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ORIGINAL ARTICLE

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The Impact of Obesogenic Neighborhood Environments and Maternal Health Literacy on Children's Obesogenic Feeding Attitudes

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ABSTRACT

Background: The escalating prevalence of childhood obesity constitutes a significant public health concern, with a multitude of interacting factors contributing to its etiology.

Aims: This investigation was conducted to determine the interrelationships among obesogenic feeding attitudes in early adolescents, the degree of obesogenic environmental exposure, and maternal health literacy (HL).

Patients and Methods: This research employed cross-sectional design. The study population comprised middle school students (grades 5–8) residing within the urban center of Yozgat city, with data collection conducted in 2022. Data acquisition was facilitated through the administration of the Food Desire Visual Analog Scale (VAS), the Obesogenic Environment Evaluation Form (OEEF), and the European Health Literacy Scale Turkish Short Form (EHLS-TR-16). A total of 583 students and their respective mothers participated in the study.

Results: The findings indicated that 20.9% the child participants exhibited a disposition towards obesogenic foods, while 28.6% demonstrated a strong inclination towards such consumption. Furthermore, 24.4% of the children were identified as being at heightened risk due to exposure to an obesogenic environment. A statistically significant positive correlation was observed between children's preference for obesogenic foods increases and elevated OEEF score (β=0.197, $p < 0.05$), engagement in sporting activities (β = 0.102, $p < 0.05$), and the utilization of social media via mobile devices (β=0.096, $p < 0.05$). Conversely, no statistically significant associations were observed between children's preference for obesogenic food consumption and maternal HL levels, familial characteristics, child sex, age, or dietary behaviors such as the frequency of meals and snacks, and the practice of bringing food to school ($p > 0.05$).

Conclusions: The findings of this study suggest that residing within an obesogenic environment and the utilization of social media exert a noticeable influence on children's consumption of energy-dense, nutrient-poor foods. It is recommended that local authorities consider the provision of requisite playgrounds and sporting infrastructure for children.

Keywords: Children, Obesity, Feeding Attitude, Neighborhood Environment, Health Literacy.

ARTICLE INFORMATION

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1 INTRODUCTION

Obesity represents a rapidly escalating global health challenge. Adolescent obesity, characterized by the excessive accumulation of weight and body fat, frequently coincides with the period of accelerated growth and development inherent to adolescence. The prevalence of overweight and obesity among children and adolescents aged 5–19 years has dramatically increased from 8% in 1990 to 20% in 2022 (WHO, 2023). Adolescence, a transitional phase between childhood and adulthood, is marked by significant physiological and hormonal changes. Obesity during this period can predispose individuals to immediate health complications and elevate the risk of serious chronic diseases in later life (Kansra *et al.*, 2021). The preference for obesogenic foods and the experience of food cravings are increasingly prevalent among contemporary adolescents. Obesogenic foods, defined as energy-dense, nutrient-poor foods, are often favored due to their high caloric content, elevated levels of sugar, saturated fats, and sodium, and their relative lack of essential nutrients. The consumption of fast food, sugary snacks, and carbonated beverages is commonly

observed within this category of individuals (Ergül & Kalkım, 2011; Nogueira-de-Almeida *et al.*, 2024).

Post-childhood, adolescence is characterized by marked variations in physical development. Consequently, the assessment of obesity in this population frequently relies on the body mass index (BMI). The World Health Organization (WHO) stratifies individuals aged 5–19 years into categories of underweight, normal weight, overweight, and obese, based on age- and sex-specific BMI percentiles and Z-scores. These classifications are currently widely employed. According to the WHO (2023), the global prevalence of obesity in children and adolescents aged 5–19 years, which was slightly less than 1% in 1975, increased to 7% (6% in girls and 8% in boys) by 2016. The global prevalence of adolescent obesity has increased substantially. Studies indicate a rising trend in the number of overweight and obese adolescents, with significant heterogeneity observed across different regions and countries (Ng *et al.*, 2014). Various factors can contribute to the etiology of obesity during childhood. These include sociocultural influences, sedentary lifestyles, genetic predispositions, endocrine disorders, and factors such as access to healthy food and safe spaces for physical activity (Karamelikli, 2021). Data from the Türkiye Nutrition and Health Survey 2017 indicate that the prevalence of mild obesity in the 15–18 age group is 17.2%, while the prevalence of obesity is 15%. Among second-grade elementary school students, these rates are 14.6% and 9.9%, respectively (Sağlık Bakanlığı/Ministry of Health, 2023).

Despite the multifactorial etiology of obesity, the concept of obesogenic environment has garnered increasing scholarly attention in recent years. The obesogenic environment is broadly defined as the constellation of environmental conditions that promote excessive weight gain; however, its precise contextual boundaries remain somewhat indeterminate. Etymologically, the term is a portmanteau of "obese" (denoting excess adiposity) and "genic" (signifying production), thus reflecting its role in the pathogenesis of obesity (Gauthier & Krajicek, 2013). The WHO's Commission on Ending Childhood Obesity (ECHO) defines it as an environment that encourages elevated energy intake and sedentary lifestyles (WHO, 2022). Investigations have demonstrated that residents of more obesogenic environments exhibit significantly increased odds of cardiovascular disease (CVD), engage in a greater number of health-compromising behaviors, and display more pronounced physiological dysregulation (Guo *et al.*, 2022). The obesogenic environment refers to environmental determinants that predispose individuals to behaviors that increase the risk of obesity, such as unhealthy eating and low levels of physical activity. These determinants manifest as heightened exposure to energy-dense, nutrient-poor foods, barriers to physical activity engagement, and influences that contribute to sedentary behaviors. The obesogenic environment plays a significant role in the escalating global obesity epidemic (Mei *et al.*, 2021). A recent systematic review exploring the influence of built, food, and natural environmental elements on childhood obesity indicated that proximity to fast-food outlets is positively associated with increased consumption, whereas access to infrastructure such as bicycle lanes, sidewalks, and green spaces supports physical activity and reduces sedentary behavior (Jia, 2021). However, heterogeneity in study design and population characteristics contributed to inconsistencies across the reported findings. Notably, the review did not address several of the specific variables investigated in the present study.

