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# Extending the Turkish EDE-Q-13 to adolescents: a psychometric validation study

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## Abstract

**Background** Eating disorders are increasingly prevalent during adolescence, a critical developmental stage, and there is a pressing need for concise, yet robust assessment tools tailored for this age group. This study evaluated the psychometric properties of the Turkish version of the Eating Disorder Examination Questionnaire-13 (EDE-Q-13) among healthy adolescents.

**Methods** A total of 223 participants aged 10–17 years were recruited from Istanbul University-Cerrahpaşa, Faculty of Medicine. Internal consistency, test–retest reliability, and construct validity were examined through Cronbach's alpha, McDonald's omega, Composite Reliability (CR), Average Variance Extracted (AVE), confirmatory factor analysis (CFA), and correlations with the Eating Attitudes Test-26 (EAT-26) and the Body Appreciation Scale-2 (BAS-2).

**Results** The total scale showed high internal consistency ( $\alpha = 0.86$ ,  $\omega = 0.85$ ), with subscale reliabilities ranging from acceptable to good ( $\alpha = 0.60$ – $0.87$ ). CFA supported the original five-factor structure, yielding satisfactory model fit indices (CMIN/df = 1.58, RMSEA = 0.05, CFI = 0.97, TLI = 0.97). Test–retest reliability over a 15-day interval demonstrated strong temporal stability ( $r = 0.82$ ; ICC = 0.795–0.886). Significant positive correlations with EAT-26 and negative correlations with BAS-2 confirmed convergent and discriminant validity.

**Conclusions** These findings indicate that the Turkish EDE-Q-13 is a valid, reliable, and efficient measure for assessing eating disorder psychopathology in healthy adolescents. Its brevity enhances practicality for both clinical and epidemiological research, though future validation in clinical populations is recommended.

## Plain English summary

Eating disorders are becoming more common among teenagers, and early detection is very important for effective treatment. However, many existing questionnaires are too long or not designed for young people. This study tested a short and easy-to-use tool called the Eating Disorder Examination Questionnaire-13 (EDE-Q-13) in Turkish adolescents. A total of 223 participants aged 10 to 17 years took part in the study at Istanbul University-Cerrahpaşa. Researchers checked how reliable and accurate the questionnaire is by looking at how consistent the answers were whether the results stayed stable over time, and whether the questions measured what they were supposed

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to measure. The results showed that the Turkish EDE-Q-13 is both valid and reliable. It worked well in measuring eating disorder symptoms and related attitudes toward food and body image. Because it is brief and scientifically sound, the EDE-Q-13 can be a useful tool for researchers, psychologists, and clinicians working with adolescents.

**Keywords** EDE-Q-13, Adolescents, Eating disorders, Eating attitude, Body appreciation scale

## Introduction

Eating disorders (EDs) represent a major public health issue, particularly during adolescence, a critical developmental stage characterized by profound physical, emotional, and social changes [1]. Epidemiological data indicate a global rise in the prevalence of eating disorders, with adolescence frequently marking sensitive developmental period for the emergence of disordered eating attitudes and behaviors rather than the onset of fully defined diagnostic categories [2, 3]. Symptoms and behaviors associated with EDs can lead to serious health risks, emotional distress, and marked impairments in daily functioning [4]. Therefore, early identification and intervention are essential to mitigate the long-term adverse effects on both mental and physical health [5].

The Eating Disorder Examination Questionnaire (EDE-Q) is among the most widely used self-report measures for assessing eating disorder-related attitudes and behaviors and provides a comprehensive assessment of eating disorder-specific psychopathology, rather than diagnostic classification [6–8]. The original EDE-Q consists of 28 items that assess core aspects of eating disorders, however its length may be perceived as burdensome [6, 9]. This has led to the development of shorter versions of the EDE-Q, including the 7-item [10], 8-item [11], 11-item [12], 12-item [13], 13-item [14], and 18-item [15] forms, which aim to reduce respondent burden [16].

The Eating Disorder Examination Questionnaire-13 (EDE-Q-13) is a brief self-report instrument developed by Lev-Ari et al. [14] to assess the severity of eating disorder-related attitudes and behaviors. It consists of 13 items organized to five factors: Eating Restraint, Shape and Weight Over-Evaluation, Body Dissatisfaction, Bingeing, and Purging. The EDE-Q-13 retains the three-factor structure of the original EDE-Q with strong psychometric properties while incorporating the Bingeing and Purging factors that are absent in other short versions. A strong positive correlation has been reported between the EDE-Q-13 and the original EDE-Q [14]. Compared to other short versions, it integrates both cognitive and behavioral components within its scoring framework. Due to its brevity and established reliability and validity, the EDE-Q-13 is suitable for use in research and clinical screening contexts, including the assessment and monitoring of eating disorder-related psychopathology [13, 16]. As a self-report measure, the EDE-Q-13 does not replace structured diagnostic interviews or

clinician-administered assessments required for formal diagnosis [13].

Cultural and developmental differences that influence eating behaviors necessitate the adaptation and validation of such tools in diverse populations [17]. Moreover, since adolescents constitute a significant proportion of individuals experiencing eating disorder symptoms, it is important to examine how well the instrument performs among younger individuals from both clinical and non-clinical samples [18]. Validity and reliability studies of the full-length EDE-Q in Turkish adolescents, culturally and developmentally appropriate assessment tool [19]. In a study by Esin and Ayyıldız [20], the validity and reliability of the Turkish short form of the EDE-Q13 were examined, and the scale was found to be an appropriate assessment tool for Turkish adults. However, no validity or reliability study of any short form of the EDE-Q has been conducted among Turkish adolescents to date. Examining age-specific psychometric properties is of particularly important importance when assessing individuals in adolescence. This study aims to address this gap by evaluating the validity and reliability of the Turkish version of the EDE-Q 13 in adolescents aged 10–17 years. By examining its psychometric properties, this research contributes to the availability of concise and effective tools for assessing eating disorder-related psychopathology in Turkish adolescent populations.

