**Ulutas Med J** 2024;10(2):26-38
**DOI:** 10.5455/umj.20240515072336

ORIGINAL ARTICLE OPEN ACCESS

# Factors Affecting the Prediction of Eating Behavior in Children: Stepwise Regression Analysis on Parental Feeding Styles

**Gülcan Arusoğlu**[1] · **Sine Yılmaz**[2] · **Başak Can**[3]

[1] *Kirklareli University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Kırklareli, Türkiye*
[2] *Ankara Medipol University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Ankara, Türkiye*
[3] *Istanbul Gelişim University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Istanbul, Türkiye*

Introduction: To prevent obesity in adults, it is necessary to intervene in negative behaviors developing in childhood. These negative behaviors include negative eating behaviors. The aim of our study is to investigate the relationship between parental feeding styles, which is one of the most important factors affecting children's feeding behavior.
Materials and Methods: The Child Eating Behavior Questionnaire and Parental Feeding Style Questionnaire scales were administered to the participants by the researchers in this research, which was planned as a descriptive study,
Results: Research results showed that parental feeding styles, such as emotional feeding and incentive feeding, are one of the most important predictors of children's eating behaviors. In addition, the child's weight also affects sub-dimensions such as eating selectivity, slow eating, and enjoyment of eating.
Conclusion: The interaction between the child's weight and eating behavior is a vicious circle that is harder to break. However, if the parents' eating styles are changed in the right direction, the child's eating behavior can be improved and the child's weight can be managed. This is an important way to prevent childhood obesity. For this reason, parents and caregivers who are responsible for the child's nutrition need to acquire healthy eating behaviors and adapt these behaviors to their own lives.
Keywords: Children's eating behavior, parental feeding styles, preschool, school-age

## Introduction

In light of the significant rise in childhood obesity in recent years, researchers have directed their attention toward investigating the influence of parental factors on the development and prevention of obesity. The developmental stages during which children are most influenced by their parents' dietary choices and behaviors are preschool (3-5 years) and school-age (6-12 years) (1). It is reported in the literature that parental feeding styles impact children's eating behavior and overall dietary patterns. This phenomenon can be attributed, in part, to the role of parents, particularly women, in influencing child's food environment and exerting an impact on dietary preferences.

**Corresponding Author:** Başak Can; Faculty of Health Sciences, Department of Nutrition and Dietetics, Istanbul Gelişim University, Istanbul, Türkiye
**E-Mail:** bulker@gelisim.edu.tr
**ORCID:** 0000-0002-0608-6496
**Received**: March 5, 2024 **Accepted**: Apr 17, 2024
**Published**: June 19, 2024

This is an Open Access article distributed under the terms of Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, or reproduction in any area, original work is properly cited.

**The Ulutas Medical Journal © 2024**

Therefore, it is important to assess parental feeding styles and practices to introduce healthy eating habits to the child (2).

Parental feeding styles include the cognitive and behavioral aspects of parents, including attitudes, beliefs, and actions toward feeding practices. These parenting styles encompass a broad spectrum of fields, including physical exercise, nutrition, sleep routines, hygiene practices, recreational activities and educational approaches. Parental styles comprise three distinct categories: authoritarian, authoritative, and permissive. Parental styles also change the way parents feed. According to a systematic review, the authoritarian parenting style is associated with pressure on a child to eat and having restrictive parental eating behaviors, whereas authoritative parenting is associated with parental monitoring of children's food intake. In contrast, a permissive parenting style is inversely related to monitoring the child's dietary intake (2). The availability of consistent evidence regarding the association between parental feeding habits and child eating outcomes is constrained due to variations in the assessment methods employed (3). Therefore, a variety of questionnaires has been developed to facilitate the comparison of parental feeding patterns. One of the questionnaires utilized in this study is the Parental Feeding Styles Questionnaire (PFSQ) (4). The primary objective of the questionnaire is to assess various feeding styles, including control over eating, emotional feeding, instrumental feeding, encouragement to eat, as developed by Wardle et al. (5).

In the course of investigating parental feeding methods, it is imperative to determine eating behaviors. The Children's Eating Behavior Questionnaire (CEBQ), which has been created and validated in the United Kingdom, is considered to be one of the most complete assessment tools for preschool and school-age child (6). CEBQ is a comprehensive assessment tool formulated based on discussions with parents about how their children eat. The items cover four extents indicating 'food approach' (enjoyment of food, emotional overeating, food responsiveness, and desire to drink) and four extents measuring 'food avoidance' behavior (slowness in eating, satiety responsiveness emotional undereating, and food fussiness) (7). According to the CEBQ, among preschoolers, and school-age children (8) higher scores on food approach were associated with higher body mass index (BMI) due to higher weight status, while higher scores on food avoidance were associated with lower weight status and lower BMI. The investigation of the parental eating patterns' impact on BMI is of significant importance due to the crucial role BMI plays as a marker for childhood obesity (9).

The prevalence of childhood obesity was compared with CEBQ and PFSQ similar to other countries in Turkey (7,9,10,11). Before conducting a comparison between parental feeding patterns and childhood obesity, it is essential to establish the basis for the relationship existing between parental feeding styles and child eating behaviors. Given the prevailing role of women as primary caregivers in Turkey, the objective of this study is to determine the dietary practices of mothers with preschool and school-age children, as well as children's eating behaviors. Furthermore, the study attempts to elucidate the relationship between these factors.