In today's world, the construct of health literacy is assuming increasing significance. Health literacy involves the capacity of individuals to comprehend prescription instructions, medical procedures, appointment schedules, and information disseminated by healthcare professionals, thereby enabling them to navigate the seemingly complex healthcare system and actively participate in their own health management (Nutbeam, 2000). Research conducted in Türkiye in 2014 revealed a low prevalence of health literacy, with approximately 64.6% of the population exhibiting problematic or insufficient health literacy (Tanrıöver *et al.*, 2014). Health literacy has been associated with individuals' engagement in physical activities, the selection of salutary dietary options, and awareness of the risks associated with harmful substance use (Safeer & Keenan, 2005; Taş & Akış, 2016). Furthermore, health literacy influences dietary behaviors related to preventive healthcare practices (Speirs *et al.*, 2012). Individuals' dietary habits contribute to their assumption of responsibility for their own health (Avcı, 2016). A study conducted in Türkiye identified maternal health literacy, maternal BMI, children's physical activity levels, and dietary behaviors as significant determinants of BMI z-scores among children aged 8 to 12 years (Güneş, 2024). Parental perception of children's weight plays a critical role in shaping feeding behaviors and obesity-related outcomes. In one study, nearly 60% of mothers underestimated their child's weight status, with this proportion increasing considerably among overweight children. Interestingly, mothers who underestimated their children's weight were more likely to have children who exhibited greater satiety responsiveness and slowness in eating—behavioral cues that may obscure visible signs of excess adiposity (Savcı & Yalçın, 2025). It is posited that mothers with higher levels health literacy may be better equipped to navigate obesogenic environments by making healthier more informed dietary choices, comprehending the importance of physical activity, and seeking healthier environments for their offspring. A systematic review has yielded substantial evidence indicating that health literacy knowledge and skills play a key role in the subsequent

management of childhood obesity and BMI levels (Chrissini & Panagiotakos, 2021).

Prior investigations have examined the relationship between health literacy and dietary behaviors. Speirs *et al.*, (2012) reported that individuals with low health literacy exhibited unhealthy dietary habits, irrespective of socioeconomic status (Speirs *et al.*, 2012; Yıldırım & Keser, 2015). Similarly, a study involving adult participants concluded that lower health literacy was associated with diminished dietary behavior scores (Gül, 2018). In Türkiye, Sarıalioğlu *et al.* (2021) investigated the relationship between obesogenic environments and obesity awareness levels among students in grades 5 through 8. However, that study did not examine children's interest in obesogenic foods or maternal health literacy. In this regard, the present study offers a novel perspective by addressing these additional dimensions (Sarıalioğlu *et al.*, 2021). Upon reviewing the extant literature on the relationship between health literacy and dietary behaviors, it is generally observed that these investigations have been conducted on adult populations. To date, no studies have specifically examined the impact of maternal health literacy on children's dietary attitudes.

This study aims to elucidate the relationship between obesogenic dietary attitudes, exposure to obesogenic environments, and maternal health literacy among early adolescents.

2 Material and Methods

2.1 Study Design and Population

This investigation adopted an analytical cross-sectional study design. The target population for this research consisted of middle school students aged 9 to 14 and their respective parents. The study sample included students and parents attending public or private middle schools in the central district of Yozgat, Türkiye. Data collection was conducted across ten middle schools located in the central district between January and March 2022. The inclusion criteria for student participants were enrollment in the 5th to 8th grades of secondary schools within the city center, absence of visual or auditory impairments, provision of family consent for participation, and the accessibility of their mothers for contact. Students and their mothers who did not meet all of these criteria were excluded from the study.

The minimum required sample size for the study was calculated using the G*Power 3.1 software. For a linear regression analysis involving ten predictor variables— namely, the obesogenic environment assessment score, the child's age, sex, BMI percentile, and maternal HL score, maternal age, maternal BMI, maternal education level, and maternal income level— hypothesized to influence students' obesogenic food craving VAS scores, the minimum sample size was calculated to be N = 172. This calculation was based on an assumed effect size of $R^2 = 0.15$, a type I error rate (α) of 0.05, and a statistical power ($1-\beta$) of 0.95. A total of 583 students and their mothers participated in the study.

Ethical approval was obtained from the Yozgat University Ethics Committee (decision dated 12.11.2021, no. 27/04), and all participants provided written informed consent prior to their enrollment in the study.

2.2 Data Collection and Instrumentation

Data were collected through the administration of survey instruments. The researcher utilized a socio-demographic data form (comprising 14 items), the Childhood Obesogenic Environment Evaluation Form (OEEF) (comprising 20 items), the European Health Literacy Scale Turkish Short Form (EHLS-TR-16) (comprising 16 items), and a Visual Analogue Scale (VAS) assessing food preference (comprising 13 items).