## Methods

### Study design and participants

This research was conducted in accordance with the Declaration of Helsinki and was formally approved by the Social and Human Sciences Research Ethics Committee of Tokat Gaziosmanpaşa University (15.08.2023; 13/01–39). Written informed assent was obtained from all participants, and written informed consent was obtained from their parents, as all participants were under 18 years of age.

The study was conducted face-to-face between September 2023 and June 2024 with 223 healthy adolescents (60.5% female, 39.5% male), aged 10–17 years, who presented to the Pediatric Endocrinology and Diabetes Nutrition Outpatient Clinic of Istanbul University-Cerrahpaşa, Faculty of Medicine, a clinical setting that also offers routine follow-up services for healthy children and adolescents. A sample size equivalent to 5 to 10 times the number of scale items is often considered adequate for conducting validity and reliability assessments

[21]. Given that the scale comprises 13 items, the target sample size was set between 65 and 130 adolescents.

The study included healthy adolescents who volunteered to participate, were literate in Turkish, and had obtained parental consent. Individuals who reported having disorder (eating disorders or psychiatric conditions etc.) were excluded based on self-reported health history.

## Measurements

### **EDE-Q-13**

The Eating Disorder Examination Questionnaire (EDE-Q), originally developed by Fairburn and Beglin [22], is a 28-item self-report instrument designed to assess eating disorder psychopathology. It evaluates eating-related behaviors over the past 28 days and encompasses four distinct subscales: Restraint, Eating Concern, Shape Concern, and Weight Concern. The Turkish adaptation of the EDE-Q for adolescent populations was validated by Yücel et al. [19].

The abbreviated version, EDE-Q-13, comprises 13 items and assesses five dimensions: Eating Restraint (ER), Shape and Weight Over-Evaluation (SWO), Body Dissatisfaction (BD), Bingeing, and Purging [14], Lev-Ari et al. [14], conducted the validation study for this shortened form, demonstrated strong positive correlations with the original EDE-Q. Reported Cronbach's alpha coefficients for the subscales were 0.99 for SWO, 0.89 for BD, 0.92 for ER, 0.89 for Bingeing, and 0.63 for Purging, indicating acceptable to excellent internal consistency.

The Turkish version of the EDE-Q-13, whose validity and reliability were previously established by our research team [20], was employed in this study to examine its applicability among adolescents. Each item is rated on a 7-point Likert scale, ranging from 0 (never) to 6 (every day), with intermediate scores corresponding to specific frequency ranges (e.g., 1 = 1–5 days, 2 = 6–12 days, etc.). Scale scores can be calculated either by summing item responses or by computing subscale totals, with higher scores indicating greater severity of eating disorder symptoms [22].

The Turkish adaptation and psychometric evaluation of the scale in adult populations were conducted by Esin et al. [20]. In that study, the internal consistency of the Turkish version was high, with a Cronbach's alpha coefficient of 0.89. The Cronbach's alpha coefficients for the five subscales ranged from 0.75 to 0.94, indicating acceptable to excellent internal consistency.

Scoring of the EDE-Q-13 involves calculating both total and subscale scores. The total score is obtained by averaging the total item scores across the entire scale, whereas subscale scores are calculated by dividing the sum of items within each subscale by the number of items in that subscale. Higher scores reflect greater severity of eating disorder-related psychopathology.

### **EAT-26**

The Eating Attitudes Test-Short Form (EAT-26), originally developed by Garner et al. [23], is a widely used self-report instrument designed to screen for symptoms and concerns characteristic of eating disorders and Cronbach's alpha coefficient of 0.94. The Turkish adaptation and psychometric validation of the EAT-26 were conducted by Ergüney-Okumuş et al. [24], who reported a Cronbach's alpha coefficient of 0.84, indicating good internal consistency. In the present study, the Cronbach's alpha coefficient was found to be 0.80, also demonstrating good internal consistency.

The scale consists of 26 items rated on a 6-point Likert-type scale, with higher scores indicating greater disordered eating attitudes. Responses were obtained using a six-point Likert scale with the options "Always," "Usually," "Often," "Sometimes," "Rarely," and "Never." According to the standard scoring procedure, responses are scored as follows: "Always" = 3, "Usually" = 2, "Often" = 1, and "Sometimes," "Rarely," and "Never" = 0. Notably, item 26 is reverse scored. The total score is obtained by summing all item scores, and higher scores indicate a greater risk for eating disorders. A score of 20 or above is considered clinically significant and warrants further evaluation.

### **Body Appreciation Scale – 2 (BAS-2)**

The Body Appreciation Scale-2 (BAS-2) is developed by Tylka and Wood-Barcalow [25], to assess the extent to which individuals hold positive attitudes toward their bodies and respect those attitudes. The scale was adapted into Turkish by Oktan and Saylan [26] and has a unidimensional structure.

The BAS-2 is a 5-point Likert-type scale consisting of 10 items, with no reverse-scored items. Participants respond to each item on a five-point scale ranging from "Strongly Disagree" to "Strongly Agree." The scores obtained from all items are summed to yield a total score, which can range from 10 to 50. Lower scores indicate a more negative evaluation of one's body, whereas higher scores reflect greater body appreciation.

In the original version of the scale [25], the Cronbach's alpha coefficient for internal consistency was reported as 0.97. In the Turkish adaptation study [26], the Cronbach's alpha value was calculated as 0.90. In present study, the Cronbach's alpha value was 0.90. These findings demonstrate that both the original and Turkish forms of the scale possess high reliability.

### **Anthropometric measurements**

The body weight and height of participants were obtained by the dietitian and assessed by established reference values. Height was measured (cm) with feet close together and the head in the Frankfort plane with a 0.1 cm stadiometer [27]. Weight was measured with an electronic

scale (nearest 0.1 kg). Body mass index (BMI) was calculated for adolescents based on their body weight and height. BMI-for-age z-scores (BAZ) were evaluated using World Health Organization (AnthroPlus) software. For this classification, those with a BAZ below  $-1$  SD were categorised as underweight, those with a BAZ between  $-1$  and  $1$  SD were categorised as normal weight, those with a BAZ between  $1$  and  $2$  SD were categorised as overweight, and those with a BAZ above  $2$  SD were categorised as obese [28].

