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Validity and Reliability of the Turkish Version of the Food Neophobia Scale in Adolescents

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ABSTRACT

Objective: Food neophobia is an aversion or reluctance to eat new or unfamiliar foods. The aim of this study was to establish the Turkish validity and reliability of the Food Neophobia Scale, which is used to measure the fear of trying new foods, in the adolescent age group.

Method: The study was conducted with high school students in the province of Rize during the 2023-2024 academic year. The sample of the study was comprised of 466 students in 13-18 age range. Data were collected using a questionnaire containing demographic characteristics and the Food Neophobia Scale. To assess the validity and reliability of the scale, Exploratory Factor Analysis, Confirmatory Factor Analysis, and Cronbach's alpha internal consistency coefficient were used.

Results: The mean age of the students included in the study was 15.4±1.1 years 50.6% were male. The items in the scale used in the study were found to have sufficient correlation and the dataset was suitable for factor analysis (KMO=0.747; Bartlett's sphericity test, $p<0.001$). The Confirmatory Factor Analysis revealed that the scale had a good model fit ($\chi^2=3.78$, $p<0.001$). The Cronbach α internal consistency coefficient for the scale integrity was 0.71.

Conclusion: The Turkish Food Neophobia Scale is a valid and reliable measurement tool. The scale can determine food neophobia in adolescents aged 13-18.

Keywords: Adolescent, food neophobia, scale, validity and reliability

INTRODUCTION

Food neophobia (FN) is defined as the reluctance to consume new or unfamiliar foods, or the avoidance or rejection of new foods (Pliner and Hobden 1992). The mechanism of FN formation has not yet been clearly defined. It is accepted that many factors, including biological, psychological, and environmental factors, interact with its etiology (Cooke et al. 2007, Dovey et al. 2008, Lafraire et al. 2016, Scaglioni et al. 2018). It is assumed that FN is a defense mechanism that individuals, especially young children, develop to protect themselves from harmful and dangerous foods (Cooke et al. 2007; Cassells et al. 2014; Lafraire et al. 2016). On the other hand, individuals need a wide variety of foods for healthy nutrition. FN is accepted to represent a problematic behavior in healthy nutrition. In order to achieve dietary diversity, individuals need to be willing to try and accept new foods (Cassells et al. 2014). It has been reported that FN is less common in children under 24 months of age but increases sharply in the 2-6 years of age when children become more mobile and independent of their parents. Neophobia, which is also instinctively necessary for the continuation of the species, can make it difficult to get used to new foods during this process. It is stated that this neophobic avoidance gradually decreases and continues after the period of introduction to new foods, which is difficult for the baby. On the other hand, it is observed that neophobic avoidance decreases significantly with adolescence period (Koivisto and Sjödén 1996, Dovey et al. 2008, Roßbach et al. 2016, Łoboś and Januszewicz 2019). However, in some

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cases, avoidance of new foods can continue into adolescence and even adulthood (Nicklaus and Monnery-Patris 2018). This neophobic avoidance is associated with a tendency to eat the same type of food repeatedly and thus have a more restrictive diet, and in some cases, it can pave the way for the development of eating disorders such as obesity (Tuorila et al. 2001, Nicklaus et al. 2005). It is important not to overlook FN, especially during adolescence period, when the risk of developing eating disorders is high (Vardar and Erzengin 2011). Improper dietary practices such as monotonous, unbalanced, and inadequate diets can lead to both psychological disorders and nutritional and developmental problems in adolescents.

Therefore, it is important to be able to measure and assess FN in order to identify its causes and effects, reduce FN, change unhealthy eating behaviors, and develop effective intervention strategies. FN can be evaluated more objectively with clinical tests to be applied to patients. The Food Neophobia Scale (FNS) was developed in Canada by Pliner and Hobden in 1992 to measure the characteristics of food neophobia. Although the scale was developed about thirty years ago, it is still a leading tool widely used to measure FN (Damsbo-Svendsen et al. 2017, Rabadán and Bernabéu 2021)it is still the leading instrument used to evaluate food neophobia (FN. Validity and reliability studies have been conducted in many countries. In addition, the scale has been tested for validation and reliability in many different age groups and languages, such as Finnish, Korean, Spanish, German, Italian, Portuguese, Arabic, Chinese, and Hungarian (Tuorila et al. 2001, Choe and Cho 2011, Fernández-Ruiz et al. 2013, Siegrist et al. 2013, Laureati et al. 2015, Ribeiro de Andrade Previato and Herman Behrens 2015, Roßbach et al. 2016, Guidetti et al. 2018, Zhao et al. 2020, Mouallem et al. 2021, Szakály et al. 2021).