Visual Analog Scale (VAS)

Visual Analogue Scales have been employed in prior research to assess the nutritional attitudes of both children and adults (Hammond *et al.*, 2022; Stubbs *et al.*, 2000). The food preference VAS utilized in this study was adapted for adolescents by Hayzaran (2018). This instrument consists of 13 items and employs a scoring continuum ranging from 1 to 10. Items 1 through 12 are negatively valanced, while the 13th item (fruit) is positively valanced. Each item is prefaced by the question: "How would you rate your desire to eat the following foods on a scale from '1 being very low' to '10 being very high'?" Examples of the food items include "Chocolate and chocolate products," "Cream cake and patisserie products," "Chips," "Carbonated beverages". The responses provided by the participants were utilized to determine individuals' food preferences (Hayzaran, 2018). For analytical purposes, the raw VAS scores were linearly transformed to a 100-point scale, with scores of 0–49 categorized as low preference, 50–69 as medium preference, and 70 and above as high preference.

Childhood Obesogenic Environment Evaluation Form (OEEF)

The OEEF consists of 20 items and employs a dichotomous (Yes/No) response format, corresponding to a 2-point Likert scale. A reverse scoring method was applied to specific items: a 'No' response was assigned 1 point for questions 2, 6–11, 13, 14, and 20, while a 'yes' response was assigned 1 point for questions 1, 3–5, 12, and 15–19. Each affirmative response on the assessment was awarded 1 point. The total score on the OEEF ranges from 0 to 20, with higher scores indicative of a more obesogenic environment (Yayan & Çelebioğlu, 2018).

European Health Literacy Scale Turkish Short Form (EHLS-TR-16)

The EHLS-TR-16, developed between 2009 and 2012, comprises 16 items and utilizes a 5-point Likert scale with response options ranging from a minimum value of 0 to a maximum value of 4. To facilitate interpretation, a normalized scoring index was calculated using the formula: index = (Average Score - 1) * (50/3), reflecting the proportional relationship between the raw values. The The resultant scale score ranges from 0 to 50, with scores of 33 and above indicating adequate health literacy levels (Sørensen *et al.*, 2013). The Turkish validity and reliability of the EHLS-TR-16 were established by Emiral *et al.* in (2018).

2.3 Data Collection Procedure

Following ethical approval, informed consent forms and survey instruments were distributed to students for dissemination to their families. Children's participation was contingent upon the provision of written informed consent by their parents and the completion of parental questionnaires. These questionnaires included socio-demographic questions and incorporated the mother's health literacy scale. Subsequently, the children completed the preference-to-eat Visual Analog Scale (VAS) and the Obesogenic Environment Evaluation Form (OEEF) at the school setting.

2.4 Statistical Analysis

The collected data were subjected to rigorous statistical analysis utilizing the Statistical Package for the Social Sciences (SPSS) software. Descriptive statistics were generated to characterize the sample. Inferential statistical techniques, including Chi-square tests, independent samples t-test, Analysis of Variance (ANOVA), Pearson correlation coefficients, linear regression, and multinomial logistic regression analyses, were employed to examine the relationships between variables. The normality of the data distribution was assessed visually through the inspection of Q-Q Plots and histograms. The food preference VAS score served as the dependent variable in subsequent analyses. The independent variables included the childhood OEEF score, the mother's HL score, and familial socio-demographic characteristics. To facilitate linear regression analysis, child sex, mother-reported extracurricular activities, and the practice of bringing meals to school were transformed into dichotomous (dummy) variables. A forward elimination model was applied for the selection of independent variables to be included in the regression analysis. Variables demonstrating statistical significance in the final model are presented in the Table 1. The threshold for statistical significance was set a priori at $p < 0.05$.

3 Results

3.1 Characteristics of the Study Participants

The participating mothers presented a mean age of 37.8 years (SD = 5.4), with 35.5% falling within the 28–39 year age range. The educational attainment of mothers varied, with 22.5% having completed primary education and 23.3% holding university degrees. In contrast, the fathers exhibited a higher rate of university completion (37.0%) and a lower rate of primary education completion (15.8%). Occupationally, 71% of mothers identified as homemakers, while 56.2% of fathers were employed. Regarding familial financial status, 19.0% reported a monthly income below 3000 Turkish Lira (TL), while 30.7% reported an income of 7000 TL or more. The mothers' health literacy levels demonstrated heterogeneity, with 70.8% exhibiting adequate literacy and 6.2% displaying inadequate literacy. Anthropometric data indicated that 41.5% of mothers were classified as mildly obese, and 17.7% met the criteria for obesity. The majority of the children (nearly 90%) resided in two-parent households, and 72.9% of families consisted of 4–5 members. Additionally, 10.1% of mothers reported the presence of health issues. A plurality of mothers (43.1%) had two children, and a substantial majority (75.1%) reported shared child-rearing responsibilities with their spouses (Table 1).

The study cohort comprised 583 children, with 67.6% attend general middle schools. The sex distribution indicated that 56.1% were female. The children's ages ranged from 9 to 14, with a mean age of 11.8 years (SD = 1.1). Exploration of extracurricular activities revealed that 16.6% engaged in computer games, 30.0% played outdoors, 31.6% used social media on their phones, and 26.2% participated in sports activities (Table 2).

3.2 Nutritional Attitudes

The dietary habits of the children revealed that half (51.0%) reported consuming three main meals per day, while slightly less than half (39.3%) reported two main meals per day. Analysis of snacking patterns indicated that over half (56.3%) consumed one snack per day, 34.1% adhered to a 2-snack pattern, and a smaller proportion (9.6%) reported three daily snacking occasions. The frequency of meal skipping and bringing food to school varied among the participants. Approximately one-third (35.3%) reported never skipping meals, whereas 57.6% indicated occasional meal skipping and 7% reported usually skipping meals. Similarly, 42.7% sometimes brought food to school, 24.5% generally did, and 32.8% never brought food to school. The mean BMI percentile for the children was 58.5 ± 31.0, indicating a moderate level within the distribution (Table 2).

