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Intuitive Eating Scale-2 for adolescents: Validity and reliability study in Turkish adolescents

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Abstract

The Intuitive Eating Scale-2 (IES-2) is currently used for this concept and consists of four sub-dimensions. This cross-sectional study aimed to determine the validity and reliability of the culturally and linguistically adapted IES-2, which examines multiple aspects of eating behavior in adults, in the Turkish adolescent population for the first time. The factor structure of the IES-2 was evaluated in study 1 ($n = 300$, 57.7% girl) using exploratory factor analysis (EFA), and in study 2 ($n = 470$, 60.9%) with confirmatory factor analysis (CFA). The Figure Rating Scale (FRS), the Emotional Eating Scale Adapted for Use in Children and Adolescents Scale (EES-C), the Children's Eating Attitudes Test (ChEAT), and BMI-Z score were used to assess convergent validity, and their relationship with IES-2 was examined. Cronbach-α, McDonald's omega, Spearman–Brown, and Guttman split-half coefficients were used for reliability analysis. The four-factor structure of the IES-2 was obtained through EFA, and items with low factor loadings were removed. The 15-item version of the scale was created and verified by CFA. The new scale adapted for adolescents is the IES-2-Turkish adolescents (IES-2-TA). Good fit index values were achieved because of CFA. The Cronbach-α coefficients for the sub-dimensions (unconditional permission to eat—UPE: 0.649, eating for physical reasons–EPR: 0.683, relying on hunger and satiety cues—RHSC: 0.871, body–food choice congruence—BFCC: 0.751) and total scale (0.789) were found to be at good values. A negative correlation was found between IES-2-TA and ChEAT, as well as EES-C, for convergent validity.

Conclusion: The analysis of data revealed that the new version of the IES-2-TA is a reliable and valid instrument to assess intuitive eating in Turkish adolescents.

What is Known:
• *Intuitive eating is an eating behavior that emphasizes internal bodily cues to guide food decisions.*
• *There is no scale to measure intuitive eating in children and adolescents in Turkey.*

What is New:
• *This scale (IES-2-TA), adapted from the adult IES-2, is valid and reliable for assessing intuitive eating in Turkish adolescents.*

Communicated by Gregorio Milani

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Abbreviations

BFCC	Body–food choice congruence
BMI	Body mass index
BMI-Z	Body mass index Z score
CFA	Confirmatory factor analysis
CFI	Comparative fit index
ChEAT	Children's eating attitudes test
CMIN/DF	Minimum discrepancy function by degrees of freedom divided
CMIN	Chi-squared value
EES-C	Emotional eating scale adapted for use in children and adolescents
EFA	Exploratory factor analysis

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EPR	Eating for physical reasons rather than emotional reasons
FRS	Figure rating scale
GFI	Goodness of fit index
HFA-Z	Height-for-age Z score
IE	Intuitive eating
IES	Intuitive eating scale
IES-2	Intuitive eating scale-2
IES-2-TA	Intuitive eating scale-2-Turkish adolescents
NFI	Non-normed fit index
RHSC	Reliance on hunger and satiety cues
TLI	Tucker–Lewis index
UPR	Unconditional permission to eat

Introduction

Obesity, driven by unhealthy diets and sedentary lifestyles, has become a significant public health issue in Turkey and globally, especially among young adults [1]. In addition to genetic factors, eating behavior, which is a modifiable behavioral factor, plays an important role in the onset and continuation of overweight/obesity [2]. Encouraging adaptive eating behaviors and reducing eating disorder symptoms are important tasks for nutritionists [3]. This is because the primary approach to obesity treatment is diet and exercise [1], but due to the limited long-term effectiveness of traditional diets, intuitive eating (IE) has attracted attention as a non-restrictive alternative [4]. IE emphasizes internal bodily cues for food decisions, promoting regular eating and well-being, while inversely related to psychological distress and disordered eating [5]. Individuals who practice IE follow natural hunger and fullness signals and allow unconditional permission to eat, significantly reducing dependence on diets [2]. The Intuitive Eating Scale (IES) originally assessed three dimensions: (1) unconditional permission to eat, (2) eating for physical over emotional reasons, and (3) hunger/fullness cues [6]. It was later revised into the IES-2 by adding a fourth factor: body–food choice congruence [7]. Though designed for adults, IE and its tools have shown benefits in adolescents, such as reduced depression, anxiety, and overeating, and better weight control [5].