In Turkey, Duman et al. (Duman et al. 2020) conducted a validity and reliability study of the Turkish version of the same scale for children aged 9-11. However, to our knowledge, there is no Turkish scale to evaluate FN in the adolescent period or validity and reliability study of the Turkish FNS for this period. This study aimed to contribute to the literature by providing a validated and reliable Turkish scale for food neophobia in the adolescent age group. Thus, it is aimed to ensure the use of the FNS in adolescents, who are at risk for eating disorders and contribute to clinicians with this tool to assess and intervene in food neophobia.

MATERIALS

Sample

The study was conducted between December 2023 and January 2024 with high school students attending the 2023-2024 academic year in Rize province. Stratified sampling method was employed, and simple random sampling was used to select participants. The target population (universe) for this study was adolescents aged 13-18 and living in Turkey, while the sample consisted of 466 students from this age group. Data were collected using a face-to-face interview technique, employing a survey form that included the Food Neophobia Scale and questions on demographic characteristics. The average time to complete the survey form was 15 minutes. Only high school students between the ages of 13-18 who provided written informed consent from both themselves and their parents and who volunteered to participate were included in the study. Students who had applied to the child and adolescent psychiatry department, were receiving or had a history of receiving special education, had a chronic illness (such as epilepsy, diabetes, asthma, etc.), or were taking regular medication were excluded from the study. In addition, participants with special diets were also excluded from the study.

In the literature, taking into account the opinion that the sample size should be at least 10 times the number of items in the scale used in scale development and adaptation studies, it is recommended that the sample size should be at least 100 in a scale development study in which factor analysis will be performed (Boateng et al. 2018). In the sample size determining process of this study, it was first determined that there was a total of 15799 students in the secondary education institutions in Rize province. The power analysis (g-power) showed that the minimum sample size should be 305 participants (effect size = 0.23, α = 0.05, β = 0.8, and number of explanatory variables = 10). Therefore, a total of 504 students studying in secondary education institutions under the National Education Directorate in Rize Province (Center) were included in the research. However, 38 students were excluded due to incomplete information on the scale and sociodemographic data form or because they did not meet the inclusion criteria. The study was completed with a total of 466 students (230 females and 236 males).

Data Collection Tools

Sociodemographic and Clinical Characteristics Data Form: This data form was created by the authors for the study. It includes multiple-choice, and open-ended questions related to sociodemographic characteristics. Additionally, participants' height and weight were asked, and body mass index (BMI) was calculated by dividing body weight (kg) by body height squared (m^2). Socioeconomic status (SES) was determined by the researchers using the Hollingshead-Redlich Scale (HRS). This scale evaluates SES based on the parents' occupation and education levels. Scoring is based on the parent with the highest level of occupation and education. According to the scoring, levels 1 and 2 indicate high SES,

level 3 indicates moderate SES, and levels 4 and 5 indicate low SES (Hollingshead and Redlich 1958).

Food Neophobia Scale (FNS): This is a 10-item scale developed by Pliner and Hobden in 1992 to assess reluctance and rejection of new foods (Pliner and Hobden 1992). It is used to assess individuals' food neophobia levels and their tendency to try unfamiliar foods. The scale consists of 7-point Likert-type items ranging from "strongly disagree" to "strongly agree". Items 1, 4, 6, 9, and 10 are reverse-coded, and their scores are reversed when calculating the total score. The total score obtained from the scale ranges from 10 to 70, and increasing scores indicate increasing severity of food neophobia. The Turkish adaptation of the scale for the adult age group was carried out by Duman and colleagues in 2020, and the Cronbach α internal consistency coefficient was found to be 0,61. The Corrected Goodness of Fit Index (CFI) was 0,92, and the model was reported to have a good fit (Duman et al. 2020.