Table 1. Children's VAS of preference obesogenic foods and OEEF score averages according to family characteristics

Family characteristics	VAS					OEEF		
	Count	%	Mean	SD	t/F *p*-value	Mean	SD	t/F *p*-value
Mother age (year)								
28–34l	166	28.5	59.3	17.5		8.1	2.2	
35–39	207	35.5	59.7	18.0	1.165	8.4	2.5	4.428
40–44	147	25.2	58.5	17.5	.322	7.6	2.4	0.004
≥ 45	63	10.8	55.0	19.7		7.8	2.2	
Mother education								
Primary school	131	22.5	57.9	19.1		7.8	2.1	
Middle school	123	21.1	57.8	18.6	.403	8.0	2.2	2.924
High school	193	33.1	59.3	17.5	.751	8.4	2.3	0.033
University	136	23.3	57.4	16.8		7.7	2.8	
Father education								
Primary school	92	15.8	57.4	17.5		8.1	2.0	
Middle school	83	14.2	55.2	19.3	2.334	8.4	2.1	0.143
High school	192	32.9	61.1	18.3	.073	8.2	2.4	0.867
University	216	37.0	58.7	17.1		7.7	2.5	
Mother profession								
Housewife	417	71.5	58.9	18.3	.124	8.1	2.3	0.143
Paid employee	106	18.2	58.9	17.0	.884	8.0	2.5	0.867
Other	60	10.3	57.7	17.2		7.9	2.6	
Father profession								
Unemployed	36	6.2	55.7	20.0		8.3	2.0	
Employee	174	29.8	58.3	18.8	.522	8.1	2.4	1.407
Officer	154	26.4	58.5	17.8	.719	7.7	2.6	.230
Self-employed-Retired	108	18.5	60.3	17.6		8.1	2.4	
Other	111	19.0	59.4	16.6		8.3	2.0	
Family income								
> 3000TL	111	19.0	58.7	18.9		8.5	2.1	
3000–3999TL	85	14.6	57.6	18.5	.369	8.0	2.0	1.666
4000–4999TL	103	17.7	60.5	18.4	.831	8.0	2.5	0.156
5000–6999TL	105	18.0	58.3	17.5		8.0	2.3	
≥7000TL	179	30.7	58.6	17.1		7.8	2.6	
Mother HL level								
Insufficient	36	6.2	52.3	19.5		8.9	2.4	
Problematic	134	23.0	60.6	18.7	3.114	8.0	2.0	2.664
Sufficient	413	70.8	58.7	17.4	.045	8.0	2.5	0.071
Total	583	100.0	58.8	17.9		8.0	2.4	
Mother BMI(Kg/cm²)								
Low-Normal	238	40.8	60.5	18.0	1.950	8.2	2.6	
Overweight	242	41.5	57.6	17.6	.143	7.8	2.2	2.521
Obese	103	17.7	57.4	18.3		8.2	2.2	.081
Parents partnership								
Living together	521	89.4	58.7	17.9	.191	8.0	2.4	2.546
Spouse died/divorced	62	10.6	59.2	18.5	.848	8.8	2.3	.011
Maternal health conditions								
None	524	89.9	58.8	17.8	.004	8.0	2.4	.446
Yes	59	10.1	58.8	18.9	.997	8.2	2.1	.656
Number of people at home								
2–3	72	12.3	59.4	18.2		8.2	2.4	
4	245	42.0	58.4	17.9	1.881	8.1	2.5	.404
5	180	30.9	60.7	16.2	.123	7.9	2.1	.750
≥4	86	14.8	55.3	20.9		7.9	2.4	
Number of children								
1	38	6.5	58.6	15.5		8.2	2.8	
2	251	43.1	58.9	17.6	1.303	8.2	2.5	.733
3	205	35.2	60.1	17.2	.273	7.9	2.1	.532
≥ 4	89	15.3	55.6	21.2		8.0	2.2	
Caring for the child								
Mother	532	91.3	59.0	17.9	1.169	8.0	2.4	.247
Other	51	8.7	56.0	18.7	.243	8.1	2.2	.805

Note: t: Independent Student t-test in two groups. F: One way ANOVA in more than two groups. VAS: Visual Analogue Scale, OEEF: Obesogenic Environmental Evaluation Form. BMI: Body mass index. HL: Health literacy

Mean OEEF scores for the children were observed to be highest among mothers aged 35–39 years (8.4), those with a high school education level (8.4), families with a monthly income below 3000 TL (8.5), and those with inadequate health literacy levels (8.9). Examination of the children's OEEF scores revealed higher scores for males (8.4) and those not engaged in sports activities (8.3) compared to those who engaged in sports (7.4). However, no statistically significant differences in OEEF scores were noticed based on school type, child's age, BMI percentile level, playing computer games, playing outside, using social media on the phone, and other activities ($p > 0.05$) (Table 2). Regarding the child's obesogenic environment level, 75.6% were classified as not being at risk, while 24.4% were identified as being at risk (Table 2).

