

Are child and parent health behaviors associated with childhood obesity? A descriptive and methodological study

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ABSTRACT

Purpose: This study was conducted to determine the relationship between child and parents' health behaviors and childhood obesity. In addition, an adaptation of the Turkish version of the Family Health Behavior Scale (FHBS) was performed in this study.

Design and methods: This is a descriptive and methodological study. The research sample consisted of 358 parents who have a child between the ages of 5 and 12 studying in one of the seven state schools at the kindergarten, primary, and secondary school levels in Istanbul. Data were collected between February 2022 to May 2022 using the Parent and Child Descriptive Information Form, the Family Nutrition and Physical Activity (FNPA) Screening Tool, and the FHBS. IBM SPSS 25.0 (IBM, Armonk, NY, USA) and SPSS AMOS 21.0 software were used to analyze the data.

Results: It was found that the confirmatory factor analysis result of FHBS confirmed the original structure of the scale, and Cronbach's Alpha coefficient was calculated as 0.80. A positive correlation was found between the parents' total scores of FNPA and FHBS ($r:0.511, p < 0.001$).

Conclusions: It is recommended to evaluate the child and their parents holistically in preventing and managing childhood obesity. School health nurses should plan family-centered interventions to improve health behaviors and carry out these interventions with a multidisciplinary team. Moreover, it has been determined that FHBS is a valid and reliable measurement tool for the Turkish population.

Introduction

Childhood obesity is a severe public health problem and a disease associated with many comorbidities, including an increased risk of death at an early age and disability in adulthood (WHO, 2022). The number of obese children worldwide increased dramatically between 1975 and 2016 (NCD Risk Factor Collaboration (NCD-RisC), 2017). Today, children of all age groups living in Europe are affected by obesity (WHO, 2022). It is stated that 8% of children under the age of 5 and a quarter of children between the ages of 10–19 live with being overweight and/or obesity (WHO, 2022). In Turkey, 15.6% of children aged 6–9 years are overweight, and 9.9% are obese (Türkiye Ministry of Health, General Directorate of Public Health. Türkiye Childhood (Primary School 2nd Grade Students) Obesity Survey - COSI-TUR, 2016). Although genetic factors significantly affect the development of obesity in children, their nutrition, physical activity level, and health behaviors are directly affected by their parents and families (Dozier et al., 2020). Therefore, it

has been shown that family-based interventions are essential in preventing and managing childhood obesity by integrating behavior changes into daily life (Ahmad et al., 2018; Yackobovitch-Gavan et al., 2018).

School health nurses, who have a crucial role in primary health care services and are in contact with many children and their families, play an essential role in protecting and improving the health of individuals and families (Bejster et al., 2020). They cooperate with the family, school management, and other health professionals to monitor the healthy development of children and intervene in potential or existing health problems (Bejster et al., 2020). Health professionals in Turkey use various measurement tools to assess behaviors leading to childhood obesity (Erdim et al., 2017; Kabasakal et al., 2020; Uluk & Yıldırım, 2020). However, these measurement tools do not comprehensively assess the health behaviors of parents and children in a wide age range and a short format considering ethnicity. In order to fill this gap, it is aimed to perform the Turkish adaptation and validation of the Family

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Health Behavior Scale (FHBS) developed by Moreno et al. (2011). In addition, the results of this study are expected to guide future studies to be carried out to determine the health behaviors of parents and children, to reduce the risk of childhood obesity, and to improve family and child health.

Methods

This descriptive and methodological study was conducted to determine the relationship between child and parents' health behaviors and childhood obesity. Turkish adaptation and validation of the Family Health Behavior Scale (FHBS) was performed in this study.

Participants and settings

The study was conducted in seven state schools at kindergarten, primary, and secondary school levels in Istanbul in the 2021–2022 academic year. Parents with children aged 5–12 studying in these schools were included.

A stratified sampling method was used, and classes from the same level were determined using the lottery method. The sample size was aimed to be over 300 people (Tabachnick & Fidell, 2014). Accordingly, 358 parents formed the research sample. Four weeks after the first administration of the scale, data were collected from 132 parents for the re-test.