Ethical Approval

Prior to the study, the necessary permissions were obtained from the Rize Provincial Directorate of National Education. Approval was obtained from the local administrative and ethical committee (Date: 23.11.2023, Decision no: 2023/266). The study was conducted in accordance with the principles of the Helsinki Declaration.

Application

Prior to the study, permission was obtained to use the scale, which already had Turkish reliability and validity in the adult age group. Two experts were consulted to assess the suitability of the questions in the scale in terms of language, expression, and age level for the adolescent age group. Based on their feedback, it was decided that the questions were clear, understandable, and linguistically appropriate for the adolescent age group. Therefore, no changes were made to the scale. A pre-application was conducted with participants at the child and adolescent psychiatry outpatient clinic by using data not included in the study. A total of 56 children aged 13-18 were included in the study, and two approximately 10-minute interviews were conducted with each participant at a two-week interval to assess the comprehensibility of the questions.

Statistical Analysis

Statistical data analysis was performed using the SPSS software (version 22) (SPSS, IBM Corp, Armonk, N.Y. USA). Confirmatory factor analysis was performed using the Jamovi 2.4.6 program. As a result of descriptive statistics, basic statistics of the dataset such as central tendencies (e.g., mean, median) and measures of dispersion (e.g., standard deviation, minimum-maximum values) were obtained. The Shapiro-Wilk test was applied to determine whether the variables were normally distributed. The independent samples t-test was conducted to determine whether there were statistically significant differences in total FNS scores, which were found to be normally distributed, between the gender groups. Pearson correlation analysis was used to investigate the relationship between total FNS scores and BMI. In addition, the one-way ANOVA test was performed to examine whether there were significant differences in scale scores between the SED groups.

Sample size and correlation adequacy, which are prerequisites for performing validity and reliability analyses of a scale, were analyzed. The adequacy of the sample size was examined with Kaiser-Meyer-Olkin (KMO) and whether there was sufficient correlation between the items for the application of factor analysis was determined with Bartlett's sphericity test (Hair 2009). The Internal consistency of the scale is evaluated with the Cronbach's α value obtained by measuring the consistency between all items of the scale. The additivity of the scale was examined using Tukey's Test of Additivity. The factor structure of the scale was determined by Exploratory Factor Analysis and structural validity was examined. The structural dimensions and item groupings underlying the scale were revealed, and analysis results such as the number of factors, factor loadings, factor heights, explained variance, and correlations between factors were obtained. The varimax rotation method was used to evaluate the construct validity and factor structure of the scale in the study. In scale development and validity analysis, Confirmatory Factor Analysis was employed to validate a pre-specified structure. The test-retest method was used to determine the reliability of the scale. The Food Neophobia Scale's test-retest application was performed using Dependent Samples t-test and Intraclass Correlation Coefficient (ICC). Using the internal consistency the scale, reliability of it was also evaluated. The significance level was accepted as $p<0.05$ in all statistical analyzes.

RESULTS

Evaluation of Sociodemographic Characteristics and Food Neophobia Scale Results

A total of 466 participants, 50.6% of whom were male, were included in the study. The mean age of the participants was 15.4±1.1 (female: 15.4±1.09, male: 15.3±1.1). The participants' BMI values were on average 21.90±3.54 (female: 22.6±3.69, male: 21.1±3.20). The total FNS score was 37.68±9.83 (min-max: 12-70). The distribution of FNS item scores by gender is shown in Table 1, and the distribution of total scale scores by gender is shown in Figure 1.