Table 2. VAS and OEEF scale average scores according to various characteristics of children

Children characteristics	VAS					OEEF		
	Count	%	Mean	SD	r/F p	Mean	SD	r/F p
Middle school type								
General	394	67.6	59.4	18.2	.919	8.1	2.3	1.040
Private	97	16.6	57.8	17.0		7.9	2.7	
Religious	92	15.8	56.9	17.6	.400	7.8	2.4	.354
Child sex								
Girl	327	56.1	59.3	18.0	.675	7.6	2.3	3.865
Boy	256	43.9	58.4	17.9	.500	8.4	2.4	<0.001
Child age (year)								
9-10	56	9.6	58.4	20.2	2.575	7.8	2.5	.655
11	181	31.0	55.8	18.0		8.0	2.3	
12	181	31.0	60.3	17.4	.053	8.0	2.4	.580
13-14	165	28.3	60.4	17.4		8.2	3.2	
Child BMI percentile								
<5	40	6.9	57.1	17.5	.986	7.9	2.1	.839
5-<25	73	12.5	55.7	16.9		7.9	2.1	
25-<75	229	39.3	60.1	17.3		8.2	2.4	
75-<85	81	13.9	58.5	17.5	.425	8.2	2.6	.522
85<95	106	18.2	59.8	19.9		7.9	2.3	
≥95	54	9.3	56.7	18.8		7.6	2.2	
Number of main meals								
1	56	9.6	55.7	16.2	.934	8.7	2.6	4.054
2	229	39.3	58.9	17.0	.393	8.2	2.4	.018
3	297	51.0	59.2	18.9		7.8	2.3	
Obesogenic environment level								
No risk (1-9)	441	75.6	57.7	17.6	2.583	7.1	1.7	25.918
Risky (10-12)	142	24.4	62.1	18.4	.010	11.1	1.4	<001
Gaming on computer								
No	486	83.4	58.6	17.6	.559	8.1	2.4	.415
Yas	97	16.6	59.7	19.6	.577	7.9	2.4	.678
Playing outside								
No	408	70.0	58.2	18.1	1.180	8.1	2.4	.685
Yes	175	30.0	60.1	17.4	.239	7.9	2.3	.494
Using social media on phone								
No	399	68.4	57.5	17.5	2.558	7.9	2.3	1.729 .084
Yes	184	31.6	61.6	18.6	.011	8.3	2.5	
Sport activities								
No	430	73.8	58.1	18.0	1.606	8.3	2.3	3.832
Yes	153	26.2	60.8	17.7	.109	7.4	2.4	
Total	**583**	**100.0**	**58.8**	**17.9**		**8.0**	**2.4**	**<0.001**

Note: VAS: Visual Analogue Scale, OEEF: Obesogenic Environmental Evaluation Form. BMI: Body mass index

The mean score of VAS for children's preference for obesogenic foods consumption was 58.8 ± 17.9, indicating a

moderate level of preference within the measured construct. A statistically significant association was observed solely between the VAS score and maternal HL level ($p < 0.05$). Children whose mothers exhibited inadequate HL levels presented significantly lower mean VAS scores (52.3). Other familial factors examined did not demonstrate significant associations with the VAS score ($p > 0.05$). Further analysis revealed that children exposed to obesogenic environments with risk factors (VAS = 62.1) and those engaging in phone-based social media usage (VAS = 61.6) exhibited significantly elevated scores compared to their counterparts (VAS = 57.7, VAS = 57.5, respectively; $p < 0.05$). It is noteworthy that school type, sex, age, BMI percentile, engagement in computer games, outdoor play, and participation in sports activities among the children did not yield statistically significant differences in VAS scores ($p > 0.05$) (Table 2).

To further elucidate the children's preference for obesogenic foods, VAS scores were categorized into three distinct levels: low desire (10–49), moderate desire (50–69), and high desire (≥ 70). Notably, 20.9% of children exhibited a moderate level of desire (60–69), and 28.6% demonstrated a high level of desire (≥ 70). Among children exposed to obesogenic environments, a significantly higher proportion (36.6%) displayed a high desire for obesogenic eating compared to those in low-risk environments (26.1%). Additionally, the likelihood of exhibiting a high level of desire was observed to increase with the child's age. Interestingly, engagement in phone-based social media was associated with a higher prevalence of high desire (35.9%) compared to non-engagement (25.3%; $p < 0.05$). Similarly, children participating in sports activities exhibited a higher percentage with high VAS levels (35.3%) compared to those who did not (26.3%), although this association did not reach statistical significance ($p = 0.086$). No other significant associations between children's VAS levels and characteristics like sex, BMI percentile, or other examined factors ($p > 0.05$) (Table 3).

3.3 Association between Maternal and Child Characteristics, OEEF, VAS, and HL

Correlation analysis revealed a weak positive correlation (r=0.187) between children's desire for food, as measured by the VAS score and the OEEF score. A weak positive correlation (r=0.098) was also observed with the child's age. Conversely, a weak negative correlation (r=-0.082) was noticed with the number of children in the family. However, no statistically significant correlations were found between the child's BMI percentile level, mother's HL score, mother's BMI value, mother's age, parental education level, number of family members, and family income level ($p > 0.05$) (Table 4).

Table 3. Obesogenic nutrition preference level according to various characteristics of the child

Children characteristics	VAS level 10-49		50-90		≥ 70		X^2 p
	Count	%	Count	%	Count	%	
Middle school type							
General	114	28.5	160	40.6	120	30.5	3.123 .538
Private	25	29.5	44	45.4	24	24.7	
Religious	33	39.5	36	39.1	23	25.0	
Child sex							
Girl	73	28.5	108	42.2	75	29.3	.607
Boy	103	31.5	132	40.4	92	28.1	.738
Child age (year)							
9-10	21	37.5	18	32.1	17	30.4	10.638 .100
11	67	37.0	70	38.7	44	24.3	
12	43	23.8	81	44.8	57	31.5	
13-14	45	27.3	71	43.0	49	29.7	
Child BMI percentile							
<5	12	30.0	21	52.5	7	17.5	15.440 .117
5-<25	27	37.0	29	39.7	17	23.3	
25-<75	55	24.0	106	46.3	68	29.7	
75-<85	27	33.3	26	32.1	28	34.6	
85<95	34	32.1	38	35.8	34	32.1	
≥95	21	38.9	20	37.0	13	24.1	
Number of main meals							
1	21	37.5	24	42.9	11	19.6	3.567 .471
2	66	28.8	98	42.8	65	28.4	
3	89	30.0	117	39.4	91	30.6	