## Material and Methods

### *Study group*

The present study was conducted in a diverse range of preschools and primary schools, which were picked from different socio-economic strata (lower, middle, and upper) in Turkey. The selection of schools was based on a simple random sampling technique. A total of 1302 children and their mothers were included in the study population. The study was conducted using a size of 1101 children and mothers after excluding participants with missing data.

Mothers were engaged through direct communication as comprehensive explanations and information were provided to them. Before the start of data collection, explicit verbal and written consent was obtained from both mothers and their children, ensuring their voluntary involvement in the research. Upon acceptance of the voluntary permission form, the researchers proceeded to administer the questionnaire to the participants, reading it aloud and meticulously documenting their responses. The questionnaire included socio-demographic information, CEBQ, and PFSQ scales. The questionnaires were completed in approximately 15 min. The researchers ensured that the participants gave clear and complete answers to each question. All data collected were statistically analyzed.

*Participants*

Mothers whose children attended public kindergartens and primary schools were randomly selected by the researchers and were included in the study. The participants had to have at least one child aged between 3 and 12 years old. In instances when a family consisted of two or more children, they were requested to complete the questionnaire for a single child alone. The sample of the study was obtained by choosing a simple random sample, while the sample size was calculated using the sample formula with a certain universe, and it was calculated that 1310 children would be sufficient for the study to be carried out based on a sample size calculation made with a sampling error of 0.05 and 95% confidence.

The inclusion criteria were: (i) the children were in preschool (3-5 years) or school-age (6-12 years), (ii) the parent could speak Turkish, and (iii) the parent agreed to participate and answer the questionnaire. Exclusion criteria were: (i) a history of chronic illness in the last two months that may have affected the child's eating behavior and (ii) not being able to communicate with parent.

*Instruments*

The instrument was the PFSQ, CEBQ, and a questionnaire including socio-demographic information. The socio-demographic form includes the mother's age, weight, height, smoking, monthly income, mother/father's education, and occupation. The demographic characteristics of the child are age, age group, gender, and presence of chronic disease.

*Children's Eating Behavior Questionnaire (CEBQ)*

Wardle et al. developed the Children's Eating Behavior Questionnaire which has 35 elements in food styles related to obesity risk, and they come together in 8 subscales. The 'Food Approach' dimension is represented by four factors: food responsiveness (FR), emotional overeating (EOE), enjoyment of food (EOF), and desire to drink (DD). The "Food Avoidance" dimension includes satiety responsiveness (SR), slowness in eating (SE), emotional undereating (EUE), and food fussiness (FF) subscales (6). CEBQ items were answered on a 5-point Likert scale from 1=never to 5=always. Scale scores were only calculated if at least 75% of the items were completed.

The CEBQ version, validated in Turkish by Yılmaz et al., was tested with exploratory factor analysis. The Cronbach's Alfas ranged from 0.61 to 0.84. The confirmatory factor analysis was calculated as 0.049 depending on the RMSEA index of fitness and it found that the scale was suitable for Turkish population (12). According to our study, the Cronbach Alpha coefficient of CEBQ sub-factors varies between 0.68 and 0.81, and the composite reliability index varies between 0.65 and 0.81.

*Parental Feeding Style Questionnaire (PFSQ)*

The Parental Feeding Styles Questionnaire, created by Wardle and colleagues, is a 27-point parental reporting measure used to assess parental feeding patterns (5). All the parents' responses to 27 statements on a 5-point Likert-type scale ranging from "never" (=1) to "always" (=5) were recorded. In the Turkish version of

the original questionnaire with four subscales, the scale was divided into five subscales. The first three subscales are emotional feeding (EF), instrumental feeding (IF), and prompting/ encouraging feeding (PF). Strictly controlled (SC), and tolerantly controlled (TC), which emerged by dividing the control over eating subscale into 2 scales, are the other 2 subscales.

A mean score was calculated for each subscale, where a higher score indicates more frequent use of the feeding style in question (13). Parents use the instrumental feeding style when it uses food as a reward (or punishment for the removal of food). The style of feeding the child according to emotions is the emotional feeding style (e.g., if a child has a bad day at preschool, the mother offers the child a cookie to make him or her feel better). Another form of feeding style is control over eating feeding. In this feeding style, parents; want to control when, where, and how the child eats. Lastly, parents have to prompt and encourage a feeding style that offers a wide range of healthy and safe options for their children and allows their children to make food choices (14).

A reliability and validity study were done by Özçetin et al. According to the research, the reliability coefficients (Cronbach's Alfas) of the confidence subscales vary between 0.54 and 0.83. In addition, close results were obtained from the original PFSQ in terms of structure validity, internal consistency, and sub-group relations (15). When the Cronbach Alpha and composite reliability values of the PFSQ sub-factors are examined, the Cronbach Alpha coefficient varies between 0.58 and 0.88, and the composite reliability index varies between 0.61 and 0.89.

### *BMI Z-Scores*

The children were weighed and their height was measured following standard procedures. Age- and gender-specific BMI z-scores were calculated using the WHO Anthro Plus.

### *Ethical Statement*

The study was found ethically appropriate with the protocol code P0165R00 dated 11/10/2019 by Kirklareli University, Institute of Health, Ethical Committee Chair. Food consumption frequency used in the survey form was taken from the study titled "Legumes and Oilseed Consumption Frequency" (16).