Data collection and data collection tools

Parents who were eligible for the research sample selection criteria were identified. They were informed about the research in the groups they were involved in (such as WhatsApp groups and parent-teacher meetings). In the next stage, data collection tools were given to the students to be filled in by their parents. In the following days, the students returned the questionnaires to their teachers. Four weeks later, the FHBS was given to the parents through the same students for the re-test application.

Parent and child information form

The form was created based on previous studies (Erdim et al., 2017; Kabasakal et al., 2020; Ozdemir et al., 2022; Preto et al., 2022C; Sanyaolu et al., 2019; Uluk & Yildirim, 2020). The form consists of 41 questions about sociodemographic and anthropometric features, dietary habits, physical activity routines, and the duration of screen time of the parents and their child. In addition, a pilot study of the form was conducted with thirty people. Parents provided information about their families, including the children's gender, age, height, and weight. Centers for Disease Control and Prevention (CDC) charts were used for the Body Mass Index (BMI) classification of parents (CDC, 2022) and BMI percentile classification of children (Kuczmarski et al., 2002).

The family and nutrition and physical activity screening tool

The FNPA, adapted into Turkish by Ozdemir et al., was used to assess the criterion validity of the FHBS (Ozdemir et al., 2022). The four-point Likert-type scale (1 = Never/almost never, 2 = Sometimes, 3 = Often, 4 = Very often/always) consists of five subscales and 20 items. The total score on the scale varies between 20 and 80, and a decrease in the total score indicates an increased risk of the obesogenic family environment. The Cronbach's Alpha coefficient of the scale was 0.76 (Ozdemir et al., 2022) and 0.77 in the present study.

The family health behavior scale

The original scale was developed by Moreno et al. to assess family health behaviors, including dietary habits, physical activity routines, associated with childhood

obesity (Moreno et al., 2011). It consists of 27 items and four subscales: parent behaviors, physical activity, mealtime routines, and child behaviors. The scale is a five-point Likert type. The lowest score that can be obtained from the scale is 0, and the highest score is 108. The probability of engaging in healthy behavior increases as the total score increases. The Cronbach's Alpha coefficient of the scale is 0.83, and for the scale subscales, it ranges between 0.74 and 0.85 (Moreno et al., 2011). Turkish adaptation and validation of the scale were carried out following the International Test Commission's guidelines (International Test Commissions, 2017).

Adaptation process

The translation of the scale from English to Turkish was carried out by three linguists and translators who are native speakers of Turkish and English and have a good knowledge of both languages and cultures. After harmonizing these three translations into a single form, the back-translation of the scale was carried out by two academicians who are experts in both languages. Finally, the translations were harmonized by an academician.

Validation process

Content validity

The Turkish and English versions of the form were given to experts (10 academicians working in public health, public health nursing, and pediatric health nursing). The Davis Technique was used to evaluate the content validity, and the experts were asked to give each item a score between 1 and 4 (Davis, 1992). The content validity index score of the scale was calculated as 0.98. The finalized scale was piloted with 50 participants, and the data obtained from the pilot study were analyzed. Items with an item-total correlation of 0.20 and below were reviewed but no changes were made to these items (Cokluk et al., 2021; Streinecker et al., 2014).

Construct validity

The factor structure of the scale was analyzed using Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). Bartlett's sphericity test ($\chi^2 = 2423.131$, $df = 351$, $p < 0.001$) and Kaiser-Meyer-Olkin index (KMO = 0.791) results were considered for the suitability of the data for factor analysis. Varimax, an orthogonal rotation method, was used in EFA (Tavşancıl, 2019).