Table 1. Distribution of Food Neophobia Scale Item Scores by Gender

Scale Items	Gender					
	Female (n=230)			Male(n=236)		
	Mean	SD	Skewness	Mean	SD	Skewness
Item 1	3.57	± 1.75	0.501	3.47	±1.68	0.558
Item 2	3.65	±1.76	0.085	3.84	±1.51	-0.038
Item 3	4.60	±2.19	-0.429	4.97	±1.87	-0.680
Item 4	3.21	±1.87	0.638	3.25	±1.59	0.573
Item 5	3.53	±1.84	0.253	3.67	±1.85	0.145
Item 6	3.29	±1.78	0.456	3.09	±1.60	0.741
Item 7	3.43	±1.92	0.403	3.95	±1.81	0.010
Item 8	3.90	±2.09	0.049	4.57	±2.01	-0.303
Item 9	3.93	±2.17	0.0120	4.78	±1.97	-0.443
Item 10	3.51	±2.02	0.346	3.17	±1.75	0.609
Total Score	36.6	±10.3	0.246	38.8	±9.27	-0.223

n= Number of people, SD: Standard Deviation.

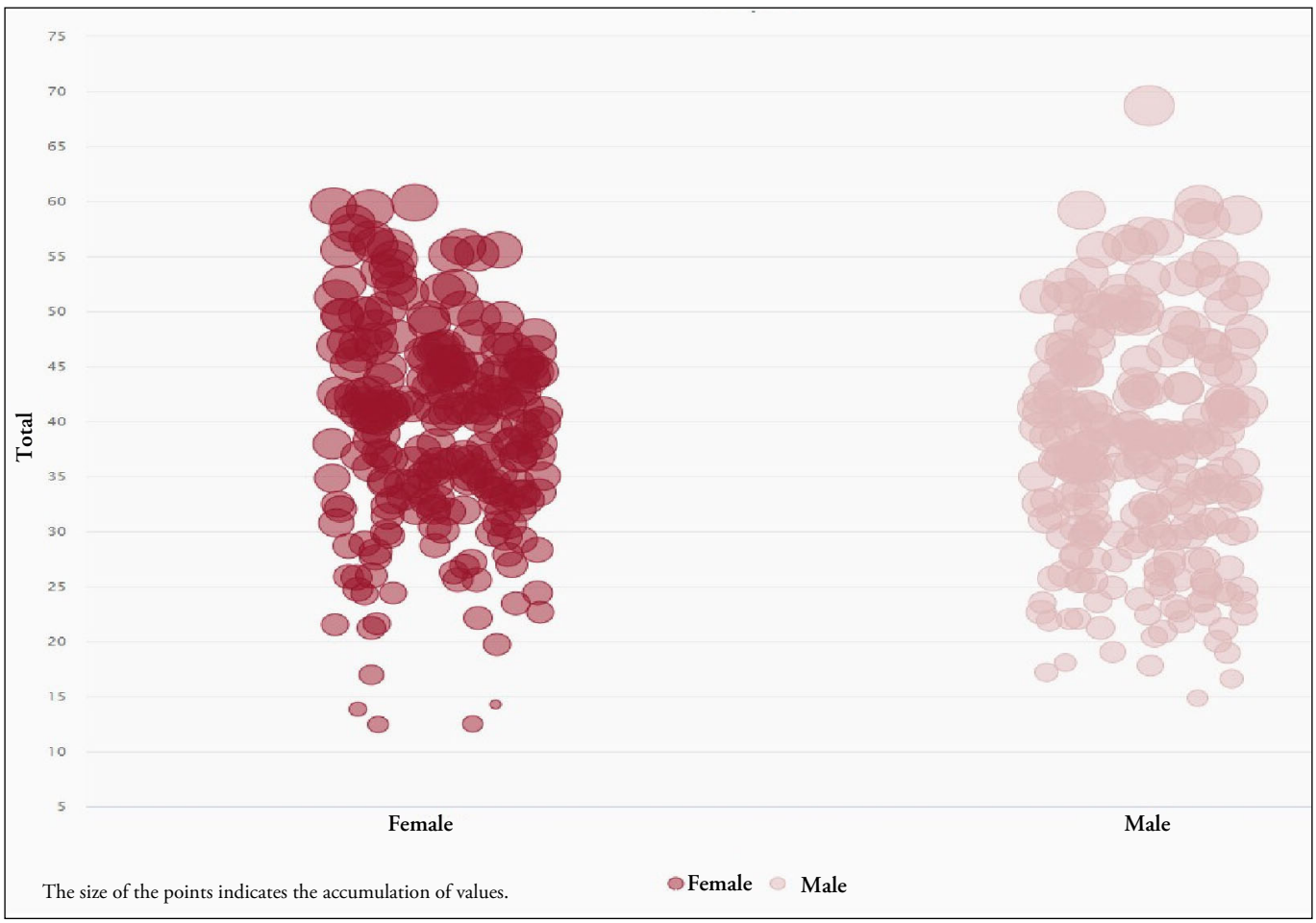

Figure 1. Distribution of Food Neophobia Scale total score by gender

The FNS total score was found to be normally distributed (Shapiro-Wilk test, W=0.99, p=0.41). The independent t-test results revealed that the total FNS score was higher in males, and there was a statistically significant difference between genders (p=0.02). When the total FNS score was compared between the age groups 13-16 and 16-18, it was observed that the difference between the groups was not significant (p=0.56). SES was assessed using the HRS. The number of

Table 2. Reliability Results and Analysis of the Scale Factor

	Cronbach α
Food Neophobia Scale	**0.708**
	The Cronbach α obtained when the item is removed
Item 1	0.694
Item 2	0.683
Item 3	0.679
Item 4	0.689
Item 5	0.688
Item 6	0.667
Item 7	0.671
Item 8	0.688
Item 9	0.685
Item 10	0.713

participants in the calculated low-medium-high SES groups was found to be distributed almost equally within the sample, and no significant relationship was determined between SES and FNS scores (p=0.54). When the relationship between total FNS score and the BMI variable was examined using correlation analysis, a very low negative relationship was determined, but it was not statistically significant (r=-0.05, p=0.29). A negative relationship was observed between total FNS score and BMI in both female and male gender groups. However, this relationship was not statistically significant (r=-0.03, p=0.59, r=-0.18, p=0.78, respectively).

Internal Consistency Analysis