## Procedure

### Reliability analysis and internal consistency

Reliability and internal consistency of the measurement model were assessed through Cronbach's alpha, McDonald's omega, Composite Reliability (CR), and Average Variance Extracted (AVE) indices. The psychometric evaluation of the Turkish EDE-Q-13 included assessments of reliability and internal consistency, quantified through Cronbach's alpha and McDonald's omega, where coefficients exceeding 0.60 and 0.70 were interpreted as indicating acceptable and good model fit, respectively [21].

The assessment was conducted based on the Average Variance Extracted (AVE) and Construct Reliability (CR) values. In the measurement model, the CR value of the latent was expected to exceed 0.70, while the AVE value was required to be greater than 0.50 [29].

### Test-retest reliability

Test-retest reliability was evaluated to determine the temporal stability of the questionnaire over a 2-week interval. It was preferred a 2-week (14-day) interval for the test-retest assessment because this time frame is widely recommended in psychometric reliability studies to balance recall bias and temporal stability. Furthermore, there are EDE-Q studies that have employed even shorter retest intervals ( $< 14$  days), which supports the appropriateness of short-term reliability evaluation for this instrument [30]. Temporal stability was assessed using Pearson's correlation coefficient and the intraclass

correlation coefficient (ICC) based on a two-way mixed-effects model with absolute agreement. In addition, Bland-Altman analysis was performed to evaluate the agreement between the two administrations by estimating the mean difference and the 95% limits of agreement.

According to conventional interpretation guidelines, a Pearson correlation coefficient ( $r$ ) exceeding 0.80 reflects a very strong association between the variables [31].

Interpretation of ICC values were interpreted according to the classification proposed by Oremus et al. [32]:  $< 0.40$  = poor,  $0.40-0.75$  = fair to good, and  $> 0.75$  = excellent reliability [32].

Bland-Altman analysis involves plotting the differences between the two measurements against their mean to visually examine systematic bias. The mean difference (bias) quantifies systematic error, while the 95% limits of agreement are calculated as the mean difference  $\pm 1.96 \times$  standard deviation of the differences, representing the interval within which most differences between the two measurements are expected to fall [33].

### Construct validity

For construct validity assessment, the EAT-26 and BAS-2 were also administered. Interpretation of correlation strength between two constructs followed established guidelines:  $r = 0-0.20$  (very weak),  $r = 0.20-0.39$  (weak),  $r = 0.40-0.59$  (moderate),  $r = 0.60-0.79$  (strong), and  $r = 0.80-1.00$  (very strong) [31]. Given the normal distribution of total scores for the EDE-Q-13, EAT-26, and BAS-2, Pearson's correlation coefficient was used to assess.

### Confirmatory factor analysis (CFA)

Confirmatory factor analysis (CFA) was conducted to examine the factorial validity of the EDE-Q-13 in adolescents. Model fit was evaluated based on a range of commonly used fit indices, including the chi-squared goodness-of-fit (CMIN/df), the root mean square error of approximation (RMSEA), the goodness-of-fit index (GFI), the adjusted goodness-of-fit index (AGFI), the normed fit index (NFI), the Tucker-Lewis index (TLI), and the comparative fit index (CFI). Recommended cut-off values from the literature were used to determine model adequacy. The following thresholds were adopted from the literature are given in Table 1 [34].

### Statistically analysis

All statistical analyses were performed using IBM SPSS Statistics (version 25, IBM Corp., Armonk, NY, USA) and AMOS (version 31.0., IBM Corp.). Descriptive statistics (mean, standard deviation, frequency, and percentage) were computed to summarize the sociodemographic characteristics and scale scores. Skewness and Kurtosis Tests were used to determine the normality of the distribution of the data.

**Table 1** Threshold criteria for acceptable and good model fit indices

Index	Thresholds for acceptable fit	Thresholds for good fit
CMIN/df	$\leq 5.00$	$\leq 3.00$
RMSEA	$\leq 0.08$	$\leq 0.05$
GFI	$\geq 0.80$	$\geq 0.90$
AGFI	$\geq 0.85$	$\geq 0.95$
NFI	$\geq 0.80$	$\geq 0.95$
TLI	$\geq 0.80$	$\geq 0.95$
CFI	$\geq 0.85$	$\geq 0.95$

CMIN/df Chi-squared goodness-of-fit, RMSEA Root Mean Square error of Approximation, GFI Goodness of Fit Index, AGFI Adjusted Goodness of Fit Index, NFI Normed Fit Index, TLI Tucker-Lewis index, CFI Comparative-Fit Index

Reliability was evaluated through Cronbach's alpha and McDonald's omega coefficients (calculated by *Jamovi* (Version 2.7.5). Composite Reliability (CR) and Average Variance Extracted (AVE) were also calculated for each factor. Construct validity was examined using confirmatory factor analysis (CFA) in AMOS 31.0. Model fit was assessed using multiple indices and threshold values for acceptable and good fit were determined according to established criteria in the literature.

For convergent and discriminant validity, Pearson's correlation coefficients were calculated between the EDE-Q-13, EAT-26, and BAS-2 total scores. Test–retest reliability was assessed in a subsample of 40 participants who completed the EDE-Q-13 twice, 15 days apart. Temporal stability was examined using Pearson's correlation coefficient, the intraclass correlation coefficient (ICC) based on a two-way mixed-effects model with absolute agreement, and Bland–Altman analysis. The level of statistical significance was set at  $p < 0.05$  for all analyses.