Lower IE levels in adolescents correlate with higher body mass index (BMI), negative dieting behaviors for weight management, body dissatisfaction, and societal thinness pressure. Conversely, IE is positively linked to body appreciation, glycemic control, emotional well-being, and life quality [2]. Ozkan and Bilici (2021) showed in their studies that IE is positively correlated with mindful eating [8]. Another study reported significant improvement in healthy eating habits among adolescents after IE training [9]. Hazzard et al. (2021) showed that IE negatively relates to overeating, unhealthy weight control (e.g., fasting, skipping meals),

low self-esteem, and body dissatisfaction [10], suggesting IE's long-term benefits from adolescence into adulthood. A recent study also noted IE's positive effect on diet quality and a strong IES–diet quality correlation [11].

Dockendorff et al. (2012) developed the IES-Adolescents from the original 2006 IE version to assess IE in adolescents [5, 12]. In Turkey, existing IE studies focus on individuals over 19 years old [13, 14], and no current scale evaluates IE in adolescents. Therefore, this study aims to establish the validity and reliability of the culturally and linguistically adapted IES-2 among the Turkish adolescent population. In addition, to determine construct validity, we analyzed the relationship between the IES-2-TA and several variables (body mass index (BMI)-Z score, Children's Eating Attitudes Test (ChEAT), Emotional Eating Scale Adapted for Use in Children and Adolescents (EES-C), and Figure Rating Scale (FRS)) to evaluate convergent validity.

Materials and methods

Procedure

In the literature, it is reported that a sample size between 5 and 20 times the number of items in the scale is sufficient for sample calculation [15]. In this cross-sectional study, data obtained from 300 adolescents in the first phase and 470 adolescents in the second phase, where validity and reliability were verified, were used. The study included secondary and high school students who agreed to participate, could understand and answer the questions, and whose native language was Turkish. Adolescents with food allergies or acute/chronic diseases affecting food intake, those on disease-specific diets, and adolescents with taste/smell disorders were excluded. Our study was carried out by collecting two separate data: study 1 and study 2. For this study, permission was obtained from the Bitlis Eren University Non-Interventional Ethics Committee (date: 2024/3, No. 8). All participants were informed about the purpose of the study, and informed consent forms were obtained from both adolescents and their parents. Data for the study were collected face-to-face from volunteer participants using a questionnaire form.

Data collection tools—measures

The personal information form includes details on adolescents' gender, body weight, height, age, etc. Anthropometric measurements were evaluated according to adolescents' self-reports.

Intuitive eating scale-2 (IES-2)

The original IES-1, developed by Tylka, consists of 21 items and three subfactors [6]. Tylka and Kroon Van Diest revised the IES-1 and developed the IES-2 [7]. Bas et al. (2017) determined the validity and reliability of this scale for Turkish. The IES-2 consists of 23 questions and assesses IE across four subfactors: factor 1: unconditional permission to eat (UPE), factor 2: eating for physical reasons (EPR), factor 3: relying on hunger and satiety cues (RHSC), and factor 4: body–food choice congruence (BFCC). The reliability scores for the scale are $\alpha = 0.89$. The higher the IES-2 score, the higher the IE [13].

Children's eating attitudes test (ChEAT)

The Children's Eating Attitudes Questionnaire is a self-administered questionnaire based on the adult Eating Attitudes Test (EAT-26) that evaluates eating attitudes and behaviors in children [16]. The higher the scale score, the higher the likelihood of an eating disorder. It was developed by Maloney et al. [17], and because of the Turkish validity and reliability study, the 26-question ChEAT scale was reduced to 15 questions. Its validity and reliability were tested in children aged 10–14 ($\alpha = 0.724$) [18].