As a result of EFA, it was decided to remove four items (Q3, Q4, Q21, Q24) from the scale at this stage. After the last factor analysis, an internal consistency analysis was performed with the 23 questions forming the final version of the scale and corrected item-total correlations were examined. At the following stage, the items with corrected item-total correlations below 0.20 (Q5, Q17, Q21) were removed, and the analysis was repeated. The final analysis with 20 items determined that there were no items with a corrected item-total correlation below 0.20. After eliminating all selected items from the scale, EFA was conducted with 20 items, and Kaiser-Meyer-Olkin (KMO) value was found to be 0.791. Bartlett's sphericity test results showing the correlation between variables ($\chi^2 = 1767.804$, $df = 190$, $p = 0.001$; $p < 0.05$) was statistically significant, and there was a correlation between the variables. When the eigenvalues and explained variances of the scale were analyzed, it was seen that the first factor explained the highest percentage of the variance at 22.41%, the second factor explained 10.32%, the third factor explained 8.63%, and the fourth factor explained the least percentage of variance with 7.15%.

In CFA, modification was needed to improve the model (Fig. 1). The adequacy of the model in explaining the data was tested with the fit indices. The fit indices obtained for the model as a result of CFA were χ^2 , $df = 1.877 < 2$, Goodness of Fit Index (GFI) = 0.917 \leq 0.95, Adjusted Goodness of Fit Index (AGFI) = 0.890 \leq 0.90, Comparative Fit Index (CFI) = 0.913 $<$ 0.95, Normed Fit Index (NFI) = 0.834 $<$ 0.90, Tucker