To further strengthen the evidence for criterion-related validity, the discriminatory capacity of the EDE-Q-13 total score in distinguishing individuals at risk for eating disorder symptomatology from those not at risk was examined using Receiver Operating Characteristic (ROC) analysis. The criterion (reference) classification was defined by the dichotomized EAT-26 score (0 = no risk; 1 = risk), whereas the EDE-Q-13 total score was specified as the test variable. The Area Under the Curve (AUC) was computed as a global index of discriminatory performance, representing the probability that a randomly selected individual classified as “at risk” would obtain a higher EDE-Q-13 score than a randomly selected individual classified as “not at risk.” In accordance with conventional benchmarks, AUC values of 0.50 indicate no discrimination (chance level), 0.60–0.70 poor, 0.70–0.80 acceptable to moderate, 0.80–0.90 good, and  $\geq 0.90$  excellent discrimination. Alongside the AUC

estimate, the standard error, 95% confidence interval, and statistical significance were reported [35].

In addition, sensitivity and specificity values were obtained across all possible cut-off scores, and the optimal threshold was determined using the Youden index ( $J = \text{sensitivity} + \text{specificity} - 1$ ), whereby the cut-off corresponding to the maximum J value was retained as the point providing the most favorable balance between true-positive and true-negative classification [36].

## Results

A total of 223 healthy adolescents (60.5% female, 39.5% male) aged between 10 and 17 years participated in the study, with a mean age of  $14.9 \pm 1.86$  years. Table 2 shows the general characteristics of the participants, some anthropometric measurements, and classification according to BMI-for-age z-scores (BAZ). According to the BAZ classification, 56.1% of adolescents have a normal weight, 2.2% are underweight, and 41.7% are overweight or obese. The descriptive statistics for the total and subscale scores of the EDE-Q-13 are presented in Table 3.

Table 4 presents the reliability analyses for the EDE-Q-13 among adolescents. The overall Cronbach's alpha was 0.86, with subscale values varying between 0.60 and 0.87. The McDonald's omega was 0.85, with subscale values ranging from 0.61 to 0.87. These indices meet established psychometric thresholds, supporting the internal consistency and reliability of the instrument. The factors yielded AVE values between 0.54 and 0.78 and CR values between 0.77 and 0.87, demonstrating that each construct met the commonly accepted cut-off values for convergent validity and composite reliability.

## Confirmatory factor analysis (CFA)

Confirmatory factor analysis was used to validate the five-factor structure (F1: Restricted Eating; F2: Shape

**Table 2** General characteristics of the participants

	Female (n:135)		Male (n:88)		Total (n:223)	
	X ± SD	Min–Max	X ± SD	Min–Max	X ± SD	Min–Max
Age (years)	14.7 ± 1.84	10–17	15.1 ± 1.77	10–17	14.9 ± 1.82	10.0–17.0
Body weight (kg)	58.4 ± 15.06	32–87	65.4 ± 13.8	37.5–96.0		
Height (cm)	159.7 ± 8.62	136.0–183.0	168.4 ± 13.8	145.0–195.0	–	–
BMI (kg/m <sup>2</sup> )	22.8 ± 5.71	14.9–42.17	22.9 ± 4.57	13.6–37.9	–	–
HAZ	0.06 ± 1.202	(-2.94)–3.01	0.17 ± 1.482	(-3.29)–4.22	–	–
BAZ	0.58 ± 1.507	(-2.31)–4.21	0.77 ± 1.397	(-4.08)–3.81	–	–
	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
BMI classification						
Underweight	2	4.5	3	3.4	5	2.2
Normal weight	82	60.7	43	48.9	125	56.1
Overweight	20	14.8	26	29.5	46	20.6
Obese	31	23.0	16	18.2	47	21.1

BMI body mass index, HAZ height-for-age z-score, BAZ BMI-for-age z-score

**Table 3** The scores of general and subfactors of EDE-Q-13 for adolescents

	X ± SD
F1	1.6 ± 1.66
1. Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded)?	1.6 ± 1.86
2. Have you tried to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)?	1.5 ± 1.90
3. Have you tried to follow definite rules regarding your eating (for example, a calorie limit) in order to influence your shape or weight (whether or not you have succeeded)?	1.6 ± 1.85
F2	2.4 ± 2.05
4. Has your weight influenced how you think about (judge) yourself as a person?	2.3 ± 2.16
5. Has your shape influenced how you think about (judge) yourself as a person?	2.5 ± 2.27
F3	2.8 ± 2.32
6. Have you been dissatisfied your weight?	2.8 ± 2.44
7. Have you been dissatisfied your shape?	2.7 ± 2.48
F4	1.3 ± 1.45
8. Have you eaten what other people would regard as an unusually large amount of food (given the circumstances)?	1.3 ± 1.84
9. Did you have a sense of having lost control over your eating (at the time that you were eating)?	1.4 ± 1.85
10. Have such episodes of overeating occurred (i.e. you have eaten an unusually large amount of food and have had a sense of loss of control at the time)?	1.1 ± 1.61
F5	0.5 ± 0.91
11. Have you made yourself sick (vomit) as a means of controlling your shape or weight?	0.4 ± 1.05
12. Have you taken laxatives as a means of controlling your shape or weight?	0.3 ± 1.07
13. Have you exercised in a “driven” or “compulsive” way as a means of controlling your weight, shape or amount of fat or to burn off calories?	0.9 ± 1.51
Total EDEQ Score	1.7 ± 1.23

F1 Restricted Eating, F2 Shape and Weight Over-evaluation, F3 Body Dissatisfaction, F4 Bingeing; 11–13 Purging

**Table 4** Reliability analyses for EDE-Q-13 for adolescents

EDE-Q-13-total score	Cronbach's alpha	McDonald's omega	AVE	CR
	<b>0.86</b>	<b>0.85</b>		
F1	0.87	0.86	0.69	0.87
F2	0.83	0.87	0.78	0.88
F3	0.87	0.83	0.72	0.83
F4	0.75	0.78	0.68	0.82
F5	0.60	0.61	0.54	0.77

F1 Restricted Eating, F2 Shape and Weight Over-evaluation, F3 Body Dissatisfaction, F4 Bingeing, 11–13 Purging

and Weight Over-evaluation; F3: Body Dissatisfaction; F4: Bingeing; F5: Purging), and the model fit diagram is presented in Fig. 1. The CFA results indicated an acceptable to good model fit: CMIN/df = 1.58, RMSEA = 0.05, GFI = 0.94, AGFI = 0.91, NFI = 0.94, TLI = 0.97, and

CFI = 0.97. These values met or exceeded the recommended thresholds for adequate/good model fit supporting the factorial validity of the scale. These results are illustrated in Fig. 2.