Figure rating scale (FRS)

The Figure Rating Scale was initially developed by Stunkard et al. [19] to evaluate body image. The pictogram uses boy- and girl-specific pictures representing the BMI ranking of the adolescent. These gender-specific pictures depict figure eights in ascending order of body circumference from thinnest to heaviest. In the FRS, adolescents are asked to choose the silhouette that resembles their own appearance (current body image) and the silhouette that represents how they would like to look (desired body image) [20].

Emotional eating scale adapted for use in children and adolescents (EES-C)

The Emotional Eating Scale is specifically designed to assess emotional eating in individuals aged 10 to 18 years. This scale is a five-point Likert scale and has 26 items. The last item, "happiness," is excluded from the scoring. Scores between 25 and 125 can be obtained from the scale. As the score increases, emotional eating behavior increases [21]. This scale was developed by Tanofsky-Kraff et al. [22], and its validity and reliability were established by Bektaş et al. ($\alpha = 0.90$) [21].

Study 1 and study 2 statistical analysis

To determine whether the sample was sufficient and to ensure construct validity, the Kaiser–Meyer–Olkin (KMO) coefficient was evaluated. The suitability of the scale for factor analysis was determined with Bartlett's test of sphericity. In this study, 300 people were included in the first study (57.7% girls) and the second study included 470 students (60.9% girls). Missing data analysis was conducted to confirm that there is no missing data within the dataset. SPSS 27.0® (Statistical Package for the Social Sciences) software was used for EFA, and the principal axis factoring method was employed. Additionally, direct oblimin rotation was used due to the interrelatedness of the scale items. The number of subfactors for the scale was determined using the scree plot. The Cronbach-α coefficient assessed the internal consistency of the scale. To evaluate convergent validity, correlation coefficients between the IES-2, ChEAT, EES-C, and FRS were calculated. Recently, confirmatory factor analysis (CFA) was conducted on a separate sample as suggested [13]. Since the data of study 2 were normally distributed, the maximum likelihood (ML) estimator method was used in CFA. The principle of ML is to identify estimates that maximize the likelihood that the observed covariances (the data) originated from the population [23]. To perform the CFA, the data (study 2) were collected again from different schools using the same surveys, and the analyses were performed on these data. Data obtained from a total of 470 high and middle school students who had similar characteristics to study 1 (age, socioeconomic status, etc.) but did not participate in study 1 were used. AMOS 24 program was used for CFA, and model fit was evaluated using traditional criteria [24]. While evaluating the model fit, fit indices were used as x^2/SD (reference range: 0–2), root mean square error of approximation (RMSEA—reference range: $0.00 \leq \text{RMSEA} \leq 0.05$), comparative fit index (CFI—reference range: $0.97 \leq \text{CFI} \leq 1.00$), normed fit index (NFI—reference range: $0.95 \leq \text{NFI} \leq 1.00$), goodness of fit index (GFI—reference range: $0.95 \leq \text{GFI} \leq 1.00$), adjusted goodness of fit index (AGFI—reference range: $0.90 \leq \text{AGFI} \leq 1.00$) [25], and Tucker–Lewis index (TLI—reference range: $0.95 \leq \text{TLI} \leq 1.00$) [13].

Results

Study 1

The mean age of adolescents aged between 11 and 17 years was 13.7 ± 1.55 years, and 57.7% of these adolescents were girls. It was also found that 75% of them were in the

