (0.45 to 0.81), the Other as Shamer Scale-2 (0.54 to 0.74), the Offence-related Feelings of Shame and Guilt Scale (0.36 to 0.75), and the Compass of Shame Scale (0.32 to 0.77). These values are comparable to those found in our study (0.370 to 0.691) [29–32]. The findings indicate that the items of the Turkish Version of Shame Frequency Questionnaire in Medical Students appear to have sufficient sensitivity to differentiate individuals based on their level of shame experience.

### Construct validity (Exploratory and Confirmatory Factor Analysis)

All 12 items loaded onto a single factor, supporting the unidimensional structure observed in the original version [21]. In validity and reliability studies, an adequate sample size is critical for ensuring reliable variable correlations. Accordingly, the KMO value was 0.911, indicating excellent sampling adequacy for factor analysis [27]. The Bartlett's Test of Sphericity yielded significant results ( $p < 0.001$ ), supporting the suitability of the correlation matrix for EFA, which was used to assess construct validity [26]. The findings were consistent with those reported in the original version of the scale, in which the KMO value was 0.94 for the Uniformed Services University sample and 0.91 for the Duke University School of Medicine sample, and Bartlett's Test of Sphericity was also significant ( $p < 0.001$ ) [21]. Additionally, the KMO value was found to be comparable to those reported for the Other as Shamer Scale-2 (0.87) and the Compass of Shame Scale (0.91) [30, 32].

The Turkish Version of the Shame Frequency Questionnaire in Medical Students accounted for 49.75% of the total variance. While measurement instruments are generally expected to account for 50% to 70% of the

total variance, in the field of social sciences, a variance explanation rate between 40 and 60% is typically considered acceptable [26]. Similarly, the scale explained a higher proportion of total variance compared to other related instruments, including the Other as Shamer Scale (46.42%), the Offence-Related Feelings of Shame and Guilt Scale (31.83%), and the Compass of Shame Scale (40.37%) [30–32]. In a study examining the validity and reliability of the State Shame and Guilt Scale in a Greek adult population sample, the explained variance was reported as 49.39% [33]. In the Turkish adaptation study of the External and Internal Shame Scale, the explained variance was reported to range from 32 to 59% for the internal shame subscale and from 35 to 53% for the external shame subscale [34]. The explained variance values reported in the original study (58.54% and 65.33% for different samples) indicate that the Turkish version provides evidence of adequate construct validity, though further testing in diverse samples is recommended [21].

CFA is used to test a scale's factor structure based on theory or prior analysis. Although various indices assess the fit between observed and latent variables, there is no clear consensus on which should be preferred [35]. Our factor analysis showed that factor loadings for the questionnaire were above 0.50 (Fig. 2). Therefore, the factor loadings were generally considered to be at an acceptable level.

The poor model fit observed in the CFA is likely attributable to structural rather than methodological factors. Specifically, Items 2 and 4 exhibited semantic similarity after the translation process, which may have introduced redundancy within the same factor and negatively impacted fit indices. Similar issues related to semantic overlap between items have been reported as a common source of reduced factorial distinctiveness in psychological scales [36]. Minor wording inconsistencies during translation might have affected semantic and conceptual equivalence, leading participants to interpret some items differently [23]. Another possible factor involves social desirability bias, as self-report instruments on emotional constructs are often influenced by participants' tendency to provide socially acceptable responses [37]. Additionally, the poor fit indices may stem from residual correlations among semantically similar items, which can distort model fit even in theoretically sound structures. Montoya and Edwards (2021) noted that such correlations may render fit indices misleading and lead to the erroneous rejection of valid models [38].

Collectively, these factors may explain the poor model fit and highlight the need for item refinement and further evaluation of the factor structure, including the repetition of the CFA in different student groups, especially given that both the EFA and CFA were conducted on the

same sample, to enhance the scale's generalizability in future research.

### Internal consistency

Cronbach's alpha was 0.906, indicating high internal consistency, close to the original scale (0.95) [16]. This exceeds the values typically reported for similar scales in Turkish literature (0.76–0.85) [28–32, 34]. A meta-analysis of scale development studies between 1960 to 1992 in the social sciences, particularly in psychology, reported that only 14% of published Cronbach's alpha coefficients reached 0.90 or above [39]. The alpha coefficient in our study exceeds this threshold, indicating high reliability, with all items contributing positively to the scale.

As Tangney and Dearing (2002) highlighted, shame scales face inherent limitations due to the internal and unobservable nature of the emotion, as well as individuals' difficulty in identifying or expressing it [3]. While this questionnaire addresses a gap by focusing on shame frequency with strong psychometric support, its abstract subject matter and suboptimal fit indices warrant further testing in diverse samples.