In our study, the Cronbach α internal consistency coefficient for the total FNS was 0.71, which indicates that the scale is quite reliable (Cortina 1993). The internal consistency level between the items of the FNS is shown in Table 2. It was observed that the alpha coefficients obtained when the relevant question was removed were greater than 0.60. This indicates that all the questions are reliable within the whole scale and should be included in the scale. Cronbach's alpha coefficients calculated for the sub-dimensions of the scale were found to be 0.546 for the willingness sub-dimension, 0.628 for the selectivity sub-dimension, and 0.483 for the trust sub-dimension.

The additivity of the scale was examined using Tukey's Test of Additivity. The difference between measures (between measures) was found to be statistically significant (p<0.001), while the property of non-additivity was not statistically significant (p=0.100). This indicates that the 10-item subscale is additive, but there are differences between the measures.

Validity Analysis

Exploratory Factor Analysis

In the analysis conducted for the sample size, the KMO value was found to be 747.0 % (0.75). The fact that the KMO value (0.75) was greater than 0,50 indicated that the sample size was sufficient. Secondly, the Bartlett test was applied for correlation adequacy, and it was found to be statistically significant (χ^2=797.6, P<0.001). As a result, there were high correlations between the variables and the dataset was suitable for factor analysis. In the exploratory factor analysis conducted in the study, there were 3 factors with eigenvalues greater than 1 (FNS explanatory factor analysis results are shown in Supplementary Material 1). It was observed that the first factor explains 20.83% of the total variance, while the first and second factors together explain 39.18% of the total variance. Three factors were found to explain 55.74% of the total variance. The rotated factor matrix is shown in Table 3. This matrix is the final result of the factor analysis. The table shows the three factors and the loadings (correlation coefficients between the variables and the factors) of each variable under the factors. As a result of the factor analysis, a three-factor structure was obtained, consisting of willingness to try new foods (Willingness; 1-4-6-10), pickiness against new foods (Pickiness; 3-7-8-9), and trust in new foods (Trust; 2-5) (Figure 2).

