

# The Relationship between Eating Behaviors of Children and Mothers, and Nutritional Status of Children

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**Abstract:** *Introduction:* Parents have a significant impact on child nutrition and the child's eating habits in long-term behavior. This study aims to examine the effects of mothers' attitudes on the eating behaviors of children and the determination of their nutritional status.

*Method:* Children's eating habits and mothers' eating attitudes were examined in 417 children with face-to-face interviews using the Child Feeding Questionnaire (CFQ). The participants' anthropometric characteristics were determined, and body mass indexes ( $\text{kg}/\text{m}^2$ ) were calculated. AnthroPlus software was used to determine the children's BMI-for-age Z-scores. BeBIS nutrition information system was used to assess children's food intake.

*Results:* The mothers' median BMI was above the overweight threshold. The lowest CFQ score was for perceived child weight, and the maximum score was for food restriction. Significant differences were found in mothers ages, mothers' BMIs, children's WAZ and BAZ scores, and BMIs, weight ( $p < 0.001$ ), perceived parent weight scores ( $p = 0.04$ ), and pressure to eat ( $p = 0.04$ ). Families should be conscious about nutrition for the protection and promotion of children's health.

**Keywords:** Eating behavior, children, mother, anthropometry, nutritional status.

## INTRODUCTION

Nutrition, genetics, family, and environment are some of the many factors that affect child growth, development, and being a healthy adult. During the school ages (6-14 years) when growth is quite fast, is the most important time in the development of eating habits which will continue throughout the child's life, for not only growth but also for the prevention of chronic diseases (anemia, obesity, weakness, vitamin and mineral deficiencies, etc.) [1]. Parents have a significant impact on child nutrition in long-term behavior, but parents' effect on a child's eating habits decreases by and by [2].

The formation of a positive personality in a child depends on the rearing attitudes of parents. Many factors like raising style as seen from the family of parents, age of parents, socioeconomic status, the relationship between mother and father, cultural factors, child's sex, and age can affect parenting styles. Socioeconomic and cultural levels of families influence dietary goals, eating habits, and children's eating attitudes and behaviors, which last lifelong [3]. Furthermore, parents have an important role in the prevention of chronic diseases because they should be role models to their children, with healthy nutrition. Child's eating habits are influenced by family members

- especially by their parents' eating habits, perception of nutrition, knowledge, attitudes, and behaviors. According to the wishes of the child, parental feeding styles are divided into four types: authoritarian, authoritative, neglectful, and permissive. Controlling parents' attitudes can make the child either depend on parents for food choice or drift instability in food consumption. Mothers' negative attitudes and wrong diets lead to the formation of nutritional problems in children because mothers have the greatest individual influence on children's eating behaviors [2].

This study aimed to examine the effects of parental attitudes about eating behaviors on the feeding of children by using the Child Feeding Questionnaire (CFQ) and determining nutritional status, which is an important factor in child health.

## METHOD

### Participants

The study was conducted in public schools in Istanbul, administered by the Ministry of Education. A group of 509 students, 49.3% boys and 50.7% girls, aged between 6 and 11 years, were randomly selected by the school directors. Ninety-two students were not included because of health reasons, or they left school.

### Instruments

Child Feeding Questionnaire (CFQ) was used to evaluate the children's dietary practices and mothers' attitudes. The WHO AnthroPlus Program Version 1.0.4

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was used to determine the children's weight-for-age (WAZ), height-for-age (HAZ), and BMI-for-age (BAZ) Z scores. Data evaluation was conducted with SPSS 20.0 statistical software (IBM Corp. Armonk, NY USA). To determining the energy and macronutrient intakes, the BeBiS nutrition information system (BeBiS 7.0, Ebispro for Windows, Stuttgart, Germany, Turkish Version) was used.

## Procedure

After obtaining the parents' consent, a total of 417 children and parents completed a structured questionnaire during a face-to-face interview. Sociodemographic characteristics, food consumption, and anthropometric measurements were obtained during the interview.