Table 1 EFA (sample 1) factor loadings for the four-factor solution

		EFA factor loadings				h^2
		1	2	3	4	
1 = UPE						
1	I try to avoid certain foods high in fat, carbohydrates, or calories.	0.70				0.55
2	I find myself eating when I'm feeling emotional (e.g., anxious, depressed, sad), even when I'm not physically hungry.	0.77				0.60
3	I find myself eating when I'm feeling emotional (e.g., anxious, depressed, sad), even when I'm not physically hungry.	0.80				0.64
2 = EPR						
12	I am able to cope with my negative emotions (e.g., anxiety, sadness) without turning to food for comfort.		0.80			0.66
13	When I am bored, I do NOT eat just for something to do.		0.84			0.73
14	When I am lonely, I do NOT turn to food for comfort.		0.63			0.47
3 = RHSC						
15	I find other ways to cope with stress and anxiety than by eating.			0.71		0.59
16	I use food to help me soothe my negative emotions.			0.78		0.62
17	I find myself eating when I am stressed out, even when I'm not physically hungry.			0.78		0.63
18	Most of the time, I desire to eat nutritious foods.			0.74		0.58
19	I mostly eat foods that make my body perform efficiently (well).			0.80		0.67
20	I mostly eat foods that give my body energy and stamina.			0.80		0.66
4 = BFCC						
21	I rely on my hunger signals to tell me when to eat.				0.79	0.66
22	I rely on my fullness (satiety) signals to tell me when to stop eating.				0.80	0.70
23	I trust my body to tell me when to stop eating.				0.78	0.66
	Eigenvalues	1.79	1.91	3.68	2.02	
	% of variance	11.94	12.78	24.54	13.47	

Factor 1, unconditional permission to eat (UPE); factor 2, eating for physical reasons rather than emotional reasons (EPR); factor 3, relying on hunger and satiety cues (RHSC); factor 4, body–food choice congruence (BFCC); h^2, common factor variance

7–10th grade, and 60.3% of the adolescents stated that their family income was sufficient to cover their expenditures. According to the BMI-Z score, 14.4% of adolescents were underweight, 57.7% were in the normal weight range, 22.6% were overweight, 5.3% were obese, 7.4% of adolescents were very short/short, 71.2% were in the normal height range, and 21.4% were tall.

Exploratory factor analysis

Bartlett's (1950) test of sphericity indicated X^2 (105) = 1505.67, $p < 0.001$, and the KMO measure of sampling adequacy was 0.808, providing evidence that item bivariate correlations were sufficient for factorability [26]. EFA of the 23-item IES-2 scale was performed on the adolescent sample. Both in the EFA results (eigenvalues greater than 1.0) and in the scree plot graph, it was found that a four-factor structure would be appropriate. This four-factor structure, which explains 62.75% of the total factor structure, was formed (UPE, EPR, RHSC, and BFCC).

Principal axis factoring, utilizing squared multiple correlations as the communality estimates, was employed for factor extraction. Parallel analysis was used to determine factor retention [26], along with direct oblimin rotation. Additionally, the item-total correlation was performed. The criteria for retaining or removing scale items included: (1) deleting items with factor loadings lower than 0.40, (2) removing cross-loading items with differences between the highest loadings lower than 0.15, (3) eliminating items with absolute loadings above a specified value (e.g., 0.40) on two or more factors, and (4) deleting items with inter-item correlations lower than 0.30 [27]. As a result, it was seen that 8 items (4–11) should be deleted. Similarly, two items were deleted in the Turkish validity and reliability study of IES-2 for adults [13], and 4 items in the IES scale were deleted in the adaptation study for early adolescence [12]. As a result of EFA, the IES-2-TA scale structure with 4 factors and 15 items was formed. The factor details are shown in Table 1.

Reliability analysis

The Turkish validity and reliability of the IES-2 scale were found to be 0.82 [14] in a study conducted in 2017 and 0.89 [13] in a study conducted in 2021. This study determined

Table 2 Reliability results of the IES-2-TA

IES-2-TA Cronbach's alpha	0.789			
Cronbach's alpha of subscale of IES-2-TA	UPE	EPR	RHSC	BFCC
	0.649	0.683	0.871	0.751
McDonald's omega (ω)	0.762			
Spearman–Brown coefficient	0.864			
Guttman split-half coefficient	0.860			
	F		*P*	
Tukey's test for non-additivity	34.105		≤ 0.001	
Hotelling's *T*-squared test	15.134		≤ 0.001	

UPE, unconditional permission to eat; *EPR*, eating for physical reasons rather than emotional reasons; *RHSC*, reliance on hunger and satiety cues; *BFCC*, body–food choice congruence

Table 3 Correlations between the IES-2-TA and its subscales, FRS, EES-C and its subscales, and anthropometric measurements