Table 3. Rotated Factor Matrix Results of the Food Neophobia Scale

	Factor 1 (Willingness)	Factor 2 (Pickiness)	Factor 3 (Trust)
Item 1	0.688	0.229	-0.164
Item 2	0.038	0.287	0.650
Item 3	-0.183	0.422	0.390
Item 4	0.678	-0.062	0.356
Item 5	0.234	-0.068	0.746
Item 6	0.683	0.166	0.001
Item 7	0.105	0.509	0.507
Item 8	0.112	0.746	0.206
Item 9	0.145	0.815	-0.058
Item 10	0.741	-0.086	0.262

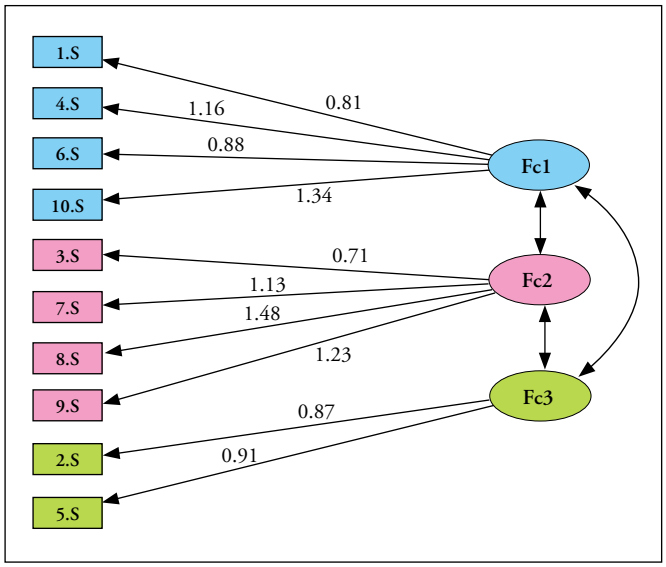

Figure 2. Three-factor structure of the Food Neophobia Scale in Adolescents

Confirmatory Factor Analysis

The structure, which can be explained by three factors, was examined for the confirmatory power of the variables under the factor loadings. It was observed that each variable has a significant confirmatory power under the factor loadings ($p<0.001$). The confirmatory factor analysis results are presented in Table 4.

The findings of the structural validity analysis conducted using the Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), and Comparative Fit Index (CFI) indicated a good fit. The RMSEA value was found to be 0.077, and the SRMR was 0.05. The RMSEA and SRMR indices range between 0 and 1, and lower values indicate better model fit (Hu and Bentler, 1999). It is stated that an RMSEA value less than 0.08 and close to 0.06 can be considered a good fit (Steiger 1990; Hu and Bentler 1999). The obtained CFI was 0.883. The CFI ranges from 0 to 1, and higher values indicate better model fit. In this study, the fact that the CFI value is over 0.8 suggests a good fit (Bentler 1990). Based on the results, it can be said that the scale is acceptable. Additionally, the fit of the scale was found to be good ($\chi^2=3.78$, $p<0.001$).

Test-retest Analysis

Test-retest analysis was used to determine the reliability of the scale. Test-retest reability was applied to a total of 56 students. In Table 5, the correlation coefficient values between the scores obtained in the test-retest reability vary between $r=0.28$ and $r=0.62$. As seen in Table 5, it was seen that there was no significant difference at the level of $p<0.05$ in the dependent groups t test result as a result of the test-retest reability of Turkish version of the FNS.

DISCUSSION

Since its initial development, the FNS has been widely used around the world to assess food neophobia (Damsbo-Svendsen et al. 2017). This study aimed to examine the validity and reliability of the Turkish version of the FNS for the assessment of food neophobia in adolescents. The findings of the study suggest that the Turkish form of the scale can be used as a valid and reliable assessment tool in adolescents.

In this current study, we first examined whether the sample size was adequate for factor analysis and whether there was enough correlation between the items to perform factor analysis. The results were found to be sufficient for factor analysis. When the fit of the FNS was evaluated, it was determined to be a good fit.