### *Statistical Analysis*

All data including continuous and categorical data were statistically analyzed by SPSS Version 21 software. The descriptive values obtained from the measurement tool were examined in the first stage of this study, in which it was tried to determine the status of children's eating behaviors and what the independent variables affecting this behavior were. In the analysis of descriptive values, mean and standard deviation values obtained from the subscales were evaluated within the framework of the minimum and maximum points that can be obtained. In the next phase of the study, the relationships between CEBQ and PFSQ subscales were examined. Pearson correlation coefficients were used in the analysis of these relationships since the subscale scores showed normal distribution. In another analysis, stepwise regression analyses were performed between the dependent variable (CEBQ subscales) and independent variables (PFSQ subscales, weight, height, gender and smoking). The final models were decided on the variables whose coefficients were significant in the established regression models. In the last stage of the study, mean comparison tests were carried out on categorical variables, which were determined as significant predictor variables as a result of regression analysis. Since the subscale score distributions of the mentioned categorical variables showed normal distribution, an independent groups t-test was applied. The level of statistical significance was set at a p-value less than .05.

## Results

A total of 1101 questionnaires were filled in completely by the parents of the children participating in the study. Number of children going to preschool is 486 (%44.1), and school-age is 615 (%55.9). The BMI distributions of the children are shown in Supplementary Figure 1.

BMI and Z-score according to age distribution are shown in Supplementary Table 1. The mean age of the mothers was 35.23±4.83. The average income of families was 5339±3832.02 ₺; the monthly income for eating was 1602.13± 1136.31₺. Table 1 shows some demographic characteristics of the children and their parents.

Table-1. Some socio-demographic characteristics of the mother and child participating in the study

| Variables | | N *(%)* / Mean±SD *(Min-Max)* |
|---|---|---|
| Child's Gender | Female | 525 (47.7) |
| | Male | 576 (52.3) |
| Age Groups | Preschool | 486 (44.1) |
| | School-age | 615 (55.9) |
| Number of People Living in the Family | ≤3 | 342 (31.1) |
| | 4 | 571 (51.9) |
| | 5 | 132 (12.0) |
| | ≥6 | 56 (5.1) |
| Mother's Age* | 35.23 ± 4.83 (22.00 -58.00) | |
| Mother's Body Weight (kg)* | 66.21 ± 10.60 (35.00-128.00) | |
| Mother's Height (cm)* | 163.50 ± 5.79 (117.00-185.00) | |
| Mother's BMI (kg/m$^2$) | 24.76 ± 3.85 (12.70-45.29) | |
| Mother's/Father's Education | Illiterate | 5 (0.5) / 2 (0.2) |
| | Literate | 9 (0.8) / 2 (0.2) |
| | Primary school | 111 (10.1) / 86 (7.8) |
| | Secondary school | 114 (10.4) / 115 (10.4) |
| | High school | 405 (36.8) / 394 (35.8) |
| | University | 457 (41.5) / 502 (45.6) |
| Mother's Occupation | Unemployed | 601 (54.6) |
| | Officer | 254 (23.1) |
| | Worker | 166 (15.1) |
| | Self-employment | 71 (6.4) |
| | Farmer | 9 (0.8) |
| Father's Occupation | Officer | 369 (33.5) |
| | Self-employment | 344 (31.2) |
| | Worker | 308 (28.0) |
| | Farmers | 44 (4.0) |
| | Unemployed | 36 (3.3) |
| Mother's Smoking | Yes | 333 (30.2) |
| | No | 768 (69.8) |
| Family Monthly Income* | 5339.00 ± 3832.02 ₺ (600.00 – 80.000 ₺) | |
| Income Allocated to Monthly Eating* | 1602.13 ± 1136.31 ₺ (3.00- 20.000 ₺) | |

***** *Mean ± SD (min-max)*

Supplementary Table 2 presents descriptive statistics on the subscales of CEBQ and PFSQ. It is seen that the Cronbach's Alfas coefficient of the CEBQ subscales varies between 0.68 and 0.81, and the composite reliable index varies between 0.65 and 0.81. When the Cronbach's Alfas and composite reliability values of the PFSQ subscales are examined, it is seen that the Cronbach's Alfas coefficient varies between 0.58 and 0.88, and the composite reliability index varies between 0.61 and 0.89.

Table 2 shows the correlation coefficients of the subscales of the CEBQ and PFSQ. A strong positive correlation was found between SC and PF. A moderate positive correlation was found between EF and DD, EUE; PF with SR, EUE; and IF with EOE, DD. Secondly, there was a weak positive correlation between EF with FR, SR; PF with DD, SE; IF with FR, SR, SE, and EUE; TC with FR and DD. On the other hand, a weak negative correlation was found between EOF and SR, SE; between SR and FF, and between SC, T.

Various independent variables were involved in the prediction of children's eating behavior subscale scores in the study. These are emotional feeding, prompting/encouraging feeding, instrumental feeding, tight control, tolerant control, parental smoking status, and child characteristics (gender, age, height, and weight). Through stepwise regression, the order of importance of the dependent variable affecting each dependent variable was determined. Variables that did not have a significant effect on the dependent variable were excluded from the models. Accordingly, the results of the stepwise regression analysis regarding the prediction of the subscales of eating behavior in children are given in Table 3.

When the stepwise regression results for the prediction of FR subscale scores were examined, it was found that EF was the most important predictor, but in the last model, the predictive effect of the weight variable increased with the entry of the height variable into the model.