	IES-2-TA	UPE	EPR	RHSC	BFCC
IES-2-TA	-				
UPE	0.472**	-			
EPR	0.544**	0.092*	-		
RHSC	0.757**	0.017	0.194**	-	
BFCC	0.632**	0.314**	0.153**	0.266**	-
ChEAT	−0.154**	−0.400**	−0.036**	0.011	−0.146**
FRS	−0.025	−0.036**	−0.054	−0.012	0.032
EES-C	−0.197**	−0.011	−0.316**	−0.132**	−0.018
EES-C-UNS	−0.171**	0.016	−0.294**	−0.131**	0.017
EES-C-AAF	−0.185**	−0.018	−0.312**	−0.106*	−0.039
EES-C-DEP	−0.195**	−0.035	−0.256**	−0.124**	−0.037
BMI-Z	−0.007	−0.043	−0.058	−0.066	0.102**
HFA-Z	−0.407	0.077	−0.008	−0.031	−0.035
Mean	3.26	2.72	3.47	3.48	3.49
SD	0.60	1.02	1.05	0.98	0.97

Spearman's correlations; *IES-2-TA*, Intuitive Eating Scale-2-Turkish adolescents; *UPR*, unconditional permission to eat; *EPR*, eating for physical reasons rather than emotional reasons; *RHSC*, reliance on hunger and satiety cues; *BFCC*, body–food choice congruence; *ChEAT*, Children's Eating Attitudes Test–total score; *EES-C*, Emotional Eating Scale Adapted for Use in Children and Adolescents; *EES-C-UNS*, feeling unsettled; *EES-C-AAF*, anxiety, anger, and frustration; *EES-C-DEP*, depressive symptoms; *FRS*, Figure Rating Scale; *BMI-Z*, body mass index *Z* score; *HFA-Z score*, height-for-age *Z* score; * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$

that Cronbach's α coefficient of the whole scale was 0.789 and McDonald's ω coefficient was 0.762. Cronbach's α values for the subscales were UPE: 0.649, EPR: 0.683, RHSC: 0.871, and BFCC: 0.751. The Spearman–Brown and Guttman split-half reliability coefficients were 0.864 and 0.860, respectively. Tukey's test of additivity and Hotelling's *T*-square values were determined as $F = 34.105$; $p \leq 0.001$ and $F = 15.134$; $p \leq 0.001$, respectively (Table 2). All IES-2-TA subscale scores positively correlated with the total IES-2-TA scores. Factor intercorrelations were positive, except between UPE and RHSC. The total score of the IES-2-TA was found to be negatively and significantly associated with ChEAT and the total score and subscales of EES-C, while it was negatively but not significantly associated with FRS, BMI-Z, and HFA-Z.

Additionally, UPE subscale scores were negatively correlated with ChEAT and FRS scores. EPR and RHSC subscale scores were negatively correlated with EES-C total scores and subscale scores. Also, EPR subscale scores were negatively correlated with ChEAT scores. BFCC subscale scores were negatively correlated with ChEAT and positively correlated with BMI-Z score (Table 3).

Validity

The IES-2 scale, which was tested for validity and reliability in Turkish for adults as a 23-item scale [14], consists of four subscales: UPE, EPR, RHSC, and BFCC. Before being adapted from adults to early adolescents, the 23 items were reviewed for clarity and understanding by

Table 4 Goodness-of-fit indices obtained as a first- and second-order multifactor CFA of the IES-2-TA

Index	Pre-modification values	Post-modification values	Good fit	Moderate fit	Result
X^2/df	1.965	1.706	0–2	2–3	Good fit
RMSEA	0.045	0.039	$0.00 \leq RMSEA \leq 0.05$	$0.05 \leq RMSEA \leq 0.10$	Good fit
CFI	0.962	0.973	$0.97 \leq CFI \leq 1.00$	$0.95 \leq CFI \leq 0.97$	Good fit
NFI	0.927	0.938	$0.95 \leq NFI \leq 1.00$	$0.90 \leq NFI \leq 0.95$	Moderate fit
TLI	0.953	0.965	$0.95 \leq TLI \leq 1.00$	$0.90 \leq TLI \leq 0.95$	Good fit
GFI	0.957	0.963	$0.95 \leq GFI \leq 1.00$	$0.90 \leq GFI \leq 0.95$	Good fit
AGFI	0.938	0.946	$0.90 \leq AGFI \leq 1.00$	$0.85 \leq AGFI \leq 0.90$	Good fit