In contrast to the majority of studies in the literature, our factor analysis of the FNS revealed a three-factor structure: willingness to try new foods (*Willingness*; 1-4-6-10), pickiness with new foods (*Pickiness*; 3-7-8-9), and trust in new foods (*Trust*; 2-5). The original one-factor structure of the scale was

Table 4. Confirmatory Factor Analysis Results of the Food Neophobia Scale

		Factor Loading	Standard Error	Z	p
Factor 1 (Willingness)	Item 1	0.805	0.0904	8.90	<0.001
	Item 4	1.159	0.0883	13.13	<0.001
	Item 6	0.881	0.0886	9.94	<0.001
	Item 10	1.335	0.0958	13.94	<0.001
Factor 2 (Pickiness)	Item 3	0.711	0.1119	6.35	<0.001
	Item 7	1.129	0.1055	10.70	<0.001
	Item 8	1.478	0.1152	12.83	<0.001
	Item 9	1.227	0.1128	10.88	<0.001
Factor 3 (Trust)	Item 2	0.867	0.1057	8.20	<0.001
	Item 5	0.914	0.1152	7.94	<0.001

Table 5. Dependent Group t-test Results of the Food Neophobia Scale Test-Retest Analysis

First Application-Last Application	n	Mean Difference	Standard Deviation	t	pa	ICC	pb
Item 1-Item 1	56	0.0179	0.418	0.0428	0.966	0.692	<0.001
Item 2-Item 2	56	-0.179	0.388	-0.46	0.647	0.621	<0.001
Item 3-Item 3	56	0.125	0.449	0.278	0.782	0.689	<0.001
Item 4-Item 4	56	-0.51	0.671	-0.664	0.508	0.617	<0.001
Item 5-Item 5	56	-0.679	0.340	-2.000	0.051	0.591	<0.001
Item 6-Item 6	56	-0.37	0.823	-0.410	0.683	0.632	<0.001
Item 7-Item 7	56	-0.50	0.380	-1320	0.193	0.603	<0.001
Item 8-Item 8	56	0.571	0.379	1.510	0.137	0.601	<0.001
Item 9-Item 9	56	0.446	0.422	1.060	0.294	0.609	<0.001
Item 10-Item 10	56	-0.679	0.39	-1.740	0.087	0.597	<0.001
FNS Total	56	-0.981	0.76	-0.751	0.061	0.593	<0.001
Willingness	56	-0.45	0.31	-1.25	0.185	0.602	<0.001
Pickiness	56	-0.69	0.12	-0.974	0.256	0.605	<0.001
Trust	56	0.32	0.21	0.971	0.823	0.691	<0.001

FNS: Food Neophobia Scale, ICC: Intraclass Correlation Coefficient, n: sample size, pa:t test value, pb: ICC value, t: Paired t-Test

not confirmed in our study (Pliner and Hobden 1992). In the Turkish validity study of the scale with adults, the first factor (component) was reported to explain 34% of the variance in the total FNS score, and the scale was defined as one-factor (Duman et al. 2020). In the Turkish validity study conducted with the child age group, on the other hand, the scale was analyzed after reducing the number of items to 9 and the Likert scale to 7 options with 5 choices, and it was reported that the one-factor structure explained 54 % of the total variance (Elmas and Kabaran 2021).

When examining other studies in the literature, it is observed that the FNS has been explained with a two-factor structure in some studies, while items have been removed in others. Even, in some studies, the use of the 6-item version with a one-factor structure has been suggested (Metcalf et al. 2022). When the literature was reviewed, it was observed that in the study conducted by Guidetti et al. with an Italian sample and in the study conducted by Ritchey et al. with a sample from three different countries, four items were removed and a single-factor structure was achieved on both scales (Ritchey et al. 2003, Guidetti et al. 2018). In a study conducted with Korean adolescents, the scale was used with a one-factor structure of 7 items (Cho et al. 2014). On the other hand, in some studies, there is a two-factor structure consisting of positive and negative questions. For instance, a validity study conducted in Hungarian also revealed a two-factor structure. It was stated that the first factor explained 48% of the variance and the second factor explained 17% of the variance. The study also removed Item 9 due to its low explanatory power (Szakály et al. 2021). In a Finnish study, factor 1 was associated with interest in trying new foods, while factor 2 was associated with anxiety about trying unknown foods, and FN was explained with a two-factor structure (Tuorila et al. 2001). On the other hand, there are also studies that explain the FNS with a three-factor structure, similar to our study. In a Chinese adaptation study conducted with adults, Zhao et al. revealed a three-factor structure including willingness (items 1-4-9-10), trust (items 2-3-7), and pickiness (items 8-9), and they reported that this structure explained 70 % of the total variance (Zhao et al. 2020).

