ORIGINAL RESEARCH ORİJİNAL ARAŞTIRMA
DOI: 10.5336/nurses.2025-112520

Investigation of the Relationship Between Temperamental Characteristics and Eating Behaviours of Preschool Children: A Cross-Sectional and Correlational Study

Okul Öncesi Dönem Çocuklarının Mizaç Özellikleri ile Yeme Davranışları Arasındaki İlişkinin İncelenmesi: Kesitsel ve Korelasyonel Bir Çalışma

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This study was presented as an oral presentation at "Yenidoğan Hemşireliği Günleri", November 3-5, 2023, İstanbul, Türkiye.

ABSTRACT Objective: This study sought to investigate the relationship between temperament characteristics and eating behaviors in preschool children, as well as the influence of demographic factors on these variables. **Material and Methods:** Short Temperament Scale for Children and the Children's Eating Behaviour Questionnaire were utilized to assess temperament characteristics and eating behaviors in preschool children. The relationships between these variables and the demographic characteristics of the children and their families were examined. Statistical analyses were conducted to investigate differences and correlations. **Results:** The study identified significant associations between children's temperament traits and their eating behaviors. In particular, rhythmicity was positively correlated with enjoyment of food and food responsiveness, while reactivity was associated with emotional eating and slowness in eating. Additionally, sociodemographic variables such as gestational age, birth weight, body mass index status, and family income were found to have significant effects on certain eating behaviors. Regression analysis revealed that temperament traits explained 36.4% of the variance in children's eating behaviors (R^2=0.364, p<0.001). **Conclusion:** Temperament traits were found to be associated with children's eating behaviors, indicating the potential for developing individualized nutritional approaches based on these characteristics. Pediatric nurses can contribute to the promotion of healthy eating habits by supporting families in early childhood with consideration of temperament-based differences.

Keywords: Child eating behavior; child temperament characteristics; preschool period

ÖZET Amaç: Bu çalışma, okul öncesi çocuklarda mizaç özellikleri ile yeme davranışları arasındaki ilişkiyi ve demografik faktörlerin bu değişkenler üzerindeki etkilerini araştırmayı amaçlamaktadır. **Gereç ve Yöntemler:** Okul öncesi çocuklarda mizaç özelliklerini ve yeme davranışlarını değerlendirmek amacıyla Çocuklar İçin Kısa Mizaç Ölçeği ve Çocuk Yeme Davranışı Anketi kullanılmıştır. Bu değişkenler ile çocukların ve ailelerinin demografik özellikleri arasındaki ilişkiler incelenmiştir. Değişkenler arasındaki farklar ve korelasyonlar, istatistiksel analizler ile değerlendirilmiştir. **Bulgular:** Çalışmada, çocukların mizaç özellikleri ile yeme davranışları arasında anlamlı ilişkiler olduğu belirlenmiştir. Özellikle ritmik yapı, besinden zevk alma ve besine tepkisellik ile pozitif yönde ilişkilidir. Reaktivite ise duygusal yeme ve yavaş yeme ile ilişkili bulunmuştur. Ayrıca çocukların doğum haftası, doğum kilosu, beden kitle indeksi düzeyi ve aile gelir durumu gibi sosyodemografik değişkenlerin bazı yeme davranışları üzerinde anlamlı etkileri saptanmıştır. Regresyon analizi sonucunda, çocukların mizaç özelliklerinin, yeme davranışlarının %36,4'ünü açıkladığı görülmüştür (R^2=0,364, p<0,001). **Sonuç:** Mizaç özelliklerinin, çocukların yeme davranışlarıyla ilişkili olduğu ve bu özelliklerin dikkate alınarak bireyselleştirilmiş beslenme yaklaşımlarının geliştirilebileceği belirlenmiştir. Pediatri hemşirelerinin, erken çocukluk döneminde mizaç temelli farklılıkları göz önünde bulundurarak aileleri desteklemesi, sağlıklı beslenme alışkanlıklarının geliştirilmesine katkı sağlayabilir.