X^2/df, chi-square/degrees of freedom; *RMSEA*, root mean square error of approximation; *CFI*, comparative fit index; *NFI*, non-normed fit index; *TLI*, Tucker–Lewis index; *GFI*, goodness of fit index; *AGFI*, adjusted goodness of fit index

five PhD-level faculty members in nutrition and dietetics with expertise in eating disorders and/or adolescence, as well as 20 middle and high school students, including five students of both genders. As a result of the evaluations, no items were added or removed, and the scale's structure remained unchanged. Ten students were selected for the pilot study. Since there was no problem with understanding the scale, the data collection process was initiated without making any changes to its structure or content.

Study 2

The mean age of the adolescents, ranging from 11 to 17 years, was 13.9 ± 1.29, and 60.9% were girls. Additionally, 76.4% were 7th- to 10th-grade students, and 55.4% stated that their family income was equal to their expenditures. According to the BMI-*Z* score, 15.3% were underweight, 57.3% within the normal weight range, 20.7% overweight, 6.7% obese, 3.8% very short/short, 71.0% within the normal height range, and 25.2% tall.

Confirmatory factor analysis

The sufficient sample size to perform CFA on the structure determined in EFA and to obtain the appropriate structure was determined as 385 in the Hoelter ($p < 0.01$) test, and CFA analyses were performed on a sample of 470 people. In the CFA analysis, the factor loadings of the scale items were found to be 0.40 and above. CFA was performed on the IES-2-TA consisting of 15 items and four factors. Modification indices greater than 10 were examined to identify sources of poor fit. Items 18 and 19, as well as items 19 and 20, were found to have relatively high modification indices, primarily due to their similar wording (Fig. S1). When performing CFA, the number of modifications can be made not to exceed 5 or 20% of the scale item count [28]. Fit indices: $X^2/df = 1.706$,

RMSEA = 0.039, CFI = 0.973, NFI = 0.938, GFI = 0.963, TLI = 0.965, and AGFI = 0.946. The goodness-of-fit indices of the four-factor structure obtained as a second-order multifactor CFA of the IES-2-TA are shown in Table 4.

Discussion

This is the first study to examine the structure and correlates of IE in Turkish adolescents using the IES-2. Two independent samples were utilized: EFA was conducted on the first to identify the structure, and CFA on the second to confirm it. Results support a four-factor, 15-item model (IES-2-TA) adapted from the adult version, comprising UPE, EPR, RHSC, and BFCC subscales. The model was validated in an independent sample and showed expected correlations with ChEAT, FRS, EES-C, and BMI.

In this study, when the EFA results of the IES-2-TA scale and its compliance with the specified criteria were evaluated, a 15-item structure like the factor structure in the original study [7] was formed, except that 8 items (4–11) were deleted. Prior adaptations—Akırmak et al. [13] for Turkish adults, Dockendorff et al. [12] for adolescents, and Saunders et al. [29] for university students—also reported item removal due to structural shifts. In addition, in the study that adapted the mindful eating scale from adults to adolescents, the 5-factor, 28-item scale was condensed into a 2-factor, 14-item scale [30]. In scale validity and reliability studies, especially in cross-validation studies, it is seen that the factor structure and the number of items can change. The data obtained from Turkish adolescents support the four-factor structure proposed by Tylka and Kroon Van Diest [7], which explains 62.75% of the variance. Thus, our EFA results were found to be compatible with the original scale.

The first factor, UPE, reflects the desire to eat in response to internal hunger signals and desirable food and initially consisted of six items. The second factor, EPR, consists of eight items that reflect the ability to consume food to satisfy hunger rather than to cope with emotional distress [7].