In a 2024 review on medical students' emotions and academic performance, the authors stated that due to limited research, findings regarding the impact of shame on academic performance remain inconclusive. The review indicated that shame can decrease learning motivation during simulation-based and physical examination practices; however, in some cases, it may also encourage learning by prompting students to avoid repeating mistakes. Overall, the literature describes shame as a negative emotion and emphasizes the importance of supportive learning environments, effective mentorship, and open communication in mitigating its effects [40]. Additionally, shame has been widely studied in psychology, and research on this topic has shown that shame is associated with depression, anxiety, post-traumatic stress disorder, suicidal thoughts, and burnout [41]. A study by the American Association of Oral and Maxillofacial Surgeons found that residents who frequently experienced shame were at greater risk of burnout and depersonalization compared to those who were rarely or never shamed [42]. A study examining the effects of teacher support on academic burnout with foreign language learners found that shame had an exacerbating effect on burnout. Teacher support, in turn, was shown to reduce academic burnout [43]. Considering these factors, the measurement and recognition of shame in medical education could enhance the psychological well-being and professional identity formation of future physicians.

Adapting this scale into Turkish has the potential to provide practical benefits for medical education. Measuring the frequency of shame experiences in undergraduate medical training can enhance awareness of students'

emotional states and inform the development of targeted support initiatives. Data obtained from the scale may also facilitate a deeper understanding of how students manage mistakes and challenging emotions during professional identity formation. Additionally, the scale could be utilized to monitor emotional processes in postgraduate training and clinical environments, although further research is required to validate this application.

Several limitations should be acknowledged. Given the construct under assessment, the Turkish version of the Shame Frequency Questionnaire in Medical Students is inherently sensitive to contextual and cultural factors. The CFA not falling within acceptable thresholds indicates room for improvement in model fit; therefore, further cross-validation in diverse institutional settings is recommended to confirm its robustness.

As data were collected from a single center at one time point, the findings may not be generalizable. The use of self-report measures also introduces potential biases such as social desirability, recall, and non-response bias.

Despite these limitations, the study's strong methodology, large sample, and thorough psychometric analyses stand out as major strengths, providing solid initial evidence and a foundation for further refinement and cross-cultural validation of the Turkish-adapted Shame Frequency Questionnaire in Medical Students.

### Conclusion

Unlike most existing shame scales, the questionnaire adapted in this study specifically addresses medical students' experiences of shame within the medical context. Although it requires further refinement, the Turkish version appears to be a potentially useful tool for investigating the frequency of shame among medical students. Recognizing and managing shame in medical education may contribute to supporting students' professional development and emotional well-being.

### Abbreviations

|       |                                         |
|-------|-----------------------------------------|
| CVR   | Content Validity Ratio                  |
| CVI   | Content Validity Index                  |
| KMO   | Kaiser-Meyer-Olkin                      |
| CFA   | Confirmatory Factor Analysis            |
| EFA   | Exploratory Factor Analysis             |
| RMSEA | Root Mean Square Error of Approximation |
| SRMR  | Standardized Root Mean Square Residual  |
| CFI   | Comparative Fit Index                   |
| GFI   | Goodness of Fit Index                   |
| AGFI  | Adjusted Goodness of Fit Index          |

### Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12909-025-08421-y>.

Supplementary Material 1.

Supplementary Material 2.

## Acknowledgements

We would like to extend our gratitude to all the students who participated in this study. We further express our appreciation to Dr. Will Bynum and Dr. Anthony R. Artino for their support throughout the research process.

## Clinical trial number

Not applicable.

## Previous presentations

This article is an expanded Turkish version of the thesis study previously presented on May 29, 2025, by Dr. Elif Aktı Çakır at the Department of Family Medicine, Ankara University Faculty of Medicine.

## Data

This article is derived from Elif Aktı Çakır's family medicine speciality thesis conducted at the Department of Family Medicine, Ankara University School of Medicine, focusing on the validity and reliability study of the Shame Frequency Questionnaire in Medical Students. The thesis was co-supervised by Hüsna Sarıca Çevik and Mehmet Ungan, with statistical support provided by Gülsüm Öztürk Emiral. A separate manuscript focusing on the relationships between shame and other psychological variables such as depression, anxiety, and burnout is planned to be published subsequently.

## Authors' contributions

EAÇ, HSÇ, GÖE and MU contributed to the conception and design of the study. EAÇ collected the data. GÖE performed the statistical analysis and data interpretation. EAÇ and HSÇ drafted the manuscript. HSÇ and MU supervised the study. All authors read and approved the final manuscript.

## Funding

Not applicable.

## Data availability

The datasets generated and/or analysed during the current study are not publicly available due to privacy restrictions but are available from the corresponding author on reasonable request.

## Declarations

### Ethics approval and consent to participate

The study was conducted in accordance with the Declaration of Helsinki, including, but not limited to, ensuring the anonymity of participants and obtaining their informed consent. The procedures related to this thesis study were approved by the Human Research Ethics Committee of Ankara University Faculty of Medicine on August 5, 2024, with the decision number I06-481–24. Additionally, permission to use the research data in other studies was granted on January 30, 2025, with the decision number I01-53–25.

### Consent for publication

Not applicable.

### Competing interests

The authors declare no competing interests.

Received: 10 September 2025 / Accepted: 3 December 2025

Published online: 31 January 2026

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