Anahtar Kelimeler: Çocuk yeme davranışı; çocuk mizaç özellikleri; okul öncesi dönem

TO CITE THIS ARTICLE:
Çelik B, Yava A, Koyuncu A, Çiğdem Z. Investigation of the relationship between temperamental characteristics and eating behaviours of preschool children: A cross-sectional and correlational study. Turkiye Klinikleri J Pediatr. 2025;34(3):105-14.

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Peer review under responsibility of Turkiye Klinikleri Journal of Pediatrics.

Received: 03 Jun 2025 ***Received in revised form:*** 25 Sep 2025 ***Accepted:*** 07 Oct 2025 ***Available online***: 30 Oct 2025

The preschool period is recognized as a critical stage that shapes children's lifelong eating behaviors. During this period, children experience rapid physical, emotional, and cognitive development. In addition to cultural influences and parental practices, intrinsic characteristics such as temperament can significantly influence eating behaviors.[1] Parents' understanding of the interaction between children's temperament and eating behaviors can provide valuable insights into their children's nutritional health. Temperament is an innate trait that determines an individual's sensitivity to various experiences and social interaction patterns.[2] Infants are born with varying temperamental characteristics, which can explain why some children face greater risks, such as excessive weight gain or nutritional issues, while others exhibit more positive emotional development.[3]

Temperamental traits such as shyness, rhythmicity, and emotional reactivity have been shown to influence children's eating behaviors. Children with high rhythmicity temperament may display more consistent eating behaviors, while those with heightened emotional reactivity may exhibit increased sensitivity in their food preferences.[4] These characteristics impact not only children's food preferences but also their adaptation to new foods. Early differences in temperament are thought to be associated with later personality traits.[5]

According to the Childhood Obesity Surveillance Initiative Türkiye (COSI-TUR) 2016 results, as reported in the Ministry of Health Action Plan (2019), the prevalence of overweight and obesity in children was 14.6% and 9.9%, respectively.[6] Weight gain during infancy and early childhood is a known predictor of obesity in adulthood.[7] Moreover, excessive weight gained during childhood increases health risks.[8] Understanding factors such as temperament and eating behaviors that may either increase or reduce children's risk of obesity is crucial.[9] Appetite loss, increased appetite, overweight, and underweight are among the most common concerns across all age groups and a frequent source of parental concern.[10] Parents often struggle to assess whether their children are eating too little or too much.[11]

Existing research has revealed an association between temperament and eating behavior in infancy. A difficult temperament in infants has been linked to negative mealtime experiences, food refusal, and problematic parental feeding practices.[12] Specifically, studies have found that children with high scores in the shyness subscale may develop fear of trying new foods and exhibit selective eating behaviors, while those with high emotional reactivity may demonstrate healthier eating habits.[4] A recent Turkish study further supports these associations, revealing that emotional reactivity is significantly linked to selective eating behaviors in preschool children, and that demographic characteristics also influence specific eating behavior patterns.[13] Another 2024 prospective study found that infants with high surgency and low regulation were more likely to develop emotional overeating behaviors in early childhood.[14]

However, the literature examining the relationships between specific temperament subdimensions and eating behavior subdimensions remains limited. Investigating the relationship between temperament traits and eating behaviors in preschool children is essential for fostering healthy eating habits and preventing chronic diseases later in life. Findings from such research can inform the development of early intervention strategies, individualized feeding approaches, and better parental support for their children. Moreover, these insights may contribute to educational and health policy improvements and support the emotional and social development of children.

In light of this, the present study aims to examine the relationship between temperament traits and eating behaviors in preschool children, as well as the effects of children's demographic characteristics on their temperament and eating behaviors.

MATERIAL AND METHODS

TYPE, LOCATION AND TIME OF RESEARCH

This cross-sectional and correlational study included children aged 3 to 6 years from 6 kindergartens under the jurisdiction of the Batman Provincial Directorate of National Education, between January-February 2023.

DATA COLLECTION

Data collection was conducted on weekdays and during daytime hours at the participating kindergartens within the specified dates. Researchers provided detailed information about the study to the parents, and both written and verbal informed consent were obtained. The data collection forms were completed through face-to-face interviews conducted by the researchers.