In this study, three items were dropped from the UPE and five items from the EPR due to low factor loadings or high residuals. No new items were added to the factors; the existing items represent the core constructs of UPE and EPR for adolescents. These exclusions may reflect developmental differences in adolescents' understanding of emotional hunger or the concept of unconditional permission to eat. Future studies should further explore whether these constructs are interpreted differently by adolescents due to cognitive, emotional, or social development stages. The third factor, RHSC, consists of six items and reflects awareness of intrinsic hunger and satiety signals, as well as reliance on these signals to guide eating behaviors. The fourth factor, BFCC, refers to appropriate dietary behavior that guides food choices that meet physical and sensory needs and consists of three items [7]. Akırmak et al. (2021) also found that the four-factor structure of the IES-2 was preserved [13]. The four-factor structure of the IES-2 was confirmed in a study conducted with overweight and obese adolescents in Portugal [2]. Babbott et al. found that it had a three-factor structure, but this study was conducted only on early adolescents [5]. The reason our results are different may be that our age range is wider. No items were dropped from the RHSC and BFCC in this study.

Cronbach's-α coefficient indicates whether the items measure the same characteristic and whether the items are related to the subject matter to be measured [15]. Akırmak et al. reported that the IES-2's Cronbach's-α was 0.89. The values for the EPR, UPE, RHSC, and BFCC subscales are 0.94, 0.71, 0.92, and 0.87, respectively [13]. In the French-Canadian adaptation study, the IES-2 value was 0.9 and the subscale values were 0.74 for UPE, 0.90 for EPR, 0.92 for RHSC, and 0.89 for BFCC [31]. In our study, the IES-2-TA's Cronbach's-α was 0.789, and the subscale values were UPE 0.649, EPR 0.683, RHSC 0.871, and BFCC 0.751. The McDonald's ω coefficient for the IES-2-TA was > 0.70, and the Spearman–Brown and Guttman split-half reliability coefficients were > 0.80. These results indicate acceptable internal consistency for the scale and its subscales. Tukey's summability test showed that the scale was summable. According to Hotelling's T-square value [32], the scale was found to have no response bias. Some researchers suggest that the UPE and EPR factors should be completely removed from the scale, accepting a threshold value of 0.7 for internal consistency [33], but the reliable range for internal consistency is stated as 0.6–0.8 in the literature [15]. Additionally, the values found are very close to 0.7. Moreover, unconditional permission to eat and eating behaviors driven by physical rather than emotional reasons can be expected to differ in adolescents who have not yet entirely left parental control. In a comparable situation, Dockendorff et al. (2012) found a Cronbach's-α of 0.60 for the "awareness of internal hunger/satiety cues" factor in the adaptation study of the IES from adults to early adolescents [12]. The author did not express this as a limitation and reported that additional research should be conducted. Considering all these reasons, it is thought that this situation should be examined in further studies considering the relevant factors. It may be necessary to add additional items to these factors.

All IES-2-TA factors had significant associations with the IES-2-TA score, like the original study [7] and the study by Akırmak et al. (2021) [13]. The negative correlation of the IES-2-TA score with BMI-Z indicates that the scale has criterion validity. IE is associated with a lower BMI [7]. Bas et al. (2017) also found that the IES-2 was inversely associated with BMI [4]. Ozkan and Bilici (2021) also reported that BMI and IE were inversely proportional, although the relationship was not statistically significant [8]. Similarly, in our study, the BMI-Z score was found to be inversely related to IE, not significantly. It is thought that this may be because the anthropometric data were based on the adolescents' self-reports. Similar to BMI, this situation may also be valid for the FRS, which measures body structure and perception. The fact that many of the adolescents who participated in the study had a normal BMI and expressed their body perception in accordance with their BMI may have led to this situation. Nevertheless, this inverse relationship suggests that listening to the body's signals and eating according to these signals helps to maintain body weight control.