#### Test–retest reliability

The Pearson correlation coefficient between the two administrations was  $r = 0.82$  ( $p < 0.01$ ), which exceeds the 0.80 threshold and is therefore classified as a very strong correlation.

Using a two-way mixed-effects model with absolute agreement, the single-measures ICC for the EDE-Q-13 was 0.795 (95% CI 0.646–0.886,  $p < 0.001$ ), and the average-measures ICC was 0.886 (95% CI 0.785–0.940,  $p < 0.001$ ). According to the classification proposed by Oremus et al. [32], the single-measures ICC indicates excellent reliability ( $> 0.75$ ), while the average-measures ICC further supports a high level of temporal stability.

Bland–Altman analysis was conducted to visually assess the agreement between the two administrations (Fig. 3). The mean difference (bias) was  $-0.05$ , indicating no systematic bias between measurements. The 95% limits of agreement (LOA) were calculated as  $-1.19$  to  $1.09$ . Inspection of the plot revealed that the vast majority of participants' difference scores fell within these limits, supporting the conclusion that the scale produces reliable and consistent measurements over time.

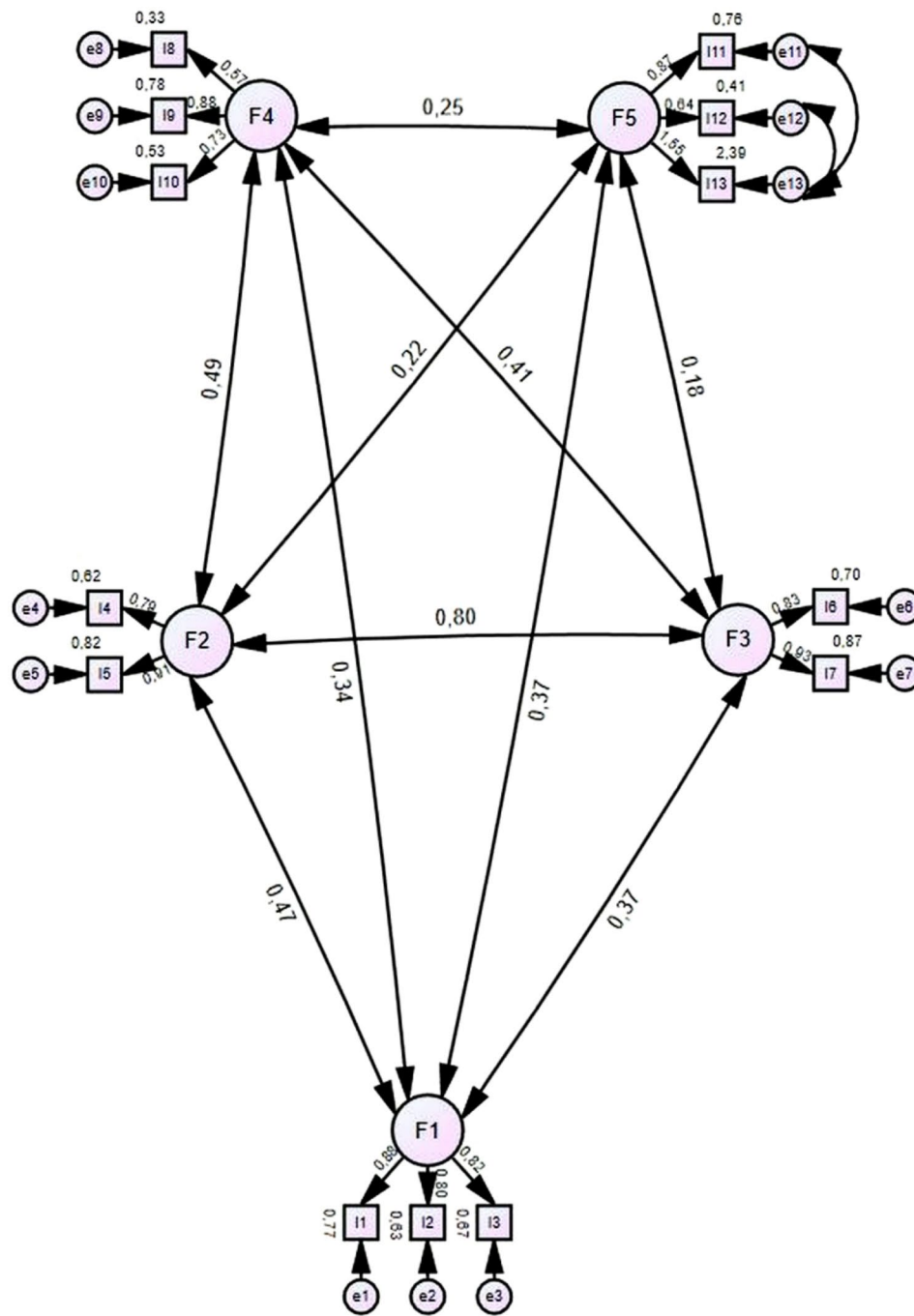
#### Construct validity

The relationship between the EDEQ-13 total score and factor scores with the EAT26 and BAS-2 scores is given in Table 5. A significant positive relationship was found between the EDEQ-13 total score and the scores of the five factors with the EAT-26 score ( $p < 0.01$ ), and a significant negative relationship was found with the BAS-2 scores ( $p < 0.05$ ).