Inclusion and Exclusion Criteria

The inclusion criteria were parental and child consent, age 3-6 years, and enrolment in a preschool institution. Exclusion criteria included withdrawal from the study, birth weight below 1,500 g, and hearing or visual impairments.

Population and Sample of the Study

The study sample consisted of children aged 3 to 6 years and their mothers, recruited from six kindergartens affiliated with the Batman Provincial Directorate of National Education. The required sample size was calculated using G*Power software (version 3.1.9.2; Heinrich Heine University Düsseldorf, Düsseldorf, Germany) based on an effect size of 0.30, a statistical power of 95%, and a 5% margin of error, resulting in a minimum of 111 participants. To increase the reliability of the findings, the sample was expanded by an additional 35%, and the study was ultimately completed with 151 participants.

Demographic Information Form

The form, developed by the researchers based on a review of the literature, included items on gender, age, body mass index, institution attended, birth weight, gestational age, history of neonatal hospitalization, number of siblings, maternal and paternal education levels, and perceived family income.

Short Temperament Scale for Children

The Short Temperament Scale for Children was developed by Prior et al. and adapted into Turkish by Yağmurlu and Sanson.[15,16] This 30-item scale, formatted as a 6-point Likert scale, includes 4 subdimensions: warmth-shyness, persistence, rhythmicity, and reactivity. The original scale's internal consistency coefficients were 0.80 for warmth-shyness, 0.77 for reactivity, 0.76 for persistence, and 0.48 for rhythmicity. In Turkish samples, reliability coefficients were reported as 0.75, 0.69, 0.75, and 0.63, respectively, indicating the scale's validity and reliability for Turkish children. In our sample, the reliability coefficients were determined as 0.73, 0.70, 0.72, and 0.65, respectively. The scale does not produce a total score; instead, each subdimension is scored by averaging the relevant items, some of which are reverse-coded. Increases in warmth-shyness, persistence, and rhythmicity scores reflect more positive temperament traits, whereas increases in reactivity scores indicate greater negative temperament tendencies. The subdimensions assess responsiveness to stimuli (reactivity), attentional focus (persistence), social adaptability (warmth-shyness), and regularity of functions such as sleep and hunger (rhythmicity).

Children's Eating Behavior Questionnaire

The Children's Eating Behavior Questionnaire (CEBQ), developed by Wardle et al. and validated in children aged 3-8 years was used to assess eating behaviors.[17,18] The Children's Eating Behavior Questionnaire is valuable for identifying early risks of obesity or anorexia in children. It comprises eight subscales: food responsiveness, emotional overeating, enjoyment of food, desire to drink, satiety responsiveness, slowness in eating, emotional undereating, and food fussiness. Parents complete the questionnaire, which contains 35 items rated on a 5-point Likert scale (1=never to 5=always).[17,19] Yılmaz and Erkorkmaz adapted the questionnaire into Turkish and confirmed its validity and reliability, with original Cronbach's alpha values between 0.74-0.91 and Turkish values between 0.61-0.84.[20] In our study, we found the Cronbach's alpha values to range between 0.65 and 0.76. The scale does not yield a total score; instead, subscale scores reflect specific eating behaviors. Higher subscale scores indicate a stronger presence of the respective behavior.

ETHICAL CONSIDERATIONS

Ethical approval was granted by the Hasan Kalyoncu University Faculty of Health Sciences Ethics Committee (date: December 12, 2022; no: 2022/135), and research permission was obtained from the Batman Provincial Directorate of National Education (approval no: E-71214596-604.02-69041804). Written and verbal informed consent was obtained from all participating parents. The study adhered to the principles of the Declaration of Helsinki throughout.

DATA ANALYSIS

The data were analyzed using "IBM SPSS Statistics for Windows, version 27.0 (IBM Corp., Armonk, NY, USA)" Descriptive statistics, including mean, standard deviation, and minimum-maximum values, were calculated. Data normality was assessed using skewness, kurtosis, histograms, Kolmogorov-Smirnov, and Shapiro-Wilk tests. For normally distributed data, independent samples t-test and analysis of variance were used, with Tamhane's "post hoc" test for multiple comparisons. Pearson correlation was used to examine relationships between scales. Additionally, multiple linear regression analysis was conducted to identify predictors of eating behavior subdimensions based on temperament characteristics and other variables. Statistical significance was set at $p<0.05$.