Table 3. (Continued)

Obesogenic environment level							
No risk (1-9)	141	32.0	185	42.0	115	26.1	6.347
Risky (10-12)	35	24.6	55	38.7	52	36.6	.471
Gaming on computer							
No	146	30.0	205	42.2	135	27.8	1.518
Yes	30	30.9	35	36.1	32	33.0	.468
Playing outside							
No	146	30.0	205	42.2	135	27.8	1.518
Yes	30	30.9	35	36.1	32	33.0	.468
Using social media on phone							
No	122	30.6	176	44.1	101	25.3	7.640
Yes	45	29.3	64	34.8	66	35.9	.022
Sport activities							
No	137	31.9	180	41.9	113	26.3	4.910
Yes	39	25.5	60	39.2	54	35.3	
Total	**176**	**30.2**	**240**	**41.2**	**167**	**28.6**	**.086**

Note: VAS: Visual Analogue Scale, BMI: Body mass index. X2: Chi-square test

Table 4. Correlation between various characteristics of mothers and children and OEEF, VAS, HL and BMI percentile

	VAS	OEEF	HL	Child BMI per.	Child age	Mother age	Mother BMI	Mother Educ.	Father Educ.	Num of people in House	Num. of children
OEEF	**.187****	1									
Mother HL	.040	.031	1								
Child BMI Per.	-.005	-.047	.052	1							
Child age	**.098***	.043	-0.62	-.077	1						
Mother age	-.035	-.059	-.025	.036	.130**	1					
Mother BMI	-.064	-.046	-.128**	.172**	.010	.120**	1				
Mother education	.035	.022	.258**	.034	-.073	.000	-.241**	1			
Father Education	.040	-.071	.248**	.055	-.040	.046	-.129**	.515**	1		
Number of people in the House	-0.45	-.054	-.078	-.085	.043	-.010	.113**	-.215**	-.071	**1**	
Number of children	**-.082***	-.046	-.119**	-.129**	-.006	.083*	.152**	-.235**	-.162**	-582**	1
Family income level	.008	**-.099***	.214**	.031	-.023	.120**	-.117**	.408**	.582**	-.052	-.179**

Note: ** Correlation is significant $p < 0.01$ (2-Tailed). *. Correlation is significant $p < 0.05$ (2-Tailed). VAS: Visual Analogue Scale, OEEF: Obesogenic Environmental Evaluation Form. BMI: Body mass index. HL: Health literacy.

Examination of the VAS values measuring children's desire for obesogenic eating through linear regression analysis indicated that an increase in the child's OEEF score (β=0.197), engagement in sports activities (β=0.102), and the child's use of social media on the phone (β=0.096) were significant predictors of increased preference for obesogenic foods ($p < 0.05$). No statistically significant relationships were found between the child's VAS score and other independent variables related to the family and the child (Table 5).

4 Discussion

The imperative to prevent childhood obesity requires a comprehensive understanding of children's preferences for obesogenic foods, which are strongly influenced by both environmental and familial factors. Identifying the fundamental factors influencing these preferences is essential for designing effective, targeted intervention strategies (Chrissini & Panagiotakos, 2021; Gauthier & Krajicek, 2013; WHO, 2022).

Table 5. Analysis of factors related to the Visual Analogue Scale score for preference for obesogenic foods by linear regression forward elimination method

Dependent Variable: VAS (Adj.R^2=0.049)	Unstandardized Coefficients		Standard Coefficients	t	*p-value*	95% Confidence Interval B	
	B	Std. Error	β			Lower limit	Upper limit
(Constant)	44.518	2.724		16.340	.000	39.166	49.869
OEEF	1.492	.312	.197	4.791	.000	.881	2.104
Sports activities = Performed	4.138	1.668	.102	2.480	.013	.861	7.414
Social media on phone = User	3.700	1.563	.096	2.366	.018	.629	6.770

Independent Variables: Mother's Health Literacy score, Mother's age, Mother's Body Mass Index, Mother's education, Father's education, Family income level, Number of people in the household, Number of children, daily main meals, daily snacks, Child's gender, Child's age, Child's BMI percentile, Child's obesogenic Environment Evaluation From (OEEF) score, Child's extracurricular activities, Bringing meals to school. Collinearity statistics: Tolerance values: 0.953 – 1.000 – 1.045. ANOVA step 3, F= 10.957, $p < 0.001$

In the present study, the mean VSA score for children's preference for obesogenic foods was 58.8, indicating a moderate level of inclination. It was found that 20.9% of the participants exhibited a willingness, and 28.6% a strong willingness towards consuming obesogenic foods. A significant finding was the positive association between children's preference for obesogenic foods and their OEEF score, engagement in sports activities, and use of social media on their phones. These results suggest that children exposed to obesogenic environments demonstrate a greater preference for such foods. While univariate analysis revealed a difference in mean VAS scores based on maternal HL levels, this association did not retain statistical significance in multivariate regression analysis. The lower mean VAS score observed in children whose mothers had insufficient HL level (52.3) compared to other groups ($p < 0.05$) warrants further consideration. The non-significance in the multivariate model may be attributable to the interplay of socio-demographic characteristics of both the mother and child, as well as the broader cultural context. These findings align with WHO's initiatives aimed at preventing childhood obesity by addressing obesogenic environments. WHO strategies, including the taxation of sugar-sweetened beverages, subsidization of nutritious food options, and restrictions on the sale of unhealthy foods, are designed to limit children's exposure to obesogenic food cravings (WHO, 2022).