The discriminative validity of the EDE-Q-13 total score with respect to eating disorder risk was examined using Receiver Operating Characteristic (ROC) analysis, and the analysis results are shown in Fig. 4; Table 6. The results indicated an acceptable level of discrimination (AUC = 0.729, SE = 0.036, 95% CI [0.658–0.801],  $p < 0.001$ ). According to the Youden index, the optimal cut-off point was 1.57, at which sensitivity was 0.86 and specificity was 0.52 ( $J = 0.37$ ) (Table 6).

#### Discussion

Eating disorders are common among children and adolescents and are characterized by excessive concerns about physical appearance, distorted body image, and fear of weight gain [37]. Although instruments available to assess eating disorders in adolescents (such as the EAT-26 and EDE-Q), and their Turkish adaptations

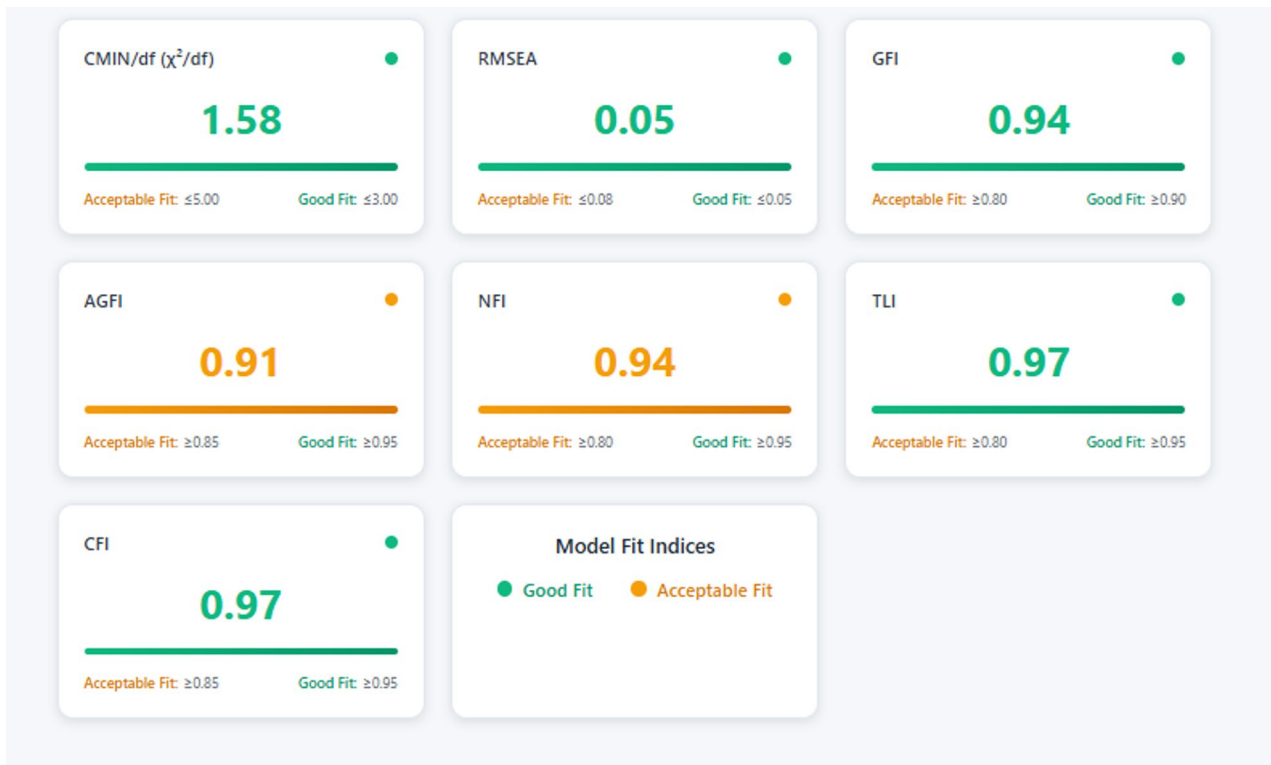


**Fig. 1** Confirmatory factor analysis of the TON-17 and five-factor model path diagram. (F1: Restricted Eating; F2: Shape and Weight Over-evaluation; F3: Body Dissatisfaction; F4: Bingeing; F5: Purging)

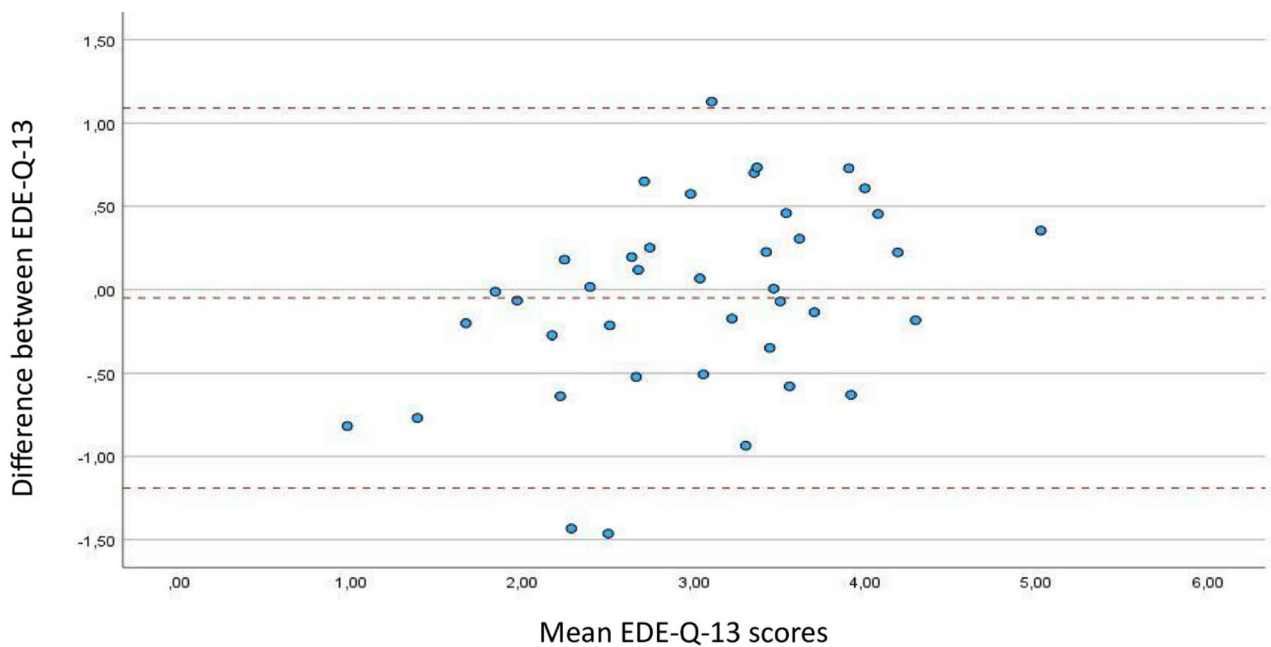
exist, these scales often include a large number of items [19, 24]. Therefore, there is a clear need for brief, comprehensive, and psychometrically sound tools to assess eating disorders in this age group. This study aimed to determine the validity and reliability of the Turkish version of the EDE-Q-13, which is reported to be a short yet comprehensive and reliable tool for identifying symptoms of eating disorders, in healthy Turkish adolescents.