Convergent validity was determined by examining the correlations of the IES-2-TA score with disordered eating, emotional eating, and body satisfaction scores. Higher IE levels were linked to lower disordered eating, emotional eating, and eating disorders [14]. In adolescents, IE was inversely related to eating disorder behaviors [34]. Akırmak et al. (2021) also showed that the IES-2 was inversely associated with eating disorders [13]. Ramalho et al. (2022) found a negative but non-significant relationship between ChEAT and IES [2]. Carbonneau et al. (2016) reported that IES-2 scores were positively associated with body satisfaction and inversely with eating disorders [31]. Another study showed that increased IE and body acceptance improved emotional/physical health in obese women [35]. As in our study, these associations may reflect that IE results from having a positive body image and functional hunger/fullness cues. Based on these correlations, the IES-2-TA demonstrates good convergent and criterion validity.

The factor structure and fit indices of the IES-2-TA obtained in study 1 were examined in study 2. As a result of CFA, it is reported that the factor loadings of all items should be above 0.30 [26], and in this study, all item loadings were 0.40 or higher. The CFA results showed good fit with the original four-factor model [7, 13, 14]. It also showed a slight improvement in goodness-of-fit indices when the

associated errors were estimated in a modified version of the four-factor model. Similar modifications were made in the Turkish adult adaptation [13]. Additionally, the IES-2 has demonstrated a good fit in studies involving adolescents [2, 5] and adults [36]. According to the model fit indices resulting from the CFA in our study [25], it was observed that the model showed a good fit.

When Dockendorff et al. (2012) adapted the IES for early adolescents, they created different subscales and altered the scale structure [12]. The IES-2 scale is the most recent scale used to measure IE. In the Turkish language and culture adaptation of the IES-2, although the scale structure remained unchanged in both studies [13, 14], changes were observed in the factors to which the items were assigned, and two items were removed in the Akırmak et al. (2021) study. In this study, we found that the IES-2 [13, 14] did not have appropriate psychometric properties for adolescents and adapted it for adolescents. According to our results, the factor structure and item distribution of the IES-2-TA are consistent with the study of Akırmak et al. (2021) [13].

Strengths and limitations

There is no valid and reliable IES-2 form adapted to Turkish for adolescents in the literature. The IES-2-TA scale is the first scale to evaluate adaptive eating behaviors in adolescents. The scales measuring attitudes towards eating in adolescents, adapted to Turkish so far, assess mindful eating, emotional eating, and disordered eating behaviors, including the risk of eating disorders. Current scales fail to evaluate the capacity to differentiate between physical hunger and emotional eating, as well as the body's capability to select suitable food. The IES-2-TA scale is ideal for completing the missing aspect of assessing adaptive eating behaviors in adolescents. Additionally, the IES-2-TA makes it possible to make international and cross-cultural comparisons.

This study has limitations. First, the data are subject to social desirability bias, as participants may have expressed their desired circumstances rather than their actual circumstances. Second, this study is cross-sectional and cannot draw conclusions about causal relationships. Third, there are slightly more girls than boys in the gender distribution, but this is not statistically significant. Fourth, since this study was conducted in the province of Kayseri, the findings cannot be generalized to all adolescents in Turkey. However, the fact that Kayseri is a densely populated large city and that the data were collected from schools with students from different socioeconomic backgrounds may increase the generalizability of the results. Fifth, measurement errors may

have occurred because anthropometric measurements were based on self-reports. Additionally, gender invariance was not tested in this study, and future research should address this issue to better understand how the scale performs across different genders. Finally, the Cronbach's-α value for UPE and EPR was found to be below 0.7. However, this falls within the confidence interval reported in the literature [15]. Despite all these limitations, determining the validity and reliability of this scale in adolescents will help define their adaptive eating behaviors.

Conclusion

Intuitive eating is an adaptive eating approach that addresses a different issue than conventional eating behaviors. The IES-2 is one of the most effective tools for assessing IE. The IES-2-TA may help determine the unconditioned eating status of Turkish adolescents, their ability to distinguish between physical hunger and emotional hunger, and understanding of hunger and satiety cues, as well as body food choice adaptation. This study demonstrates that the IES-2-TA is a valid and reliable scale for assessing IE in Turkish adolescents.

Declarations

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