Table-2. Correlation coefficients between CEBQ and PFSQ subscales

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) FR | 1.00 | | | | | | | | | | | | |
| (2) EOE | .55 | 1.00 | | | | | | | | | | | |
| (3) EOF | .48 | .28 | 1.00 | | | | | | | | | | |
| (4) DD | .32 | .25 | .08 | 1.00 | | | | | | | | | |
| (5) SR | -.15 | -.03 | -.42 | .23 | 1.00 | | | | | | | | |
| (6) SE | -.18 | -.12 | -.46 | .09 | .50 | 1.00 | | | | | | | |
| (7) EUE | .10 | .14 | -.05 | .23 | .39 | .26 | 1.00 | | | | | | |
| (8) FF | .34 | .18 | .46 | .04 | -.32 | -.20 | -.01 | 1.00 | | | | | |
| (9) EF | .19 | .35 | -.01 | .26 | .14 | .08 | .27 | .00 | 1.00 | | | | |
| (10) PF | -.04 | -.01 | -.01 | .19 | .28 | .20 | .22 | .01 | .19 | 1.00 | | | |
| (11) IF | .13 | .25 | -.11 | .21 | .15 | .10 | .17 | -.03 | .65 | .23 | 1.00 | | |
| (12) SC | .01 | -.03 | .08 | .03 | .09 | .07 | .07 | .02 | -.03 | .37 | .06 | 1.00 | |
| (13) TC | .11 | .16 | -.04 | .10 | .19 | .06 | .10 | .00 | .26 | .04 | .19 | -.28 | 1.00 |

**Food Responsiveness= FR, Emotional Overeating=EOE, Enjoyment of Food=EOF, Desire to Drink=DD, Satiety Responsiveness=SR, Slowness in Eating=SE, Emotional Undereating=EUE, Food Fussiness=FF, Emotional Feeding=EF, Prompting/Encouraging Feeding=PF, Instrumental Feeding=IF, Strictly Controlled=SC, Tolerantly Controlled= TC*

Table-3. Stepwise regression analysis results for predicting eating behaviors in children

| | | Model-1 | | Model-2 | | Model-3 | | Model-4 | | Model-5 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *β* | *Beta* | *β* | *Beta* | *β* | *Beta* | *β* | *Beta* | *β* | *Beta* |
| Food Responsiveness | EF | .16 | .19 | .17 | .21 | .17 | .21 | | | | |
| | Weight | | | .09 | .20 | .17 | .36 | | | | |
| | Height | | | | | -.06 | -.20 | | | | |
| | R | .19 | | .28 | | .30 | | | | | |
| | $R^2$ | .04 | | .08 | | .09 | | | | | |
| | F | 40.64 | | 45.47 | | 36.01 | | | | | |
| Emotional Overeating | EF | .19 | .35 | .19 | .36 | .18 | .34 | | | | |
| | Weight | | | .05 | .16 | .05 | .16 | | | | |
| | TC | | | | | .05 | .07 | | | | |
| | R | .35 | | .38 | | .39 | | | | | |
| | $R^2$ | .12 | | .15 | | .15 | | | | | |
| | F | 15.56 | | 94.69 | | 65.68 | | | | | |
| Enjoyment of Food | Weight | .14 | .24 | .22 | .39 | .22 | .38 | .21 | .38 | .21 | .38 |
| | Height | | | -.06 | -.18 | -.06 | -.17 | -.06 | -.18 | -.06 | -.18 |
| | SC | | | | | .11 | .08 | .11 | .09 | .12 | .10 |
| | IF | | | | | | | -.12 | -.09 | -.22 | -.17 |
| | EF | | | | | | | | | .12 | .12 |
| | R | .24 | | .26 | | .27 | | .29 | | .30 | |
| | $R^2$ | .06 | | .07 | | .08 | | .09 | | .09 | |
| | F | 68.37 | | 41.09 | | 30.35 | | 25.06 | | 22.20 | |
| Desire to Drink | EF | .19 | .26 | .17 | .23 | .17 | .23.17 | .23 | | | |
| | PF | | | .08 | .15 | .08 | .14.08 | .14 | | | |
| | Gender | | | | | -.56 | -.09-.56 | -.09 | | | |
| | Smoking | | | | | | -.49 | -.07 | | | |
| | R | .26 | | .30 | | .31 | | .32 | | | |
| | $R^2$ | .07 | | .08 | | .10 | | .10 | | | |
| | F | 81.01 | | 53.85 | | 39.62 | | 31.52 | | | |
| Satiety Responsiveness | PF | .27 | .28 | .27 | .28 | .24 | .25 | | | | |
| | TC | | | .29 | .18 | .29 | .17 | | | | |
| | Weight | | | | | -.11 | -.15 | | | | |
| | R | .28 | | .33 | | .36 | | | | | |
| | $R^2$ | .08 | | .11 | | .13 | | | | | |
| | F | 94.43 | | 67.93 | | 55.60 | | | | | |
| Slowness in Eating | Weight | -.12 | -.26 | -.11 | -.23 | -.11 | -.23 | | | | |
| | PF | | | .11 | .17 | .11 | .17 | | | | |
| | Gender | | | | | .45 | .06 | | | | |
| | R | .26 | | .30 | | .31 | | | | | |
| | $R^2$ | .07 | | .09 | | .10 | | | | | |
| | F | 77.35 | | 55.78 | | 39.01 | | | | | |
| Emotional Undereating | EF | .23 | .27 | .20 | .23 | | | | | | |
| | PF | | | .12 | .18 | | | | | | |
| | R | .27 | | .32 | | | | | | | |
| | $R^2$ | .07 | | .10 | | | | | | | |
| | F | 84.72 | | 62.58 | | | | | | | |
| Food Fussiness | Weight | .06 | .17 | .06 | .17 | | | | | | |
| | Gender | | | .35 | .06 | | | | | | |
| | R | .17 | | .18 | | | | | | | |
| | $R^2$ | .03 | | .04 | | | | | | | |
| | F | 33.26 | | 18.87 | | | | | | | |