The internal consistency level between the items of the FNS was examined using Cronbach's α coefficients, and the Cronbach's α coefficient for the integrity of the scale in our study was found to be 0.71. The Cronbach's α value for the original version of the scale was 0.88 (Pliner and Hobden 1992). When looking at the validity and reliability studies of the Turkish version of the scale, it was observed that the Cronbach's α value was calculated as 0.61 in the study conducted with adults and 0.89 in the study conducted with children (Duman et al. 2020, Elmas and Kabaran 2021). When examining adaptation studies conducted in different languages, it was seen that the Cronbach's α value was found to be 0.82 in the Spanish adaptation, 0.92 in the Brazilian Portuguese adaptation, 0.78 in the Chinese adaptation, and 0,79 in the German adaptation (Fernández-Ruiz et al. 2013, Siegrist et al. 2013, Ribeiro de Andrade Previato and Herman Behrens 2015, Zhao et al. 2020). The Cronbach's α value was found to be 0.74 in the Arabic validity and reliability study conducted with children aged 2-10 years (Mouallem et al. 2021). All these results show that the scale is reliable in different age groups and different languages, and that the results are affected by different geographies. The results obtained in our study indicate that the Turkish version of the scale is highly reliable in adolescents. In this study, the alpha

coefficients obtained when the relevant question was excluded were found to be positive and above 0.60. This means that the scale can measure food neophobia as a whole and that all items should be included in the scale.

In this study, it was determined that the total scale score showed a significant difference between females and males. The results in the literature regarding the relationship between FN and gender are controversial. Similar to our study, some studies have reported that females tend to have lower FN levels than males. In particular, it has been reported that FN levels are higher in males in the child and young adult age group (Tuorila et al. 2001, Del Campo et al. 2023). However, there are also studies that do not report a difference in FN levels between females and males in different age groups (Pliner and Hobden 1992, Koivisto and Sjödén 1996, Tuorila et al. 2001, Fernández-Ruiz et al. 2013, Zhao et al. 2020). In addition, unlike our study, some studies conducted with adolescents have also reported that there is no difference between females and males (Koivisto and Sjödén 1996, Roßbach et al. 2016). On the other hand, some studies have reported slightly higher FN levels in males (Del Campo et al. 2023). However, in contrast to these results, another study found higher FN levels in females (Maiz and Balluerka 2018). It has been suggested that some factors such as geographical and socioeconomic differences may be effective in these conflicting results (Roßbach et al. 2016). Additionally, in the adolescence period, females are more concerned with their body image and weight, and it is known that diet and healthy eating gain more importance for females during this age period (Story et al. 2002, Roßbach et al. 2016). This explains why females have lower FN levels than males. The obtained results are guiding, but the review of the literature reveals a lack of research on the association between food neophobia and gender differences in the adolescence period (Roßbach et al. 2016).

This study has some limitations. The data collected from the same region contain similar cultural characteristics due to the cross-sectional nature of the study and the fact that it was conducted in a single center. One of the strengths of our study is testing the use of the FNS in adolescence, a period that has been less studied in the literature but is crucial for both physical and mental development. The other strength of the study is that the validity and reliability of FNS were examined in Turkish. Additionally, the balanced distribution of the socioeconomic status (low-medium-high), one of the factors affecting FNS, strengthened the validity and generalizability of the results. Moreover, the fact that the distribution of male and female participants in the study was balanced provided information about the distribution of both sexes in this age group and prevented possible gender bias.

During adolescence, when rapid physical and mental changes occur, dietary habits play a critical role in terms of healthy growth and development. Additionally, adolescence is an age period when eating disorders are frequently seen. Food neophobia makes it difficult for adolescents to eat a balanced and healthy diet. Being able to measure food neophobia in adolescents is of great importance in understanding eating habits, developing intervention strategies, and encouraging healthy eating behaviors. The findings of this study have revealed that the Turkish version of the FNS is a valid and reliable measurement tool that can be used in the adolescent age group in Turkey. Moreover, it is believed that this study will be a guide for researchers in this field.

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