Extant literature suggests that increased family income can facilitate greater access to processed foods (Gümüş *et al.*, 2015), and promotional advertisements are implicated in fostering obesogenic eating habits (Smith *et al.*, 2019; Tsochantaridou *et al.*, 2023). Conversely, previous research has explored the potential of promotional campaigns to redirect individuals towards healthier foods choices as a means of reducing obesogenic eating patterns (Folkvord & Hermans, 2020). A study demonstrates that enhanced consumer education and income levels can lead to a greater willingness to pay for healthy food products (Ali & Ali, 2020). Contrary to some expectations, research has shown comparable attitudes towards healthy food choices across parents from diverse socioeconomic backgrounds (Vos *et al.*, 2022). In the current study, however, no significant relationship was found between family income level and preference for obesogenic foods. This suggests that the relationship between income and food choices may be more complex than a simple linear correlation, potentially involving differential food consumption patterns across income levels, or being influenced by unmeasured confounding factors.

The observed positive association between increasing age and preference for obesogenic foods aligns with previous research. A study by Inal & Canbulat (2013) emphasized parents as developmental models for children. Parental attitudes exert a critical influence on childhood obesity, with higher rates observed among children raised in authoritarian family environments and with increasing paternal weight (Koçakoğlu *et al.*, 2025). Studies have further indicated that children tend to emulate their parents' obesogenic eating habits and behaviors (Scaglioni *et al.*, 2018; Sonneville *et al.*, 2012). It has been observed that factors such as increased maternal education, higher family income, or maternal employment may correlate with children's increased consumption of high-calorie foods, such as through the provision of pocket money instead of nutritious meals (Özilbey & Ergör, 2015). However, some studies have reported no significant association between maternal education level and children's nutritional behaviors (Güneş, 2024). Children's engagement in extracurricular activities such as outdoor play, screen time (computers and televisions), and associated changes in dietary habits, have been linked to an increased desire for obesogenic eating and obesity (Erkuran & Karadeniz, 2019; Seremet Kürklü & Gökmen Özel, 2015).

In contemporary urban settings, which are increasingly characterized by monotony, noise, and unhealthy attributes, the strategic planning and utilization of recreational and sports areas as alternatives to the challenges of urban lifestyles. In this context, the availability of recreational sports and play areas within living environments enables children to benefit from these resources, thus offering protection from obesogenic environments. To encourage

healthy lifestyles through sports facilities, cities need to be planned in advance based on popular entertainment, relaxation, play, and sport's needs (Kocalar, 2020). Recreation areas serve as vital places for children's enjoyment and relaxation, diverting them from obesogenic environments. It is essential to regulate and monitor these areas with regard to child safety and the sale of obesogenic foods (Severcan, 2015). Effective obesity prevention requires a systematic approach and coordinated policy initiatives across governmental agencies. Interventions aimed at preventing pediatric obesity should prioritize strategies that are feasible, effective, and capable of reducing health disparities (Lister *et al.*, 2023).

A systematic review has established a positive correlation between childhood obesity and fast-food access, while conversely, the availability of infrastructure such as bike paths, sidewalks, and green spaces has been shown to encourage physical activity and reduced sedentary behavior. However, some findings exhibit heterogeneity likely attributable to variations in study designs and the characteristics of populations (Jia, 2021). When examining the obesogenic environment status of the children in this study, it was determined that one-quarter were at risk, with smaller proportion (0.5%) living in an obesogenic environment. The mean obesogenic environment score in this study (8.0) was lower than that reported by Sarıalioğlu *et al.*, (2021) for children attending public schools (10.5), but similar to the mean score of those attending private schools (7.7) in the same study. This variation may be a consequence of differences in school infrastructure, parental socioeconomic status, and access to healthier food and physical activity opportunities—factors that are often more prevalent in private school settings. These findings suggest that environmental exposure to obesogenic factors may be moderated by the type of educational institution attended by children. Furthermore, the children's obesogenic environment score was observed to be higher in contexts of lower family income and increasing school grade level. The family's income level influences the mean OEEF score average with children from families in the lowest income group exhibiting the highest obesogenic environment scores, suggesting that socioeconomic status has a significant impact on nutrition. While individuals with very low income may be compelled to prioritize carbohydrate-based nutrition, children from high-income families are thought to have a greater tendency toward obesogenic nutrition, characterized by a higher intake of processed foods. Conversely, the average OEEF score was lowest for children whose parents were university graduates. These findings are corroborated by studies indicating a relationship between children's obesogenic environment scores and maternal education levels (Alphan *et al.*, 2002; Pekcan & Beğenmez, 1988).

It is postulated that mothers with higher levels of education may possess greater awareness regarding obesogenic nutrition. Therefore, the child's interaction with the obesogenic environment can be influenced by the mother's knowledge and practices. An increase in maternal education tends to correlate with a greater orientation towards healthy food choices, which is believed to increase the tendency to shield the child away from obesogenic factors. Research supporting these observations has identified a significant association between obesogenic environmental factors and childhood obesity, influenced by variables such as age, sex, family income, education, and settlement characteristics (Mei *et al.*, 2021). Another study examining the obesogenic environment of parents found it to a contributing factor to childhood obesity and obesogenic behaviors (Birch & Anzman, 2010). Studies have also identified variations in obesogenic factors in the school environment based on geographical region and rural-urban differences, which subsequently affect childhood obesogenic environments (Kaczynski *et al.*, 2020).