The scale’s structure was evaluated using CFA, and the Turkish version of the EDE-Q-13 demonstrated a valid and reliable tool in this group. Furthermore, EDE-Q-13 showed a significant positive correlation with the EAT-26 and a negative correlation with the BAS-2, thus confirming its convergent and discriminant validity.

The results of the CFA showed that the factor structure reported in the original form was preserved in the



**Fig. 2** CFA results of EDE-Q-13 for adolescents (CMIN/df Chi-squared goodness-of-fit, RMSEA Root Mean Square error of Approximation, GFI Goodness of Fit Index, AGFI Adjusted Goodness of Fit Index, NFI Normed Fit Index, TLI Tucker–Lewis index, CFI Comparative-Fit Index)



**Fig. 3** Bland-Altman plots for EDE-Q-13

Turkish version as well. Most fit indices (CMIN/df, RMSEA, GFI, TLI, CFI) were within acceptable ranges, supporting the construct validity of the scale. Reliability analyses demonstrated that the internal consistency

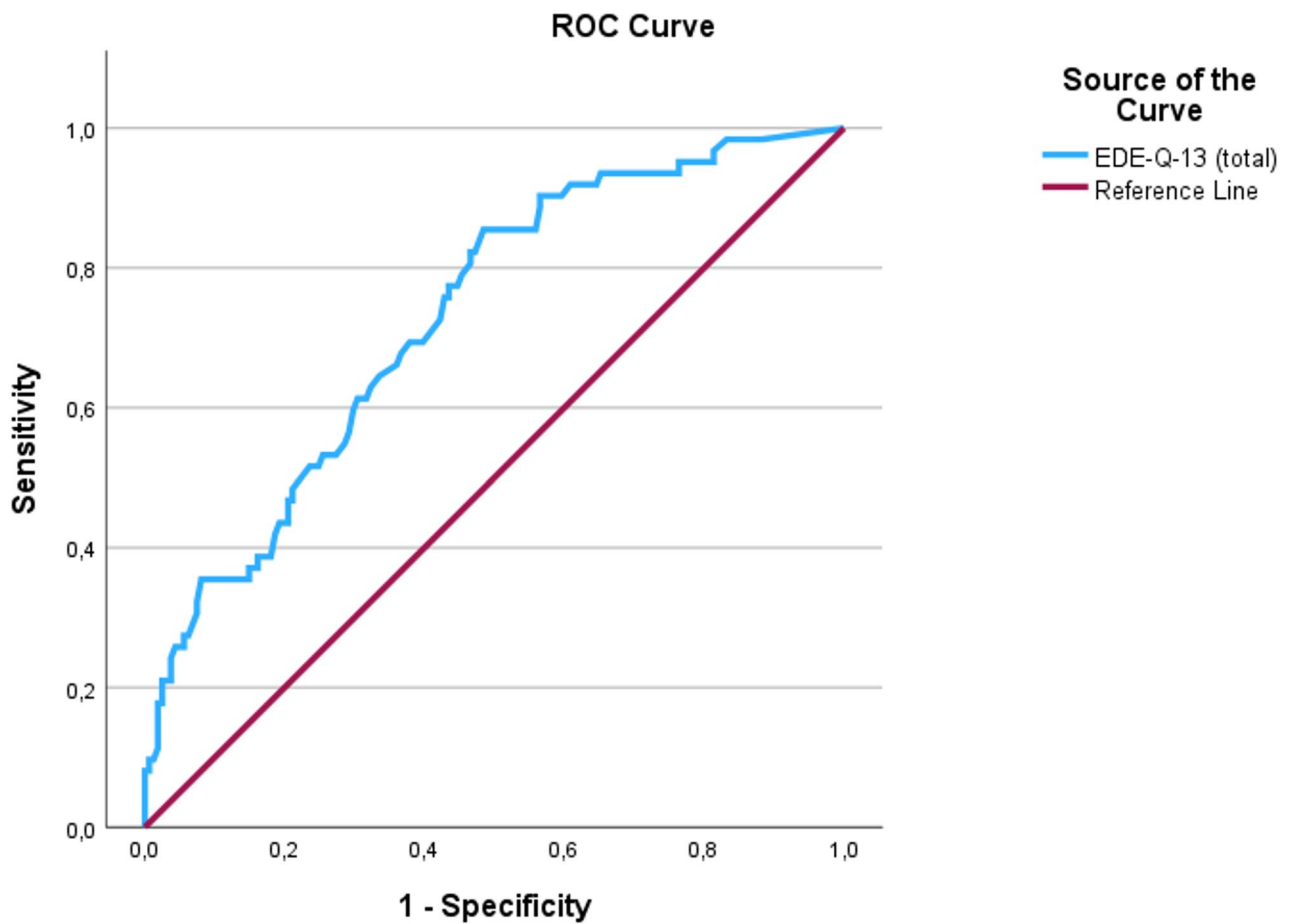
coefficients for all subscales (Cronbach’s alpha ranging from 0.60 to 0.87, and McDonald’s omega ranging from 0.61 to 0.87) and for the total scale (Cronbach’s alpha: 0.86, McDonald’s omega: 0.85) exceeded the 0.60