RESULTS

Analysis of the children's descriptive characteristics revealed that 51% were male, 58.3% were aged 61-72 months, 40.3% had a body mass index classified as underweight, 58.9% were enrolled in kindergarten, 88.7% were born at term, 80.1% were not hospitalized at birth, and 55% had a moderate family income (Table 1).

The mean scores of the Short Temperament Scale for Children subdimensions were as follows: warmth-shyness 26.82±5.90, persistence 26.31±6.09, rhythmicity 29.16±5.72, and reactivity 26.58±7.45. For the Children's Eating Behavior Questionnaire subdimensions, the mean scores were: food responsiveness 9.01±3.42, emotional overeating 6.35±2.34, enjoyment of food 13.51±4.44, Passion for drinking 8.40±3.28, satiety responsiveness 24.52±4.72, slow eating 12.82±3.23, emotional undereating 12.60±3.14, and food pickiness 6.78±2.93 (Table 2).

Analysis of the relationship between children's BMI categories and the Short Temperament Scale for

TABLE 1: Descriptive characteristics of children (n=151)

Features	n	%
Gender		
Female	74	49
Male	77	51
Age range (month)		
36-48	24	15.9
49-60	39	25.8
61-72	88	58.3
Body mass index		
Underweight	61	40.3
Normal	47	31.1
Overweight	32	21.1
Obese	11	7.2
Continued institution		
Nursery class	62	41.1
Kindergarten	89	58.9
Birth weight		
Under 2,499 g (low birth weight)	20	13.2
2,500-4,000 g (normal birth weight)	72	47.7
Gestational age, w.		
31-37 (preterm)	17	11.3
38-42 (term)	134	88.7
Hospitalisation after birth		
No	121	80.1
Yes	30	19.9
Number of siblings		
No sibling	24	15.9
1 sibling	78	51.7
2 siblings	32	21.1
3 or more siblings	17	11.3
Mother's educational status		
Primary school	12	7.9
Secondary school	7	4.6
High school	27	17.9
Associate degree	2	1.3
Undergraduate	88	58.4
Postgraduate	15	9.9
Father's educational status		
Primary school	6	4.0
Secondary school	7	4.6
High school	26	17.3
Associate degree	4	2.6
Undergraduate	81	53.6
Postgraduate	27	17.9
Perceived income status		
Low	24	15.9
Average	83	55.0
High	44	29.1

Children revealed a significant difference in the warmth-shyness subdimension (p<0.05). Further analysis showed that underweight children had significantly higher warmth-shyness scores compared to overweight children (p<0.05).

TABLE 2: Mean Scores on the Subscales of the Short Temperament Scale for Children and Mean Scores on the Subscales of the Children's Eating Behavior Questionnaire (n=151)

Scales and subscales	X̅±SD	Minimum-maximum values
Short Temperament Scale for Children		
*Warmth-shyness	26.82±5.90	12.00-41.00
*Persistence	26.31±6.09	12.00-41.00
*Rhythmicity	29.16±5.72	17.00-42.00
*Reactivity	26.58±7.45	13.00-46.00
Children's Eating Behavior Questionnaire		
*Food responsiveness	9.01±3.42	5.00-22.00
*Emotional overeating	6.35±2.34	4.00-16.00
*Enjoyment of food	13.51±4.44	5.00-25.00
*Passion for drinking	8.40±3.28	3.00-15.00
* Satiety responsiveness	24.52±4.72	8.00-35.00
*Slow eating	12.82±3.23	5.00-20.00
*Emotional under eating	12.60±3.14	4.00-20.00
*Food pickiness	6.78±2.93	3.00-15.00

SD: Standard deviation

Regarding age groups, a significant difference was observed in the reactivity subdimension, with children aged 36-48 months showing higher reactivity scores than those aged 61-72 months (p<0.05). No significant differences were identified in relation to other descriptive characteristics (p>0.05) (Table 3).

Analysis of the relationship between birth weight and the Children's Eating Behavior Questionnaire revealed that children with birth weights above the normal range had significantly higher enjoyment of food scores compared to those with normal birth weights (p<0.05).