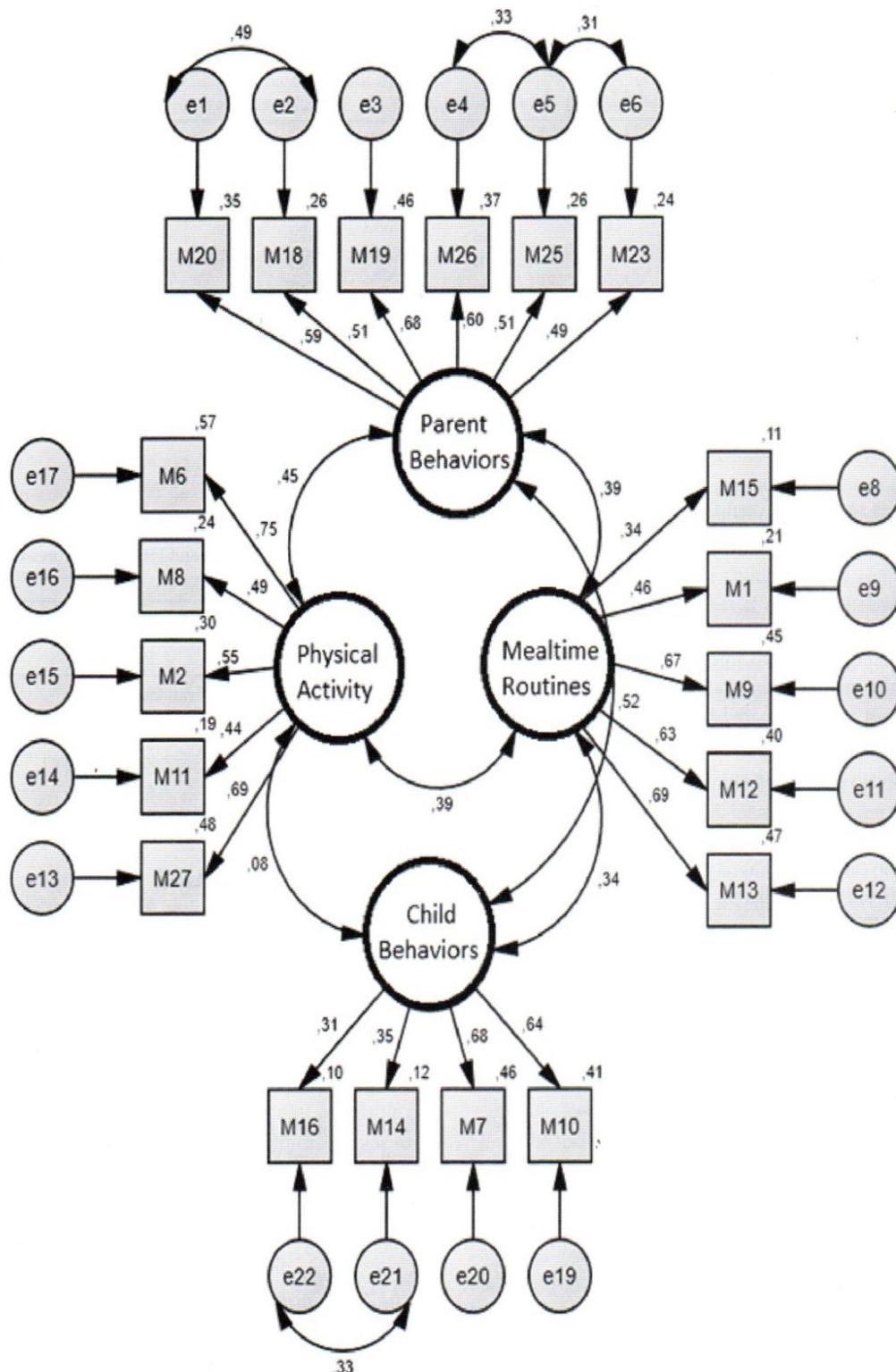


Fig. 1. Model diagram for the confirmatory factor analysis of FHBS.

Lewis Index (TLI) = 0.897 \leq 0.90, Root Mean Square Error of Approximation (RMSEA) = 0.050 \leq 0.05 (Schermele-Engel et al., 2003). It was determined that the factor loadings for each binary relationship were statistically significant ($p < 0.001$), and the items were loaded correctly on the factors.

Item discrimination

In order to calculate item discrimination, the difference between the lower 27% and upper 27% group means of the scale total scores was analyzed with the Independent Sample *t*-Test (Erkuş, 2021). The *t*-test values ranged between 4.962 and 12.389, and it was found that there was a statistically significant difference between the mean scores of the lower and upper 27% groups for all items ($p < 0.001$).

Concurrent validity

Concurrent validity was assessed by comparing the FHBS with the

FNPA using Pearson Product-Moment Correlation. A strong, positive, and significant correlation was found between the FHBS total and FNPA total scores ($r = 0.738, p = 0.001 < 0.05$). It was found that there was a moderate, significant, and positive correlation between the FHBS total score and the physical activity, healthy food intake, and sedentary behaviors subscale scores of FNPA ($r = 0.610, r = 0.481, r = 0.511, p = 0.001 < 0.05$). A weak, significant, and positive correlation was found between the FHBS total score and parental behaviors and unhealthy eating habits subscale score of FNPA ($r = 0.373, r = 0.361, p = 0.001 < 0.05$) (Table 1).

Reliability

Internal consistency

Reliability analysis was performed using Cronbach's Alpha for the 20-item scale. The scale's coefficient was found to be 0.803. Cronbach's

Table 1
The relationship between the FHBS and FNPA for concurrent validity.

Scales and Subscales		FHBS Parent Behaviors	FHBS Physical Activity	FHBS Mealtime Routines	FHBS Child Behaviors	FHBS Total Score
FNPA Total Score	r	0.507	0.600	0.454	0.411	0.738
	p	0.001	0.001	0.001	0.001	0.001
FNPA	r	0.373	0.676	0.280	0.221	0.610
Physical Activity	p	0.001	0.001	0.001	0.001	0.001
FNPA	r	0.210	0.298	0.273	0.229	0.373
Parent Behaviors	p	0.001	0.001	0.001	0.001	0.001
FNPA	r	0.339	0.086	0.195	0.451	0.361
Unhealthy Eating Behaviors	p	0.001	0.105	0.001	0.001	0.001
FNPA	r	0.292	0.365	0.479	0.138	0.481
Healthy Food Intake	p	0.001	0.001	0.001	0.009	0.001
FNPA	r	0.423	0.306	0.327	0.347	0.511
Sedentary Behaviors	p	0.001	0.001	0.001	0.001	0.001

r = Pearson Correlation, p < 0.001.