Emotional Feeding=EF, Prompting/Encouraging Feeding=PF, IF: Instrumental Feeding, Tolerantly Controlled=TC, Strictly Controlled=SC

It was determined that the three independent variable models established were significant ($R^2$=.09, F3,1097=36.01). In the EOE subscale scores, EF was the most important predictor, while the effect of the TC variable in the last model was found to be very small. However, since the three independent variable models were determined to be significant ($R^2$=.15, F3,1097=65.68), it was decided to keep the variables with significant effects in the model.

When the scores of EOF, which is another subscale, were examined, it was determined that the most important predictor variable was weight (βweight=0.38, p<0.001). Looking at the results, it was seen that while the $R^2$ contribution of the weight variable alone was 0.06, it increased to 0.09 with the addition of all other variables. In particular, it was determined that the contribution of the IF and EF variables included in the model to $R^2$ is quite low. It was determined that the most important predictor variable in the prediction of DD subscale scores was EF (βEF=.23, p<0.001). It was determined that the PF variable was the most important predictor among the SR subscale and the three independent variable model established was significant ($R^2$=.13, F3,1097=55.60). Considering the prediction of SE scores, which is another subscale, it was determined that the weight variable was the most important predictor and the three independent variable models established were significant ($R^2$=.10, F3,1097= 39.01). According to the stepwise regression results for the prediction of EUE scores, it was determined that the independent variable of EF was a more important predictor than PF and two independent variable models established were significant ($R^2$=.10, F2,1098=62.58). Finally, when the stepwise regression results for the prediction of FF subscale scores were examined, it was determined that the weight variable was the most important predictor and the two independent variable models established were significant ($R^2$=.04, F2,1098=18.87).

The results of the analysis of the children's feeding behavior and parental feeding style subscale scores for the body mass index variable are given in Table 4. Means of FR (p<0.001), EOE (p=0.008), EOF (p<0.001), SR (p<0.001), SE (p<0.001), and FF (p<0.001) of CEBQ subscales in children, BMI classes differed significantly between groups. However, it was determined that there was no difference between DD (p=0.560) and EUE (p=0.094) subscale means. Of the PFSQ subscales, only PF (p=0.002) subscales differed significantly from BMI subscales, and the other subscales were EF (p=0.495), IF (p=0.059), SC (p=0.067) and TC (p=0.668) subscale means were not different. It was determined that the effect size coefficients calculated for the significant difference were small effects for food EOE, SR, FF, and PF, close to medium effects for FR and SE, and medium effects for EOF.

## Discussion

The objective of this study was to examine the predictive influence of parental feeding methods on the feeding behaviors exhibited by children. For this purpose, the Children's Eating Behavior Questionnaire and Parental Feeding Style Questionnaire scales were used. According to the relevant literature, reliability values of 0.60 and above are considered "reliable" and values of 0.80 and above are considered "highly reliable" (17), it can be said that all subscales of the CEBQ are reliable, while the subscale of the scale EOF has a high level of reliability. Also, PFSQ subscales are reliable according to the literature. In addition, it can be stated that the EF subscale of the parental feeding style scale has a high level of reliability (Supplementary Table 1).

In our study, based on the analysis of the PFSQ in five sub-factors for the Turkish population (15), controlled feeding was divided into strictly controlled and tolerant controlled sub-factors. The original four-factor model was not validated in the United States (18) and Portugal

(19), making the five-factor model more appropriate. The presence of culturally adapted and validated parental feeding tools provides an accurate understanding of feeding styles. By implementing this approach, the regulation of children's nutritional consumption can be managed, hence mitigating any complications associated with excessive weight gain.

Supplementary Table 1 also includes the mean scores of the scales. Considering that the increase in the scores also increases the performance of the behavior in the relevant factor, it can be said that the arithmetic mean scores of the EOF, DD, SR, SE, and EUE sub-factors are higher than the minimum and maximum score values that can be obtained from the relevant sub-factor. According to the arithmetic mean scores, the averages of the EOF and SR sub-factors were found to be above the average scores that can be obtained from the relevant sub-factors. In the FR, EOE, and FF factors, it is seen that the arithmetic mean scores of the participants are below the average score that can be obtained from the relevant sub-factors. In summary, it can be interpreted that while the participants' enjoyment of food and satiety responsiveness were found to be above the average, their food responsiveness, emotional overeating, and food fussiness behaviors were not observed at a significant level. An additional investigation revealed that parental influence exhibited a higher likelihood of exerting control over dietary habits (14). A research investigation conducted in England revealed that parents of South Asian and Black Afro-Caribbean ethnicity exhibited higher levels of pressure to eat, emotional eating, and instrumental feeding in comparison to families of white ethnicity (20). Participants were not divided into any ethnic group in our study. Following the research conducted by Korani et al., the identification of ethnic attributes associated with child-feeding practices can facilitate the implementation of targeted strategies tailored to the unique characteristics of each ethnic group (21).