The CFQ consisted of 24 questions and was developed from models or trends of obesity described by Johnson and Birch (1994) [4] and Costanzo and Woody (1985) [5]. A Turkish version of the CFQ was developed by Camci, Bas, and Buyukkaragoz (2014) [6]. The CFQ consists of seven subscales (perceived responsibility, perceived parent weight, perceived child weight, concern about child weight, food restriction, the pressure to eat, intake monitoring) assessing children's feeding behaviors, and parents' attitudes scored by five-point Likert Scale responses. Four subscales rate children's nutrition (perceived responsibility, perceived parental weight, perceived child weight, and concern of child weight), and three subscales rate parental controls (food restrictions, eating pressure, and intake monitoring).

The anthropometric characteristics [body mass index ( $\text{kg}/\text{m}^2$ )] of the children and their mothers were measured by an investigator using the World Health Organization (WHO) criteria. The WHO AnthroPlus Program Version 1.0.4 was used to determine the children's weight-for-age (WAZ), height-for-age (HAZ), and BMI-for-age (BAZ) Z scores. Under a dietitian's guidance, the mothers recorded their children's food intake during two weekdays and one weekend day.

BeBiS nutrition information system (BeBiS 7.0, Ebispro for Windows, Stuttgart, Germany, Turkish Version) was used to determining the energy and macronutrient intakes. The recorded quantities of foods were checked and verified with a food atlas. All analyzes and anthropometric calculations were carried out in the laboratory that was established in a previous project.

Data evaluation was conducted with SPSS 20.0 statistical software (IBM Corp. Armonk, NY USA). The Kolmogorov–Smirnov test was used to determine whether the data had a normal distribution. For data that were not suitable for normal distribution, nonparametric tests were applied. Nonparametric Kruskal–Wallis and Mann–Whitney-U tests were used to determine the significance of differences between variables. Spearman's correlation test was used to determine the significance of the relationship between variables. Descriptive values were reported as number (n) and percent (%). P-values < 0.05 were considered significant.

## RESULTS

The association between mothers' eating behaviors, attitudes, and their school-age children's anthropometric characteristics, energy, macronutrient intakes were evaluated. The mothers' demographic characteristics show that 36.2% had a high school degree, 51.8% were employed, and 47.7% perceived their body composition as normal. The anthropometric measurements of the mothers and children are shown in Table 1.

**Table 1: Demographic Characteristics of Mothers**

	n	%
<b>Education Levels</b>		
Literate	44	10.5
Primary School	69	16.6
Secondary School	58	13.9
High school	151	36.2
University	95	22.8
<b>Working Status</b>		
Employed	216	51.8
Unemployed	201	48.2
<b>Perceived Weight</b>		
Underweight	39	9.3
Normal weight	199	47.7
Overweight	165	39.6
Obese	14	3.4

The median age of the children was 8.0 years, median weight was 31.0 kg, and median height was 132 cm. As shown in Table 2, the median age of the mothers was 36, and their median BMI was above the overweight threshold ( $25 \text{ kg}/\text{m}^2$ ).

**Table 2: Anthropometric Characteristics of Mothers and Children**

	25th percentile	Median	75th percentile	Min–Max
<b>Children (n = 417)</b>				
Age (year)	8.0	9.0	9.0	6.0–11.0
Weight (kg)	25.5	31.0	36.0	17.6–59.8
Height (cm)	125.0	132.0	138.0	105.0–155.0
BMI (kg/m <sup>2</sup> )	15.9	17.4	20.0	9.9–33.4
Weight for age Z-score	-0.12	0.82	1.63	-2.65–5.35
Height-for-age Z-score	-0.59	0.13	1.19	-3.72–4.61
BMI-for-age Z-score	-0.06	0.80	1.87	-5.94–5.18
<b>Mother (n = 417)</b>				
Age (year)	33.0	36.0	40.0	26–49
Weight (kg)	60.0	65.0	75.0	40.0–110.0
Height (cm)	158.0	163.0	168.0	120.0–190.0
BMI (kg/m <sup>2</sup> )	22.7	25.0	28.0	16.0–40.7

Energy and macronutrient intakes of the children included a median of 1971 kcal, with 14.6% of the energy from protein, 47.4% from carbohydrate, and 38.0% from fat (Table 3).