Alphas of the subscales ranged between 0.609 and 0.718 (parent behaviors: 0.765, physical activity: 0.718, mealtime routines: 0.684, child behaviors: 0.609).

Test re-test

The scale was administered to 132 people from the same sample group 4 weeks after the initial administration. Total and factor scores from the test and re-test were compared by Pearson product-moment correlation (Tsang et al., 2017). The relationship between total scores and all factors was statistically significant (r: 0.223–0.809) (p < 0.001).

Data analysis

The data were analyzed using SPSS 25.0 (IBM, Armonk, NY, USA) and SPSS AMOS 21.0 software packages. Parametric tests (One-Way ANOVA, Hochberg's GT2) were used to compare three and more independent groups with normal distribution. Content Validity Index (CVI) was calculated for the scale's content validity (Buyukozturk, 2021). EFA and CFA was performed for construct validity. Cronbach's Alpha reliability coefficient was calculated for the internal consistency analysis of the scale. Pearson Product Moment Correlation was used for item statistics and the test re-test method (Cokluk et al., 2021).

Ethics approval

The research was conducted under the Declaration of Helsinki, with the approval of the ethics committee (dated 02 July 2021, number 21/496) and the permission of the Ministry of Education (dated 20 August 2021, number E-59090411-20-29,823,209). Before starting data collection, the study's objectives were explained by the researchers, and written informed consent was obtained from all participants included in the study. Permission to use the FNPA and FHBS was obtained from the corresponding authors.

Results

A total of 358 participants took part in the research. The mean age of the parents was 37.72 ± 5.44 years, and the mean age of their children was 8.87 ± 1.96 years. Forty-three percent of the parents were university graduates, and 60.3% had two children.

The mean FHBS total score of the parents was 57.85 ± 9.17, and the mean FNPA total score was 58.28 ± 6.72. While no statistically significant difference was found between the mean FNPA and FHBS total scores and children's BMI percentile classification (p > 0.05), there was a statistically significant difference between parents' mean FNPA and FHBS total scores and parents' BMI classification (p < 0.05). It was concluded that the mean FNPA total score of the underweight parents was statistically higher than that of the normal weight, overweight, and obese parents, and the mean FHBS total score was statistically higher than that of the obese parents (F: 3.880, p < 0.05; F: 4.143, p < 0.05) (Table 2).

Table 2

Comparison of parents' FNPA and FHBS total scores with child's BMI percentile and parent's BMI classification.

Features	FNPA Total Score		FHBS Total Score	
	n	Mean ± SS	n	Mean ± SS
Child's BMI Percentile Classification (%)				
Underweight	16	58.25 ± 5.53	16	57.81 ± 8.10
Normal Weight	205	58.40 ± 7.12	205	58.33 ± 9.29
Overweight	66	59.03 ± 6.04	66	57.81 ± 8.96
Obese	71	57.28 ± 6.36	71	56.50 ± 9.28
F; p*		0.816; 0.485		0.698; 0.554
Parental BMI Classification (kg/m²)				
Underweight (a)	8	65.37 ± 5.97	8	65.87 ± 9.17
Normal Weight (b)	183	58.49 ± 6.43	183	58.49 ± 8.84
Overweight (c)	121	58.06 ± 6.57	121	57.50 ± 8.67
Obese (d)	46	56.82 ± 7.65	46	54.84 ± 10.72
F; p*		3.880; 0.009		4.143; 0.007
Post Hoc**		a > b,c,d		a > d

*One Way ANOVA test ** Post-hoc / Hochberg's GT2 test, p < 0.05.

A statistically significant difference was found between the parents' mean FNPA and FHBS total scores according to the average amount of vegetables and fruit consumed by the child per day (p < 0.05). This difference was because the FNPA and FHBS mean total scores of the parents whose child consumed 1–3 meals a day were statistically higher than those who did not consume any vegetables and fruit (p < 0.05). In addition, the FHBS mean total scores of parents who reported that their child consumed 4–6 meals of vegetables and fruit per day were statistically higher than those of parents who said that their child did not consume any vegetables and fruit (F:6.467, p < 0.05; F:11.767, p < 0.001) (Table 3).