The presence of ethnic disparities across nations is also evident in the approaches employed by parents when it comes to feeding their children. These disparities are a result of variations in social and cultural structure. Hence, conducting future comprehensive research encompassing other ethnic groups will facilitate the identification of variations in social and cultural structures that contribute to disparities in feeding practices. Existing research has demonstrated the significance of parental feeding habits and the child's eating behavior to the child's weight status (22,23). In contrast, based on the conducted analysis of variance in our study, there was not a noticeable disparity observed in PFSQ scale scores among different children's BMI groups. In the CEBQ subscales, differences were found between child BMI groups in the FR, EOF, EOE, SR, SE, and FF subscales (Table 4). In the present investigation, we identified data that support findings from a previous study conducted in Turkey. According to these data, FR, EOE, EOF, and FF increased significantly from very underweight to obese, while SR and SE decreased. In the study of Spahiĉ et al., all subscales except FF changed in the same way, supporting the data (24). Table 3 shows that the most important predictor of the food responsiveness subscale is emotional feeding, while responsiveness is encouraging feeding. Accordingly, it can be said parental feeding styles indirectly affect children's body weight and BMI. The data presented in this study provide support for the findings of a comprehensive systematic review that includes various nations in Latin America and the Caribbean region (25).

A correlation exists between specific parental feeding practices and the eating habits of children (26). For instance, a positive association was found between parental modelling of healthy eating behaviors and child fruit and

**Table 4**. Variance analysis results of CEBQ and PFSQ subscale scores by Child's BMI variable

| | Subscale | Severe Thinnes[1] | Thinness[2] | Normal[3] | Overweight[4] | Obesity[5] | F | P | $\eta^2$ | Differences |
|---|---|---|---|---|---|---|---|---|---|---|
| CEBQ | FR | 8.89±3.74 | 8.38±2.74 | 8.92±3.11 | 9.70±3.44 | 10.73±4.34 | 12.22 | **<0.001** | 0.04 | 5-1, 5-2, 5-3, 5-4, 4-2, 4-3 |
| | EOE | 5.58±2.02 | 5.67±1.92 | 5.97±2.13 | 6.16±2.40 | 6.49±2.44 | 3.45 | 0.008 | 0.01 | 5-2 |
| | EOF | 13.87±4.58 | 14.05±3.83 | 15.07±4.07 | 16.65±4.09 | 17.36±4.14 | 20.00 | **<0.001** | 0.07 | 5-1, 5-2, 5-3, 4-1, 4-2, 4-3 |
| | DD | 7.82±2.94 | 7.76±2.94 | 7.74±3.07 | 7.51±3.05 | 8.06±3.16 | 0.75 | 0.560 | - | - |
| | SR | 22.23±4.73 | 21.43±4.84 | 21.58±5.35 | 19.91±5.21 | 19.71±4.88 | 7.42 | **<0.001** | 0.03 | 5-1, 5-2, 5-3, 4-1, 4-3 |
| | SE | 11.51±3.66 | 11.34±3.71 | 10.50±3.48 | 9.84±3.28 | 9.11±3.13 | 10.83 | **<0.001** | 0.04 | 5-1, 5-2, 5-3, 4-1, 4-2 |
| | EUE | 12.09±3.55 | 11.58±3.27 | 11.07±3.64 | 10.81±3.60 | 11.01±3.59 | 1.99 | 0.094 | - | - |
| | FF | 6.75±2.69 | 6.78±2.55 | 6.93±2.66 | 7.84±3.04 | 7.76±3.03 | 6.61 | **<0.001** | 0.02 | 5-2, 5-3, 4-2, 4-3 |
| PFSQ | EF | 10.60±4.03 | 10.68±3.61 | 10.60±4.18 | 10.14±4.27 | 10.11±4.11 | 0.85 | 0.495 | - | - |
| | PF | 28.85±5.27 | 29.44±4.95 | 29.82±5.12 | 28.76±5.56 | 28.04±6.08 | 4.23 | 0.002 | 0.02 | 5-3 |
| | IF | 7.52±2.97 | 8.45±3.15 | 8.20±3.03 | 7.70±3.30 | 7.71±3.17 | 2.28 | 0.059 | - | - |
| | SC | 12.95±3.47 | 14.42±3.08 | 14.25±3.29 | 14.31±3.45 | 14.17±3.31 | 2.20 | 0.067 | - | - |
| | TC | 12.42±3.06 | 11.72±2.63 | 11.94±3.15 | 11.99±3.33 | 12.13±3.31 | 0.59 | 0.668 | - | - |