The median, minimum, and maximum scores of the seven CFQ subgroups are shown in Table 4. The minimum score (median 9.0) was seen in the "perceived child weight" subgroup, the maximum score (median 36.9) was in the "food restriction" subgroup.

The other subgroup scores were between 11.0 and 14.00. Comparisons of the mothers' CFQ scores stratified by the perception of their weight with their age, the children's ages, anthropometric characteristics, energy and macro-nutrient intakes, and CFQ subgroup scores are shown in Table 4.

The CFQ scores with the mothers' age and BMI, children's WAZ, BAZ, BMI, and weight (all  $p < 0.001$ ), parent-perceived weight, and pressure to eat (both  $p =$

**Table 3: Energy and Macronutrient Intakes of Children**

Energy and macronutrients	25th percentile	Median	75th percentile	Min–Max
Energy (kcal)	1644.0	1971.0	2298.0	574.0–4641.0
Protein (g)	58.4	71.9	85.4	21.0–238.0
Fat (g)	69.1	83.2	97.3	22.0–220.0
Carbohydrate (g)	204.0	233.5	263.0	66.0–510.0
Fiber (g)	16.3	21.0	25.7	7.0–54.0

**Table 4: Subgroup Scores of Child Feeding Questionnaire**

Subcategory	25th percentile	Median	75th percentile	Min–Max
Perceived responsibility	11.0	13.0	15.0	0.0–15.0
Perceived parent weight	9.0	12.0	13.0	0.0–20.0
Perceived child weight	8.0	9.0	10.0	0.0–15.0
Concern	9.0	11.0	12.0	0.0–15.0
Restriction	27.0	32.0	36.0	0.0–40.0
Pressure to Eat	11.0	14.0	17.0	0.0–20.0
Monitoring	12.0	13.0	15.0	0.0–15.0