Parents whose child did not engage in physical activity had a statistically lower mean score of FHBS and FNPA than those whose child was physically active total of 1–2 h, 3–4 h, and 5–6 h a week (p < 0.001). Furthermore, it was determined that the mean total scores of parents whose children engaged in physical activity for 3–4 h or 5–6 h per week were statistically higher than those of parents whose children engaged in physical activity for 1–2 h per week (F:30.451, p < 0.001; F:35.432, p < 0.001) (Table 3).

The parents' mean FNPA and FHBS total scores whose child had an average screen time of 5–6 h per day were statistically lower than those whose screen time was 0–1 h, 1–2 h, and 3–4 h (p < 0.001). In addition, a statistical difference was found between the mean FNPA and FHBS total scores and the child's screen time of 1–2 h and 3–4 h (p < 0.001). The scales' mean total scores of parents with a child who has 1–2 h of screen time were statistically higher than those with 3–4 h (F:19.778, p < 0.001; F:13.622, p < 0.001) (Table 3).

Table 3
Comparison of parents' and children's FNPA and FHBS total scores with different characteristics of children.

	FNPA Total Score		FHBS Total Score	
	n	Mean ± SS	n	Mean ± SS
Child's Daily Consumption of Vegetables and Fruits				
Never (a)	26	53.80 ± 7.65	26	49.69 ± 11.19
1–3 meals (b)	322	58.61 ± 6.56	322	58.48 ± 8.66
4–6 meals (c)	10	59.30 ± 5.61	10	58.80 ± 10.17
F; p*		6.467; 0.002***		11.767; 0.000****
Post Hoc**		a < b		a < b,c
Child Weekly Physical Activity Duration				
Never (a)	86	53.34 ± 5.52	86	50.74 ± 8.24
1–2 Hours (b)	149	58.56 ± 6.24	149	58.20 ± 7.93
3–4 Hours (c)	83	61.27 ± 5.60	83	62.02 ± 7.98
5–6 Hours (d)	40	61.67 ± 6.94	40	63.17 ± 8.44
F; p*		30.451; 0.000		35.432; 0.000
Post Hoc**		a < b < c,d		a < b < c,d
Child Daily Average Screen Time				
0–1 Hours (a)	37	59.67 ± 6.16	37	59.94 ± 8.37
1–2 Hours (b)	196	59.91 ± 6.51	196	59.50 ± 8.92
3–4 Hours (c)	97	56.53 ± 5.77	97	56.27 ± 8.47
5–6 Hours (d)	28	51.14 ± 5.99	28	49.03 ± 8.60
F; p*		19.778; 0.000		13.622; 0.000
Post Hoc**		b > c > d / a > d		b > c > d / a > d

*One Way ANOVA Test **Post-hoc / Hochberg's GT2 Test ***p < 0.05 ****p < 0.001.

Discussion

The findings of this study, which was conducted to determine the relationship between child and parents' health behaviors and childhood obesity, are discussed in line with the literature.

Parents and children's FNPA and FHBS scores

There was no difference between the children's BMI percentile classification and the parents' FNPA and FHBS total scores. Similar to the result of the present study, Lanzarote-Fernández et al. (2019) concluded that there was no statistically significant relationship between the total score of FHBS and BMI z-score of children (Lanzarote-Fernández et al., 2019). Conversely, Moreno et al. (2011) reported that each increase in the parents' score on the FHBS was associated with a 3.9% lower risk of the child being overweight and obese (Moreno et al., 2011). Additionally, Preto et al. (2022) stated that a high FHBS total score was associated with the child being in a healthy weight range (Preto et al., 2022). The difference between the results obtained in this study from the results of other studies may be due to the high educational level of the parents in this study.