**Table 5** Correlation between EDEQ-13, EAT-26, and BAS-2 scores

	EAT-26	BAS-2	EDE-Q-13					
			Total score	F1	F2	F3	F4	F5
EAT-26	1							
BAS-2	-0.245	1						
EDE-Q-13								
Total score	0.464**	-0.530**	1					
F1	0.397**	-0.226**	0.669**	1				
F2	0.269**	-0.469**	0.840**	0.408**	1			
F3	0.330**	-0.592**	0.810**	0.322**	0.683**	1		
F4	0.374**	-0.304**	0.645**	0.315**	0.404**	0.350**	1	
F5	0.378**	-0.133*	0.571**	0.466**	0.316**	0.259**	0.401**	1

\*Correlation is significant at the 0.05 level (2-tailed)

\*\*Correlation is significant at the 0.01 level (2-tailed)



**Fig. 4** ROC curve for the Turkish version of EDE-Q-13 scores of the participants

**Table 6** Area under the curve (AUC) value, sensitivity, specificity, cut-off, and Youden index for Turkish version of EDE-Q-13

AUC	SE	p	Asymptotic 95% CI		Sensitivity	Specificity	Cut-off	Youden Index (J)
			Lower Bound	Upper Bound				
0.729	0.036	0.000	0.658	0.801	0.86	0.52	1.57	0.37

CI Confidence Interval, AUC Area Under the Curve, SE Standard Error

threshold, indicating internal consistency among adolescents. The intraclass correlation coefficients (single-measures ICC: 0.795; average-measures ICC: 0.886) assessing test–retest reliability were  $\geq 0.75$ , suggesting strong temporal stability.

These findings are consistent with previous research on the associations between eating attitudes, body appreciation, and eating disorder psychopathology [14, 20]. The significant positive correlation between the EAT-26 and EDE-Q-13 indicates that both instruments reliably capture eating disorder symptoms and are sensitive to overlapping psychopathological constructs. In contrast, the negative correlations observed between the BAS-2 and the EDE-Q-13 highlight body appreciation as an important protective variable against eating disorder symptomatology, supporting the notion that a positive body image is associated with lower levels of disordered eating behaviours [25].

The ROC findings provide additional evidence for the criterion-related validity of the EDE-Q-13. The AUC value of 0.729 indicates an acceptable to moderate level of discrimination between individuals at risk and those not at risk for eating disorder symptomatology. The optimal cut-off value of 1.57 yielded high sensitivity (0.86) but relatively modest specificity (0.52), suggesting that the scale performs better in detecting potential risk cases than in minimizing false positives. This pattern is consistent with the intended use of the EDE-Q-13 as a screening instrument, where prioritizing sensitivity is preferable in order to avoid missing individuals who may require further evaluation. Nevertheless, the moderate specificity indicates that positive screening results should be complemented by additional clinical assessment rather than being used as a diagnostic indicator.

Taken together, these findings indicate that the Turkish version of the EDE-Q-13 is a valid and reliable tool for assessing the risk of eating disorders in adolescents, and it can be used for both clinical and research settings. Its short form reduces administration time, making it practical for screening studies and large-scale research. Moreover, the shorter completion time may help reduce participant dropout rates in adolescent populations.

Despite its strengths, the study has some limitations. First, as the data were collected through self-report, the potential for response bias cannot be excluded. Second, although it was initially planned to recruit an equal number of male and female adolescents, the majority of participants were female, as they were more willing to participate. Finally, the findings of this study were obtained from only healthy adolescents, which limits their interpretation in clinical contexts. While non-clinical samples can offer valuable insights into early signs and risk tendencies related to eating behaviors, the results cannot be directly generalized to adolescents with

diagnosed eating disorders. Given the greater complexity of symptom severity, comorbidities, and treatment processes in clinical populations, it remains uncertain whether the identified relationships would demonstrate similar validity. Therefore, the present findings should be interpreted as supportive of clinical assessments rather than as stand-alone evidence for diagnostic or treatment decisions, and further research involving clinically diagnosed adolescent samples are required to establish their clinical validity. The EDE-Q-13 is a scale that assesses eating behaviors and attitudes, and its usability in healthy adolescents has not been previously investigated. We believe that future studies using this scale in different groups could contribute to the literature.

## Conclusions

The EDE-Q-13 is a concise, comprehensive, user-friendly, valid, and reliable instrument for identifying eating disorder symptoms among healthy Turkish adolescents. Its strong psychometric properties, combined with its practicality, make it a valuable tool for non-clinical settings and large-scale epidemiological studies.

## Abbreviations

AVE	Average variance extracted
BAS-2	Body Appreciation Scale-2
CFA	Confirmatory factor analysis
CR	Composite reliability
EAT-26	Eating Attitudes Test-26
EDE-Q-13	Eating Disorder Examination Questionnaire-13

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## Author contributions

FA and KE contributed to the design of the study, and writing the draft of the study, DGK, EB, HT and OE contributed to the data collection, and preparation of the paper, and FA and EY contributed to the data analysis, and the preparation of the paper. All the authors read and approved the final manuscript.

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## Data availability

The data that support the findings of this research are available from the corresponding author upon reasonable request due to privacy and ethical restrictions.

## Declarations

### Ethics approval and consent to participate

This research was conducted in accordance with the Declaration of Helsinki and was formally approved by the Social and Human Sciences Research Ethics Committee of Tokat Gaziosmanpaşa University (15.08.2023; 13/01–39). All participants provided written informed consent, and for individuals under the age of 18, consent was additionally obtained from their parent.

### Consent for publication

Not applicable.

### Competing interests

The authors declare no competing interests.

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