**Table 5: Correlations between Age, Anthropometric Measurements of Participants and Subgroup Scores**

	Perceived responsibility		Perceived parent weight		Perceived child weight		Concern		Restriction		Pressure to Eat		Monitoring	
	r	p	r	p	r	p	r	p	r	p	r	p	r	p
<b>Entire group</b>														
Mother age	-0.043	0.38	0.056	0.25	0.076	0.12	-0.068	0.17	-0.109	0.02	-0.066	0.18	-0.097	0.04
Child age	0.050	0.31	-0.073	0.13	-0.029	0.56	-0.028	0.57	-0.095	0.05	-0.051	0.29	0.054	0.26
Mother BMI	-0.116	0.02	0.235	0.00	-0.008	0.88	-0.117	0.01	-0.097	0.04	-0.105	0.03	-0.116	0.01
WAZ	0.033	0.50	0.114	0.02	0.252	0.00	0.044	0.38	0.031	0.53	-0.215	0.00	0.061	0.21
HAZ	0.045	0.36	0.039	0.42	0.159	0.00	0.089	0.07	0.011	0.81	-0.107	0.02	0.098	0.04
BAZ	0.022	0.65	0.133	0.00	0.206	0.00	0.010	0.84	0.033	0.50	-0.233	0.00	0.017	0.73
BMI	0.014	0.77	0.147	0.00	0.208	0.00	0.002	0.97	0.016	0.74	-0.245	0.00	-0.010	0.83
Weight	0.015	0.76	0.140	0.00	0.242	0.00	0.015	0.75	-0.026	0.60	-0.246	0.00	-0.004	0.93
Height	0.014	0.77	0.057	0.24	0.158	0.00	0.024	0.62	-0.056	0.24	0.132	0.00	0.002	0.96
<b>Boys</b>														
Mother age	0.910	0.20	-0.790	0.27	-0.116	0.10	-0.064	0.37	-0.087	0.22	-0.025	0.72	0.127	0.07
Child age	-0.720	0.31	0.016	0.83	0.069	0.33	-0.103	0.14	-0.030	0.67	0.070	0.32	-0.049	0.49
Mother BMI	-0.024	0.73	0.276	0.01	-0.044	0.54	-0.059	0.40	-0.047	0.50	-0.083	0.24	-0.104	0.14
WAZ	0.075	0.30	0.131	0.07	0.265	0.00	0.061	0.39	0.084	0.24	-0.235	0.00	0.124	0.08
HAZ	0.041	0.57	0.034	0.64	0.200	0.00	0.035	0.62	0.071	0.31	-0.183	0.01	0.141	0.04
BAZ	0.040	0.57	0.169	0.02	0.204	0.00	0.060	0.40	0.035	0.62	-0.244	0.00	0.046	0.51
BMI	0.034	0.64	0.179	0.01	0.208	0.00	0.036	0.61	0.027	0.70	-0.231	0.00	0.027	0.70
Weight	0.033	0.65	0.149	0.04	0.275	0.00	0.013	0.85	0.046	0.52	-0.210	0.00	0.079	0.26
Height	0.004	0.95	0.022	0.76	0.219	0.00	-0.076	0.28	0.049	0.49	-0.097	0.17	0.072	0.31
<b>Girls</b>														
Mother age	-0.014	0.83	0.093	0.16	0.082	0.22	-0.036	0.59	-0.178	0.01	-0.187	0.00	-0.137	0.04
Child age	0.013	0.85	-0.049	0.46	0.058	0.39	0.018	0.78	-0.105	0.12	-0.079	0.23	-0.016	0.81
Mother BMI	-0.198	0.00	0.205	0.00	0.024	0.72	-0.163	0.01	-0.138	0.04	-0.119	0.07	-0.131	0.05
WAZ	0.011	0.8	0.089	0.19	0.238	0.00	0.031	0.64	-0.019	0.78	-0.189	0.00	0.013	0.85
HAZ	0.052	0.44	0.035	0.61	0.124	0.06	0.134	0.04	-0.052	0.44	-0.036	0.59	0.062	0.36
BAZ	0.010	0.88	0.093	0.17	0.210	0.00	-0.024	0.72	0.029	0.67	-0.222	0.00	-0.007	0.91
BMI	0.005	0.93	0.106	0.11	0.214	0.00	-0.024	0.71	0.001	0.99	-0.259	0.00	-0.041	0.54
Weight	0.014	0.83	0.123	0.06	0.213	0.00	0.031	0.64	-0.098	0.14	-0.276	0.00	-0.065	0.33
Height	0.028	0.68	0.080	0.23	0.107	0.11	0.097	0.15	-0.154	0.02	-0.156	0.02	-0.051	0.44

WAZ: weight for age Z-score; BAZ: BMI for age Z-score; HAZ: height for age Z-score; BMI: body mass index.

0.04) subgroups were significantly different. The mothers' BMIs and the children's WAZ values differed significantly from the mothers' ages (Table 5).

The correlations of CFQ subgroup scores and the characteristics of the study population are shown in Table 5. The mother's BMI was negatively correlated with "perceived responsibility" and positively correlated with "perceived parent weight." ( $p < 0.05$ ). Children's weight, WAZ, BAZ, and BMI were also positively correlated with "perceived parent weight" ( $p < 0.05$ ). "Perceived child weight" was positively correlated with WAZ, HAZ, BAZ, BMI, weight, and height (all  $p =$