This study found that underweight parents had statistically higher FNPA total scores than normal weight, overweight and obese parents and higher FHBS total scores than obese parents. They were less likely to engage in obesogenic behaviors and other research findings support this finding (Ekici et al., 2021; Williams et al., 2017). In the study conducted by Williams et al. (2017), underweight or normal weight parents had higher FNPA total scores, while parents who were overweight or obese were 2.18 times (95% CI 1.11–4.27) more likely to have a low FNPA total score (Williams et al., 2017). Ekici et al. (2021) determined that there was a negative correlation between the FNPA total scores and the BMI of the mothers (Ekici et al., 2021).

Fruit and vegetables have an important place in ensuring a healthy diet. This study concluded that parents who reported that their child did not consume fruit and vegetables had lower mean FNPA and FHBS scores. In another study, it was reported that fruit and vegetable consumption showed an inverse relationship with obesity and was

associated with low body fat mass (Bradlee et al., 2010). School health nurses are essential in ensuring healthy nutrition in school meals. In order to prepare high quality, adequately sized portions for the child instead of fried foods and foods containing excess fat, sugar, or salt, and to increase the consumption of vegetables and fruit in their diet, it is necessary to create healthy menus by working multidisciplinary and to guide the parents in this regard.

Inadequate physical activity is known to be a supporting factor in the occurrence of obesity in children and adults (Wyszyńska et al., 2021). The present study found that parents whose child did not engage in physical activity had lower FNPA and FHBS total scores than those who did. Studies have found that overweight/obese children do less physical activity than children with normal weight (Raistenskis et al., 2016); physical activity level is associated with the incidence of obesity, and increasing this level can reduce the risk of obesity (Cleven et al., 2020). As a result of the five-year school-based intervention program conducted by Bhave et al. (2016) for parents, children, and teachers, covering the areas of physical activity, nutrition, and general health; it was found that the waist circumference of the children in the intervention group was statistically lower than the children in the control group (Bhave et al., 2016). The study of Madsen et al. (2015) showed that third-year students in the intervention group had statistically lower BMI z-scores at the end of two years (Madsen et al., 2015).

It is stated that parental behaviors affect children's physical activity and sedentary behaviors. In another study conducted to examine this relationship, it was revealed that every 20-min increase in the duration of physical activity performed by parents at the moderate or vigorous level provided a 5 to 10-min increase in the duration of physical activity of their children (Garriguet et al., 2017). In this direction, it can be said that the low FNPA and FHBS total scores are related to the duration of weekly physical activity of parents and children. Moreover, parents with low scores and their children are more likely to have sedentary behaviors. Therefore, nurses should evaluate the family holistically and cooperate with them throughout the process to receive successful outcomes from interventions. Offering activities that parents can do with their children (such as dancing, walking, cycling), supporting positive behavior with rewards, or limiting screen time can be given as examples of some interventions that families can do.

The use of digital media by children and adolescents has increased significantly over time with the development of technology. Another notable finding in this study is that the FNPA and FHBS scores of parents having a child with 5–6 h of screen time a day were lower than the other groups. Ozgen Ozkaya et al. found that the proportion of obese children with >2 h of screen time is higher than children in the healthy weight range, and 2 h or more of screen time increased the risk of obesity in children by 1.56 times (Özgen Özkaya et al., 2022). It is stated that interventions to reduce children's screen time effectively reduce obesogenic behaviors but are not enough to reduce the risk of obesity in children and adolescents alone (Zhang et al., 2022). Since parents' screen time is related to their children's screen time and they have similar behavior patterns, examining all family members and the home environment is emphasized in gaining healthier behaviors (Arundell et al., 2020).

Turkish validity and reliability of FHBS

This study found that the Family Health Behavior Scale adapted for the Turkish population showed good psychometric properties, and its four-factor structure was confirmed. As a result of the analyses, it was determined that the scale is a valid and reliable measurement tool to evaluate families' obesity-related health behaviors.