Regarding birth week, preterm children exhibited significantly higher slow eating scores than term children (p<0.05).

Analysis of the relationship between neonatal hospitalization and the Children's Eating Behavior Questionnaire revealed a significant difference in slow eating scores, with children who were not hospitalized at birth exhibiting higher scores than those who were (p<0.05).

Regarding family income, children from high-income families had significantly higher enjoyment of food scores than those from lower-income fami-

TABLE 3: Comparison of the Mean Scores of the Subscales of the Short Temperament Scale for Children According to Descriptive Characteristics (n=151)

	Short Temperament Scale for Children			
	Warmth-shyness	Persistence	Rhythmicity	Reactivity
	X̅±SD	X̅±SD	X̅±SD	X̅±SD
Body mass index				
Underweight[a]	26.40±4.23	26.29±4.16	28.30±5.52	27.02±7.23
Normal[b]	25.66±4.29	24.56±4.36	28.42±4.30	26.02±6.00
Overweight[c]	25.57±6.17	23.20±5.12	27.61±3.20	25.39±4.66
Obese[d]	24.43±5.33	23.19±4.26	27.70±4.12	25.12±7.83
Test	**F=0.787**	F=1.128	F=0.435	F=0.735
p value	**p=0.200**	p=0.309	p=0.458	p=0.533
	Difference; a>c			
Child's age (month)				
36-48[a]	27.50±5.43	24.29±6.16	29.20±6.82	28.12±9.03
49-60[b]	26.76±5.39	25.76±6.46	29.92±6.20	26.53±7.10
61-72[c]	26.67±6.27	27.10±5.82	28.81±5.20	26.19±7.16
Test	F=0.187	F=2.246	F=0.500	**F=0.632**
p value	p=0.100	p=0.109	p=0.607	**p=0.033**
				Difference; a>c

p<0.05; t: Independent sample test; F: One-way analysis of variance; SD: Standard deviation lies ($p<0.05$). Further analysis showed that the difference was significant specifically between high-income and low-income groups. No significant differences were found for other descriptive characteristics ($p>0.05$) (Table 4).

Analysis of the relationship between subdimensions of the Short Temperament Scale for Children and the Children's Eating Behavior Questionnaire revealed several significant correlations. A weak, positive correlation was observed between rhythmicity and food responsiveness (r=0.215, p=0.008). Weak, negative correlations were found between rhythmicity and satiety responsiveness (r=-0.274, p=0.001), slowness in eating (r=-0.239, p=0.003), and emotional under eating (r=-0.247, p=0.002). A moderate, positive correlation was identified between rhythmicity and enjoyment of food (r=0.437, $p<0.001$), while a weak, negative correlation was found between reactivity and enjoyment of food (r=-0.186, p=0.022) (Table 5).

Regression analysis of the Children's Eating Behavior Questionnaire and the Short Temperament Scale for Children showed that temperament characteristics significantly and positively predicted eating behaviors, explaining 36.4% of the total variance (B=0.671, $R^2=0.364$, $p<0.001$) (Table 6).

DISCUSSION

This study explored the relationship between temperament characteristics and eating behaviors in preschool children. The findings demonstrate associations between temperament and eating behaviors, and highlight the influence of demographic factors on these interactions. These results contribute to the understanding of children's growth and nutrition and align with existing literature.

TABLE 4: Comparison of Mean Scores of Children's Eating Behavior Questionnaire Subscales According to Descriptive Characteristics (n=151)