0.001). "Concern," "restriction," "pressure to eat," and "monitoring" scores were negatively correlated with the mother's BMI. "Pressure to eat" was negatively correlated with WAZ, HAZ, BAZ, BMI, and weight but positively correlated with height ( $p < 0.05$ ). "Monitoring" was negatively correlated with the mother's age and BMI but positively correlated with HAZ ( $p < 0.05$ ). "Pressure to eat" was negatively correlated with WAZ, HAZ, BAZ, BMI, and body weight and positively correlated with height. "Monitoring" and HAZ were positively correlated ( $p < 0.05$ ). The relationships of mothers' and children's ages and BMIs and anthropometric characteristics of children and CFQ

subcategories of CFQ were evaluated in Table 5. Positive correlations of perceived parent weight and mother's BMI, WAZ, BMI, and body weight were found ( $p < 0.05$ ). WAZ, HAZ, BAZ, BMI, body weight, and height were also correlated with perceived parent weight ( $p < 0.05$ ). In girls, "perceived responsibility" and mother's BMI were positively correlated, as were "perceived parent weight" and mother's BMI, "perceived child weight", and WAZ, BAZ, BMI, and body weight. "Concern" was negatively correlated with the mother's BMI and positively correlated with HAZ. "Restriction" was negatively correlated with mother's age and BMI, and children's height. "pressure to eat" was negatively correlated with mother's age, WAZ, BAZ, BMI, body weight, and height. "Monitoring" was negatively correlated with the mother's age ( $p < 0.05$ ). No correlations of energy and macro-nutrient intakes and CFQ subcategory scores were found ( $p > 0.05$ ). Negative correlations of carbohydrate intake and perceived parent weight score ( $p = 0.037$ ) and monitoring scores were seen in girls ( $p = 0.024$ ).

## DISCUSSION

Parental behavior has a strong impact on the nutritional habits and nutritional status of children, especially the mother, so the eating behavior of children and parents should be evaluated together. CFQ scores were used to determine the effect of parental behavior on children's nutritional habits. In this study, the BMIs of parents and their CFQ subgroup scores were compared. The highest CFQ subgroup scores were found in the "intake monitoring" subgroup for parents whose children are underweight, normal, overweight, or obese. The lowest "intake monitoring" score was observed in the obese children's parents. Previous studies also found that the highest parental CFQ scores were in the "intake monitoring" subgroup [7], and also significant correlations were found between children's high BMIs and parental concerns of intake monitoring and perceived responsibility [8]. Moens and colleagues (2009) have reported that parents of obese children had higher control scores than those of normal weight, and parents who want their children to lose weight had increased "intake monitoring" attitudes [9, 10]. In this study, the highest "food restriction" scores were observed in the parents of obese children. The highest "pressure to eat" score belonged to parents of underweight children. Other studies have also found an inverse correlation between "pressure to eat" and children's BMI Z scores. However, Ventura and Birch found that increased "food restriction" scores were associated with increased total

food intake in long-term and increased BMI Z scores [11]. Nowicka and colleagues (2014) found a positive association between food restriction and BMI [12]. In a study about the effects of food restriction of specific foods on childhood obesity, Alm, Olsen, and Honkanen (2015) reported that the most common reasons for parental food restriction of their children's diets were a desire to avoid consuming unhealthy foods and lack of time to prepare the healthy foods that their children wanted [13]. It is important for parents to learn correct eating behaviors and teach their children to maintain age-appropriate anthropometric values.

Turkish children's recommended energy needs between 10 and 13 years of age are about 2445 kcal for boys and 2200 kcal for girls. The recommended fiber intake is 29 g for boys and 26 g for girls [14]. In this study, the median daily energy intake was 1971 kcal, and the fiber intake was 21 g, which were below the recommended values. In addition, according to the Estimated Average Requirement (EAR), the daily protein requirement is noted as 31 g for boys and 24 g for girls aged between 9-13 years. According to RDI, this value is stated as 40 g for boys and 35 g for girls aged between 9-13 years (RDI, 2015). In this study, median values of daily energy intake were found 1971 kcal, and fiber intake was found 21 g, which were below the recommended values. But median protein intake was found 72 g, which above the recommendation.