***Food Responsiveness= FR, Emotional Overeating=EOE, Enjoyment of Food=EOF, Desire to Drink=DD, Satiety Responsiveness=SR, Slowness in Eating=SE, Emotional Undereating=EUE, Food Fussiness=FF, Emotional Feeding=EF, Prompting/Encouraging Feeding=PF, Instrumental Feeding=IF, Strictly Controlled=SC, Tolerantly Controlled= TC.* **Severe thinness: <-2sd; Thinness: (-2sd)- (-1sd); Normal: (-1sd) ile (1sd); Overweight: (1sd) -(2sd); Obesity:>2

vegetable intake (27), and more covert control was found to be associated with less unhealthy snack intake and more fruit and vegetable intake in children (28). As in Table 3, the most important predictor of the subscales other than EOF, SE, and FF is a parental feeding style. Based on the findings of the research, it can be hypothesized that parents' emotional feeding patterns serve as a significant determinant of children's emotional overeating. Children who demonstrate emotional eating may consume food as a response to experiencing emotions such as anger, anxiety, or depression. This behavior of emotional eating may serve as a coping mechanism, allowing to temporarily escape from unfavorable affective states (29). Emotional eating in children is linked to the consumption of food without experiencing hunger and a lack of control over eating, which is indicative of psychopathologic manifestations of eating disorder (29,30). Due to this rationale, caregivers must use caution in their approach towards feeding children, to prevent from creating associations between food and happy or unpleasant emotion. An investigation showed a correlation between parental emotional feeding and both instrumental feeding habits and children's emotional eating (31).

The most significant predictor of a child's slow eating behavior has been identified as their body weight. It was observed that there was no parental feeding style among the predictors only in the food selectivity sub-dimension. This study highlights the significance of parental feeding patterns and techniques in shaping a child's nutritional habits. The encouragement of non-extreme parental behaviors, which avoid food labeling (bad-good) and prioritize the enjoyment of mealtime, holds significance in fostering the development of healthy dietary behavior in children (32). The child's discourse regarding food preparation was discovered to have a significant correlation with the pleasure derived from the meal. Furthermore, both the child's enjoyment of the meal and the mother's communication characterized by openness and constraint were positively associated with emotional overeating (33). An additional review provides support for this claim. They reported that parenting context (i.e., parenting styles and differential parental treatment) moderated parental feeding practices, while characteristics (temperament and appetite traits) mitigated the effects of the home-dining environment (34). While it was reported that the most applied parental feeding practices in China were praise, encouraging new foods, encouraging a balanced diet, and promoting healthy eating, it was supported that child body composition was also associated with feeding behaviors (35).

## Conclusion

The present study provides empirical data on the impact of childhood feeding methods on parental approaches, elucidating the manner and trajectory of their development. Therefore, it is essential to undertake a variety of studies during early childhood to prevent the occurrence of obesity in adulthood. By utilizing the PFSQ and the food consumption frequency questionnaire in combination, researchers can ascertain the impact of parental feeding techniques on the consumption patterns of the different food groups in future studies. However, it can be investigated which foods trigger the consumption of children by parents' approaches. There is a great burden on families and especially caregivers to detect obesity at an early age and prevent its development. To address this issue, individuals must possess a comprehensive education, adhere to proper nutritional practices, and possess the ability to effectively transmit this knowledge to younger generations.

## Conflict of Interest

The authors declared no conflict of interest.

## References

1. Mahmood L, Flores-Barrantes P, Moreno LA, Manios Y, Gonzalez-Gil EM. The influence of parental dietary behaviors and practices on children's eating habits. Nutrients. 2021; 13(4):1138