	Children's Eating Behavior Questionnaire							
	Food responsiveness X̄±SD	Emotional overeating X̄±SD	Enjoyment of food X̄±SD	Passion for drinking X̄±SD	Satiety responsiveness X̄±SD	Slow eating X̄±SD	Emotional undereating X̄±SD	Food pickiness X̄±SD
Birth weight								
Low	10.35±2.36	6.22±2.40	13.88±4.48	8.30±3.29	24.00±5.53	13.88±3.44	12.41±3.33	6.52±2.76
Normal	8.13±3.01	6.35±2.03	13.47±4.19	8.38±3.36	24.70±4.44	12.68±3.39	12.61±3.01	6.82±3.18
Test	T=1.408	T=-0.106	**T=0.359**	T=0.245	T=-0.109	T=1.441	T=0.274	T=-0.384
p value	p=0.158	p=0.912	**p=0.020**	p=0.807	p=0.913	p=0.152	p=0.701	p=0.701
(Gestational age, w.)								
Preterm	9.07±2.47	6.15±2.32	13.37±5.34	7.87±3.09	24.37±6.30	13.12±4.01	13.05±2.87	6.70±4.23
Term	8.94±3.13	6.42±2.04	13.56±4.56	8.59±3.32	24.28±5.04	12.11±3.28	12.45±3.260	6.81±2.83
Test	T=0.133	T=-0.630	T=-0.234	T=1.259	T=0.534	**T=2.238**	T=1.595	T=-0.213
p value	p=0.895	p=0.529	p=0.815	p=0.236	p=0.712	**p=0.018**	p=0.453	p=0.452
Hospitalisation after birth?								
No	8.83±3.93	6.83±2.93	13.46±4.47	7.83±3.40	25.03±4.85	13.93±3.35	12.23±3.43	7.26±3.17
Yes	9.05±3.29	6.23±2.17	13.52±4.46	8.54±3.25	24.40±4.70	12.54±3.15	12.70±3.07	6.66±2.87
Test	T=0.321	T=-1.053	T=-0.068	T=1.063	T=-0.651	**T=-2.128**	T=0.731	T=-0.997
p value	p=0.749	p=0.299	p=0.946	p=0.290	p=0.516	**p=0.035**	p=0.498	p=0.320
Perceived income status								
Low[a]	8.00±2.82	5.77±1.91	11.83±3.43	8.20±3.86	25.95±3.99	13.91±2.96	12.62±3.33	6.58±3.07
Average[b]	8.92±3.34	6.66±2.56	13.34±4.42	8.72±3.13	24.66±4.48	12.77±3.29	12.54±3.05	6.49±2.65
High[c]	9.72±3.75	6.68±2.07	14.75±4.71	7.90±3.23	23.50±5.35	12.3±3.19	12.72±3.25	7.45±3.30
Test	F=2.065	F=1.750	**F=3.586**	F=0.931	F=2.211	F=1.942	F=0.050	F=1.621
p value	p=0.130	p=0.177	**p=0.030**	p=0.396	p=0.113	p=0.147	p=0.952	p=0.201
			Difference; c>a					

$p<0.05$; t: Independent sample test; F: One-way analysis of variance; SD: Standard deviation

TABLE 5: Short Temperament Scale for Children The Relationship Between Sub-Dimension Mean Scores and Children's Eating Behavior Questionnaire Sub-Dimension Mean Scores

	*Warmth-shyness	*Persistence	*Rhythmicity	*Reactivity
*Food responsiveness	r=0.038	r=0.298	**r=0.215****	r=-0.071
	p=0.645	p=0.857	**p=0.008**	p=0.389
*Emotional overeating	r=0.040	r=-0.016	r=0.022	r=0.053
	p=0.626	p=0.845	p=0.789	p=0.522
*Enjoying of food	r=0.044	r=0.028	**r=0.437****	**r=-0.186****
	p=0.591	p=0.736	**p=0.000**	**p=0.022**
*Passion for drinking	r=0.089	r=0.070	r=-0.148	r=-0.145
	p=0.280	p=0.392	p=0.070	p=0.076
*Satiety responsiveness	r=-0.141	r=0.087	**r=-0.274****	r=0.189
	p=0.084	p=0.287	**p=0.001**	p=0.120
* Slow eating	r=-0.030	r=-0.019	**r=-0.239****	r=0.124
	p=0.719	p=0.813	**p=0.003**	p=0.129
*Emotional under eating	r=0.006	r=0.002	**r=-0.247****	r=0.153
	p=0.941	t=0.978	**p=0.002**	p=0.060
*Food pickiness	r=0.114	r=0.098	r=0.266	r=-0.116
	p=0.165	p=0.230	p=0.441	p=0.157

r: Pearson correlation coefficient, *p<0.05, **p<0.01

TABLE 6: Regression analysis of the effect of temperament characteristics on eating behaviors

Scales	Temperament characteristics**						
Eating behaviour*	B	St error	ß	R^2	T	F	p value
Total	0.671	0.056	0.451	0.364	12.452	121.14	0.000

* Dependent variable: Children's Eating Behavior Questionnaire; *Independent variable: Short Temperament Scale for Children; B: Unstandardized regression coefficient; SE: Standard error; β: Standardized regression coefficient; R²: Coefficient of determination.