In this study, no correlation was found between the average CFQ subgroup scores and the gender of the children. Previous studies claimed that children's gender might influence parental food and nutrition practices [15]. A positive correlation between children's BMIs and the "perceived weight" of parents and children was seen in this study. In a similar study in Scotland with 117 children, positive correlations between parents' "perceived child weight", parents' weight, and children's BMIs were found [7]. In a study about the relationship between parental attitudes and childhood behavior, positive correlations between parental food control perceived weight and reported child weight status were found [12]. In this study, "pressure to eat" scores and BMI values were negatively correlated, which consistent with the findings of the study of Canals-Sans *et al.* [16] and in a study in which children's high BMIs were associated with a low "pressure to eat" score [12]. In Moreira and colleagues' study, younger mothers, less educated with a poorer health perception and offspring cohabiting, were associated with higher use of 'pressure to eat' [17]. In

this study, parental BMIs and CFQ subscale scores were also compared. Positive correlations were found between parental BMI, perceived parent weight, and parental concerns of their children's body weight. There was a negative correlation between parental BMI and perceived responsibility in this study, but parental BMI and pressure to eat were not correlated. According to the Turkey Childhood (7–8 years) Obesity Research, the mean body weight of 8-year-old children was  $27.2 \pm 0.12$  kg, the mean height was  $128.1 \pm 0.12$  cm, and the mean BMI was  $16.5 \pm 0.05$  kg/m<sup>2</sup>. The mean WAZ score was  $0.11 \pm 0.02$ , mean HAZ score was  $-0.06 \pm 0.02$ , and mean BAZ score for age was  $0.16 \pm 0.02$ . Compared with 2007 WHO data in children 5–19 years of age, 66.1% of children 6–10 years of age in Turkey were found to have normal body weights and Z-score values from one or more standard deviation below to one standard deviation above the WHO reference [18]. In this study, the median age was 8 years, and their anthropometric measurements were similar to COSİ-TUR (7–8 years of age) median values for HAZ, BAZ, and WAZ [19].

In a study that was held in Turkey, 17.1% of children aged between 6–10 years were estimated to be overweight, and 29.4% were obese [6]. According to the 2010 Turkey Nutrition and Health Survey (TBSA) data, 20.7% of children from 6 to 10 years of age were underweight, 12.5% were overweight, and 4.8% were obese [20]. In this study, 1.4% of children were underweight, 19.6% were overweight, and 23.2% were obese. An association of childhood and parental BMIs has been reported [21]; in another study, an increase in parental BMIs has been found to increase the risk of obesity [6]. In line with previous reports, this study found a positive correlation between children's and mothers' BMIs. However, another study conducted in Turkey found a positive correlation between girls' and mothers' BMIs but did not find an association between girls with overweight mothers and boys with overweight mothers [22]. In that study, no relation was found between working status or educational level and children's obesity status. In this study, children's dietary fat intake, the mothers' employment statuses were correlated, as were the mothers' educational status, and the children's HAZ scores. Parents are influential in selecting food for their children. Their methods can affect the children's weight and the response to food. For example, the demand for restricted foods may increase with childhood obsession for those [23].

Cultural influences, family beliefs and attitudes, and parental dietary habits teach children what, when, and

how much to eat. In this study, a negative correlation was seen between maternal age and restrictive attitude. No correlation of restrictive family attitudes and anthropometric measurement was found, and as the parents' BMIs increased, their children's BMIs were increased too.

This study's limitations include not collecting the food consumption records from the mothers and the use of maternal anthropometric measurements that were self-reported.

This study's strengths are the detailed attitudes of the mothers regarding the nutritional status of their children and the large sample size.

Parents' unhealthy eating habits, knowledge and experience in childhood nutrition influence children's dietary habits. In Turkey, which is a country with an upper-middle-income level, families should be conscious about nutrition for the protection and promotion of children's health.

Studies such as this project need to be spread throughout the country to provide the necessary training and make the right direction for child nutrition and health. In addition, this study emphasizes the importance of setting out the situation in this regard.

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