During the validation process of the scale, seven items with lower factor loadings and item-total correlation than required (Cokluk et al., 2021; Streiner et al., 2014) were removed, and the Turkish version of the 20-item scale was obtained. The reason for item removal is considered to be that the participants did not fully understand the items or had no

relationship with them. Preto et al. (2022) carried out the adaptation of the FHBS for the Brazilian population, and it was suggested that the three items in the original the FHBS be evaluated in terms of their suitability for the Brazilian population (Preto et al., 2022). In the same study, unlike the original scale, the scale items were divided into seven factors instead of 4 factors, and all items were distributed to these factors without removing any items (Preto et al., 2022). Additionally, Lanzarote-Fernández et al. (2019) concluded that some of the items in the original scale were insufficient to measure health behaviors in the Spanish population due to cultural differences (Lanzarote-Fernández et al., 2019).

Although the results of the internal consistency analysis for the 20-item scale were relatively lower than the coefficient alphas of the original scale (Moreno et al., 2011), it was found that the coefficient alpha of the FHBS total scale was highly reliable, and its subscales showed adequate internal consistency (Taber, 2018). It can be said that removing some items that were not structurally distinctive for the Turkish population, to which the scale was applied, contributed to this formation. Likewise, Preto et al. stated that removing some items from the Brazilian Portuguese version of FHBS could increase these rates (Preto et al., 2022). Alpha coefficients ranged between 0.45 and 0.8 in studies conducted to adapt the FHBS to Brazilian and Spanish populations (Lanzarote-Fernández et al., 2019; Preto et al., 2022). Furthermore, as in other studies (Lanzarote-Fernández et al., 2019; Moreno et al., 2011; Preto et al., 2022), the coefficient alpha of the parent behaviors subscale and FHBS total scale were found to be higher than the other factors in this study.

Furthermore, item discrimination was calculated, and the difference between the lower 27% and upper 27% group means of the scale was analyzed. As a result, it was found that all items showed high item discrimination. Concurrent validity was assessed by comparing the FHBS with the FNPA, which measures the parent's and child's obesity-related behaviors (Ozdemir et al., 2022). A positive and strong relationship was found between the mean of the scales. According to these results, the FHBS is a valid and reliable measurement tool for measuring obesogenic family behaviors.

Lastly, this study administered the re-test four weeks after the first test. However, some factors' correlation analysis results were lower than expected (Tsang et al., 2017). Therefore, since participants' thoughts may change over time, keeping this period in the optimum range may optimize these results.

Limitations

The study's main limitation is that the data collection phase was carried out during the COVID-19 pandemic. Since face-to-face meetings with parents in the school environment were rarely held during the pandemic, fewer participants were reached, and the data was collected from parents who have a child in only seven different schools in Istanbul. Therefore, future studies should be conducted to test FHBS psychometric properties with a larger sample of the Turkish population. Another limitation is that many parents were informed about the research through online communication platforms (such as WhatsApp). As there were no school nurses in the schools where the data were collected, it would be beneficial to inform the participants under the guidance of a school nurse.

The research team could not perform anthropometric measurements in order to reduce the physical contact time. Therefore, these data were collected from parents based on self-report. For future studies, it would be desirable to collect precise anthropometric measurements, physical activity and eating behaviors of children and parents to relate FHBS scores.

Implications to practice

It is crucial to assess family health behaviors to manage childhood obesity. Therefore, the findings of the present study indicate that the Turkish version of FHBS can serve as a valuable tool for nurses and other

health professionals to evaluate and address the current and potential risk factors within families.

Conclusion

In order to prevent and manage childhood obesity, child and parent should be evaluated holistically, family-centered interventions should be planned to develop healthy behaviors, and these interventions should be carried out with a multidisciplinary team, especially school health nurses. Furthermore, increasing the consumption of fruit and vegetables instead of unhealthy snacks, increasing the duration of physical activity, and decreasing sedentary time are of great importance.

The study's findings indicated that this revised structure of FHBS which has four subscales and 20 items, is a valid and reliable scale in Turkish with good psychometric properties. The scale will guide school health nurses and health professionals in determining the risky health behaviors of the family related to obesity, planning family-centered interventions, and evaluating the outcomes of the implemented interventions.

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CRedit authorship contribution statement

Gizem Öztürk: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Resources, Software. **Merve Kolcu:** Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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