Our analysis indicated that rhythmicity was the highest scoring temperament trait, while satiety responsiveness and enjoyment of food were the most prominent eating behaviors. These findings align with Birch and Fisher, who reported that predictable routines and positive attitudes toward eating are common in young children.[21] Among the sample, 51% were male, 58.3% were aged 61-72 months, and 40.3% were classified as underweight. Notably, overweight children had significantly lower warmth-shyness scores compared to underweight children, suggesting a meaningful relationship between temperament and eating behaviors. Previous research has shown that shy and introverted children tend to exhibit more selective eating patterns and anorexia, which may contribute to reduced food intake and lower weight.[4] These findings support the hypothesis that warmth-shyness traits can influence feeding behaviors.

The higher reactivity scores observed in 36-48-month-olds compared to 61-72-month-olds align with developmental theories of emotional regulation. Younger children often display heightened emotional responses that influence eating behaviors, such as rejecting new foods or fluctuating between hunger and satiety.[22] As children age, emotional regulation improves, and these responses diminish. In our study, gestational age and birth weight were found to significantly affect eating behaviors. Additionally, preterm infants had higher slow eating scores compared to term infants, which may reflect developmental delays in oral-motor skills or early feeding difficulties.[23] Over time, family-led education may help preterm children adapt to sensory and motor challenges during meals, contributing to slower, more deliberate eating behaviors. These findings align with our observation that children with low regulatory traits (e.g., low rhythmicity or high reactivity) are more likely to experience feeding difficulties or irregular appetite signals. This is also supported by recent findings indicating that infant temperament, particularly low orienting/regulation and high surgency, predicts emotional overeating behaviors in early childhood, mediated by caregiver responsiveness.[16]

In this study, family income emerged as a significant factor influencing eating behaviors; children from higher-income families reported greater enjoyment of food compared to those from lower-income families. This finding is consistent with research indicating that socioeconomic status affects eating behavior.[24] Families with limited economic resources may offer less variety in foods, increasing the risk of food insecurity, stress, and limited access to nutrient-dense options, which can negatively impact children's enjoyment of meals. While the total fertility rate in Türkiye is 1.88 children per woman on average, in Batman province this rate was reported as 2.18 according to 2023 data from the Turkish Statistical Institute. This higher rate may place an additional burden on family resources and has the potential to influence dietary patterns.[25] These findings underscore the impact of economic constraints on healthy eating behaviors and highlight the importance of targeted nutritional interventions for low-income populations. Socioeconomic status affects not only the quality and variety of available food but also children's overall enjoyment of meals.[24] Furthermore, a 2025 integrative review by Oudat emphasized that caregivers' feeding strategies—shaped by household limitations—play a central role in shaping children's eating behaviors, particularly in low-resource settings.[26] These insights reinforce the need for nutrition policies and family-level interventions that are sensitive to socioeconomic disparities.

Haycraft et al. reported that children with emotional temperament exhibited avoidant eating behaviors and consumed more unhealthy food.[27,28] Farrow and Blissett found that children with difficult temperament (characterized by high emotionality and low sociability) were more likely to refuse food.12 Steinsbekk et al. identified that negative affect in 4-year-old children was associated with increased parental emotional eating at ages 6 and 8, and increased emotional eating in 10-year-olds.[29] Similarly, a 2025 descriptive study reported that children with high food responsiveness and emotional eating were more likely to have lower satiety sensitivity, suggesting that certain temperament-related behaviors may act as early markers for problematic eating trajectories.[30] In the present study, significant correlations were observed between temperament traits and eating behaviors. Specifically, rhythmicity was positively associated with food responsiveness and enjoyment of food, suggesting that children with more regular and predictable behavioral patterns are better able to develop positive eating habits.[31] Regular rhythms likely support structured mealtime routines, which are known to enhance diet quality and meal satisfaction. Conversely, rhythmicity was negatively associated with satiety responsiveness, slowness in eating, and emotional undereating, indicating that children with irregular rhythms may struggle to recognize hunger and satiety cues, potentially leading to disordered eating patterns and lower meal satisfaction. These findings align with prior research emphasizing the role of rhythmicity in fostering self-regulated eating and preventing overeating or food refusal.[22,27]