2. Wardle J, Carnell S. Parental feeding practices and children's weight. Acta Paediatr. 2007; 96(454):5–11
3. Collins C, Duncanson K, Burrows T. A systematic review investigating associations between parenting style and child feeding behaviours. J Hum Nutr Diet. 2014;27(6):557–68
4. Langer SL, Seburg E, JaKa MM, Sherwood NE, Levy RL. Predicting dietary intake among children classified as overweight or at risk for overweight: Independent and interactive effects of parenting practices and styles. Appetite. 2017; 110:72–9
5. Wardle J, Sanderson S, Guthrie CA, Rapoport L, Plomin R. Parental feeding style and the inter-generational transmission of obesity risk. Obes Res. 2002;10(6):453–62
6. Wardle J, Guthrie CA, Sanderson S, Rapoport L. Development of the Children's Eating Behaviour Questionnaire. J Child Psychol Psychiatry. 2001;42(7):963–70.
7. Al-Hamad AH, Al-Naseeb AM, Al-Assaf MS, Al-Obaid SA, Al-Abdulkarim BS, Olszewski PK. Preliminary exploration of obesity-related eating behaviour patterns in a sample of Saudi preschoolers aged 2-6 years through the Children's Eating Behaviour Questionnaire. Nutrients. 2021;13(11):4156
8. Warkentin S, Mais LA, Ranganath K, Jansen E, Carnell S. Controlling and less controlling feeding practices are differentially associated with child food intake and appetitive behaviors assessed in a school environment. Pediatr Obes. 2020;15(10):e12714
9. Ozcelik-Ersu D, Persil-Ozkan O. Association of the relationship between eating behavior, parental feeding style and body weight in children. Prog Nutr. 2021;23(3).
10. Ek A, Sorjonen K, Eli K, et al. Associations between parental concerns about preschoolers' weight and eating and parental feeding practices: results from analyses of the Child Eating Behavior Questionnaire, the Child Feeding Questionnaire, and the lifestyle behavior checklist. PLoS One. 2016;11(1):e0147257
11. Lo K, Cheung C, Lee A, Tam WWS, Keung V. Associations between parental feeding styles and childhood eating habits: A survey of Hong Kong pre-school children. PLoS One. 2015;10(4): e0124753
12. Yilmaz R, Esmeray H, Erkorkmaz U. Adaptation study of the Turkish children's eating behavior questionnaire. Anatolian Journal of Psychiatry. 2011; 12(4):25-31
13. Inhul-sen MBM, Mérelle SY, Renders CM. Parental feeding styles, young children's fruit, vegetable, water and sugar-sweetened beverage consumption, and the moderating role of maternal education and ethnic background. Public Health Nutr. 2017;20(12):2124–33
14. Boucher NL. Feeding style and a child's body mass index. J Pediatr Heal Care. 2016;30(6):583–9
15. Ozçetin M, Yılmaz R, Erkorkmaz U, Esmeray H. Reliability and validity study of Parental Feeding Style Questionnaire. Türk Pediatr Arşivi. 2011;45(2):124–31
16. Arusoglu G, Ozturk A, Firat S, Seyfeli Y. Legumes and oilseed consumption frequency. Prog Nutr. 2021;23(2).
17. Kalaycı S. SPSS Uygulamalı Çok Değişkenli İstatistik Teknikleri. Ankara: Asil Yayın Dağıtım; 2006.
18. Kidwell KM, Tomaso C, Lundahl A, Nelson TD. Confirmatory factor analysis of the parental feeding style questionnaire with a preschool sample. Eat Weight Disord. 2020;25(2): 407–14
19. Pimenta F, Garcia I, Cristina S, Galvão D, Marôco J, Leal I. Validation of the Parental Feeding Style Questionnaire in a Portuguese sample. Psicol Saúde Doença. 2019;20(3):740-58
20. Gu C, Warkentin S, Mais LA, Carnell S. Ethnic differences in parental feeding behaviors in UK parents of preschoolers. Appetite. 2017; 113:398–404
21. Korani M, Rea DM, King PF, Brown AE. Significant differences in maternal child-feeding style between ethnic groups in the UK: the role of deprivation and parenting styles. J Hum Nutr Diet. 2018;31(5):625–33
22. Tarro S, Lahdenperä M, Vahtera J, Pentti J, Lagström H. Parental feeding practices and child eating behavior in different socioeconomic neighborhoods and their association with childhood weight. The STEPS study. Health Place. 2022; 74:102745
23. Boswell N, Byrne R, Davies PSW. Eating behavior traits associated with demographic variables and implications for obesity outcomes in early childhood. Appetite. 2018; 120:482–90
24. Spahić R, Pranjić N. Children's Eating Behaviour Questionnaire: association with BMI in children aged 3-10 years from Bosnia and Herzegovina. Public Health Nutr. 2019;22(18):3360–7
25. Pérez L, Vizcarra M, Hughes SO, Papaioannou MA. Food parenting practices and feeding styles and their relations with weight status in children in Latin America and the Caribbean. Int J Environ Res Public Health. 2022;19(4):2027
26. van der Horst K, Sleddens EFC. Parenting styles, feeding styles and food-related parenting practices in relation to toddlers' eating styles: A cluster-analytic approach. PLoS One. 2017;12(5):e0178149
27. Van der Horst K, Oenema A, Ferreira I, et al. A systematic review of environmental correlates of obesity-related dietary behaviours in youth. Health Educ Res. 2007;22(2):203–26
28. Brown KA, Ogden J, Vögele C, Gibson EL. The role of parental control practices in explaining children's diet and BMI. Appetite. 2008;50(2–3):252–9
29. Braden A, Rhee K, Peterson CB, et al. Associations between child emotional eating and general parenting style, feeding practices, and parent psychopathology. Appetite. 2014; 80:35–40
30. Goossens L, Braet C, Van Vlierberghe L, Mels S. Loss of control over eating in overweight youngsters: the role of anxiety, depression and emotional eating. Eur Eat Disord Rev. 2009;17(1):68–78.
31. Rodgers RF, Paxton SJ, McLean SA, et al. Maternal negative affect is associated with emotional feeding practices and emotional eating in young children. Appetite.2014;80:242-7.
32. Erriu M, Cimino S, Cerniglia L. The role of family relationships in eating disorders in adolescents: a narrative review. Behav Sci (Basel). 2020;10(4):71
33. Roach E, Viechnicki GB, Retzloff LB,et al. Family food talk, child eating behavior, and maternal feeding practices. Appetite. 2017; 117:40–50
34. Larsen JK, Hermans RCJ, Sleddens EFC, et al. How parental dietary behavior and food parenting practices affect children's dietary behavior. Interacting sources of influence? Appetite. 2015:89:246-57
35. Guo S, Wang Y, Fries LR, et al. Infant and preschooler feeding behaviors in Chinese families: A systematic review. Appetite. 2022;168:105768

**Contact Details**

Gülcan Arusoğlu
*Kirklareli University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Kırklareli, Türkiye*
E-Mail: arusoglugulcan@gmail.com
ORCID: 0000-0002-9676-0025

Sine Yılmaz
*Ankara Medipol University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Ankara, Türkiye*
E-Mail: syilmaz@ankaramedipol.edu.tr
ORCID: 0000-0002-2592-9057

Başak CAN *(Corresponding)*
*Istanbul Gelişim University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Istanbul, Türkiye*
E-Mail: bulker@gelisim.edu.tr
ORCID: 0000-0002-0608-6496

**How to cite?**

Arusoglu G, Yilmaz S, Can B. Factors Affecting the Prediction of Eating Behavior in Children: Stepwise Regression Analysis on Parental Feeding Styles. Ulutas Med J. 2024;10(2):26-38

**DOI:** 10.5455/umj.20240515072336