Our study also identified a moderate positive correlation between food enjoyment and rhythmicity, and a weak negative correlation between food enjoyment and reactivity. These results suggest that emotionally reactive children may struggle to form positive associations with food due to heightened sensitivity to sensory stimuli or mealtime stress. This is consistent with research emphasizing the role of emotional regulation in facilitating or hindering healthy eating behaviors.[22,27]

Regression analysis revealed that children's temperament characteristics significantly and positively predicted eating behaviors, explaining 36.4% of the variance ($B=0.671$, $R^2=0.364$, $p<0.001$). This suggests that temperament influences how children respond to food-related cues and regulate their eating behaviors. These findings align with prior research emphasizing the link between temperament and self-regulation in early childhood.[32,33] For example, Anzman-Frasca et al. reported that children with higher negative affect or lower effortful control tend to exhibit more emotional or external eating behaviors.[31] Similarly, children with more difficult temperaments may require more structured feeding approaches.[33] These findings highlight the importance of considering temperament differences when designing interventions to foster healthy eating habits in early childhood.

Our findings demonstrate that temperament traits significantly predict eating behaviors in preschool children, highlighting the need for individualized intervention strategies. High-reactivity children may benefit from calm, structured mealtimes, while those with low rhythmicity may respond to consistent schedules. Identifying at-risk groups, such as underweight or low-income children, can guide targeted nutritional interventions. These findings emphasize the value of incorporating temperament-based approaches into early childhood nutrition programs.

LIMITATIONS

The main limitations of this study are its cross-sectional design, which precludes the establishment of causal relationships between temperament and eating behaviors. In addition, reliance on maternal self-reports may introduce reporting bias and affect the accuracy of the data. The study was conducted in a single province, which limits the generalizability of the findings to other regions. Furthermore, the sample size was not large or diverse enough to adequately represent different socio-cultural groups, which may limit the applicability of the results to broader populations.

CONCLUSION

This study demonstrated that temperament traits, particularly rhythmicity and reactivity, are significantly associated with the eating behaviors of preschool children. Temperament characteristics accounted for a substantial proportion of variance in eating patterns, highlighting their importance in early childhood nutrition. Sociodemographic factors such as birth status, body mass index, and family income also influenced these behaviors. These findings suggest that individual temperament differences should be considered in nutrition-focused interventions to promote healthy eating habits and prevent nutrition-related issues in early childhood. Interventions should integrate temperament characteristics, while family support programs should be developed considering socioeconomic differences. These findings offer important practical insights for pediatric nursing. Nurses can identify risk factors early by assessing children's temperament and provide families with appropriate guidance on nutrition and emotional support. Temperament-sensitive approaches may improve nutritional outcomes, especially in socioeconomically disadvantaged families.

Acknowledgments

The authors are grateful to Özkan Sir for his help in the preparation of this study.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

***Idea/Concept:** Barış Çelik, Ayla Yava, Aynur Koyuncu, Zerrin Çiğdem; **Design:** Barış Çelik, Ayla Yava, Zerrin Çiğdem; **Control/Supervision:** Ayla Yava, Zerrin Çiğdem; **Data Collection and/or Processing:** Barış Çelik; **Analysis and/or Interpretation:** Barış Çelik, Ayla Yava, Zerrin Çiğdem, Aynur Koyuncu; **Literature Review:** Barış Çelik, Ayla Yava, Aynur Koyuncu, Zerrin Çiğdem; **Writing the Article:** Barış Çelik, Ayla Yava; **Critical Review:** Ayla Yava, Zerrin Çiğdem.*

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