Mothers with higher HL may be better able to navigate obesogenic environments by making healthier food choices, recognizing the importance of physical activity, and seeking healthier environments for their children (Chrissini & Panagiotakos, 2021; Gauthier & Krajicek, 2013; Rashad, 2016; Sarıalioğlu *et al.*, 2021). Research indicates that an increase in maternal HL level prevents potential health issues such as obesity and excessive social media use (Pazarcıklcı *et al.*, 2022). The existing literature review emphasizes the importance of families, with an increase wherein enhanced health literacy enables parents to serve as positive role models for their children and provide a necessary knowledge foundation (İzoğlu Tok & Doğan, 2021). A study conducted within Türkiye identified maternal health literacy as a significant determinant of BMI z-scores among children aged 8 to 12 years (Güneş, 2024). However, in our study, there was no statistically significant relationship found between maternal HL levels and children being overweight or obese, their preference for obesogenic foods, or their exposure to an obesogenic environment. This absence of a significant association may be attributed to the relatively high proportion of mothers in the study possessing adequate HL levels. Additionally, the socio-demographic characteristics of both the mother and child, alongside the prevailing cultural context, may have attenuated the impact of the mother's HL levels.

To mitigate the adverse effects of obesogenic environments, it is crucial for families to prioritize the promotion of healthy eating habits, provide opportunities for regular physical activity for children, regulate the influence of food advertising, and implement measures that facilitate access to healthy foods within the school environment. In Türkiye,

programs aligning with these recommendations are currently being implemented. The "School Health Protection and Promotion Program" aligns with these efforts by emphasizing a Healthy and Safe School Environment, promotion of Healthy Nutrition and Physical Activity, and the importance of Family/Community Participation. These initiatives are designed to effectively distance children from obesogenic environments and reduce their inclination towards unhealthy food choices (MEB, 2016).

Limitations of the Study

The study included only middle school students from the province of Yozgat. Therefore, the generalizability of the findings to other geographical regions may be limited. Furthermore, the challenges encountered in achieving the desired sample size due to the study's implementation during the pandemic period has also posed a limitation. We also acknowledge that this investigation did not explore the influence of peer dynamics and school policies on children's preferences and obesogenic environments. Future research should examine these factors in conjunction with maternal health literacy and socioeconomic indicators to cultivate a more holistic understanding of the determinants of childhood obesity.

4 Conclusions

The findings of this study indicate that a substantial proportion of the participating children exhibited a moderate (20.94%) to high (28.6%) level of willingness towards the consumption of obesogenic foods. It was observed that 24.4% of the children were identified as being at risk in terms of exposure to an obesogenic environment. Cultural and regional specificities prevalent in Türkiye, such as dietary habits, lifestyle patterns, and social norms, exert a considerable influence on these observed results. For instance, children's engagement in sports activities, the use of social media use on their phones, and exposure to obesogenic environments emerged as key contributors to their preference for obesogenic foods, suggesting that environmental and behavioral factors may play a more prominent role in this context compared to parental or socio-demographic characteristics.

However, the absence of significant associations between children's preference for obesogenic foods and factors such as maternal health literacy, parental education, or family income highlights potential variations in the underlying dynamics when compared to other cultural or regional settings. Further research is required to explore how similar factors might interact within different cultural or regional environments.

The study's findings corroborate the notion that children exposed to obesogenic environments are more likely to prefer obesogenic foods. To prevent children from being exposed to obesogenic environments, access to unhealthy foods should be restricted and the availability of safer and healthier food alternatives should be promoted around schools. Furthermore, parental education initiatives should focus on strategies to protect children from obesogenic environments and unhealthy food choices. Local authorities, especially municipalities, can encourage children to engage in physical activity by increasing the number and accessibility of play and sports areas within their residential environments.

Additionally, schools can promote physical activity through the organization of extracurricular activities such as physical education, nature walks, and fine arts, alongside providing professional development opportunities for teachers to support these initiatives.

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References

Ali, T., & Ali, J. (2020). Factors affecting the consumers' willingness to pay for health and wellness food products. *Journal of Agriculture and Food Research*, *2*(100076), 100076. https://doi.org/10.1016/j.jafr.2020.100076 [Crossref] [Google Scholar] [Publisher]

Alphan, E., Keskin, Y., & Tatlı, F. (2002). Özel Okul ve Devlet Okulunda Öğrenim Gören Adolesan Dönemindeki Çocukların Beslenme Alışkanlıklarının Karşılaştırılması/ Comparison of Nutritional Habits of Adolescent Children Studying in Private and Public Schools. Beslenme ve Diyet Dergisi. *Journal of Nutrition and Diet*, *31*(1), 9–17 [Google Scholar] [Publisher]

Avci, Y. (2016). Personal Health Responsibility. *TAF Preventive Medicine Bulletin*, *15*(3), 259. https://doi.org/10.5455/pmb.1-1445494881 [Crossref] [Google Scholar] [Publisher]

Birch, L. L., & Anzman, S. L. (2010). Learning to eat in an obesogenic environment: A developmental systems perspective on childhood obesity: Learning to eat. *Child Development Perspectives*, *4*(2), 138–143. https://doi.org/10.1111/j.1750-8606.2010.00132.x [Crossref] [Google Scholar] [Publisher]

Chrissini, M. K., & Panagiotakos, D. B. (2021). Health literacy as a determinant of childhood and adult obesity: a systematic review. *International Journal of Adolescent Medicine and Health*, *33*(3), 9–39. https://doi.org/10.1515/ijamh-2020-0275 [Crossref] [PubMed] [Google Scholar] [Publisher]

Emiral, G. O., Aygar, H., Isiktekin, B., Göktas, S., Dagtekin, G., Arslantas, D., & Unsal, A. (2018). Health Literacy Scale-European Union-Q16: A Validity and Reliability Study in Turkey. *International Research Journal of Medical Sciences*, *6*(1), 1–7. [Crossref] [Google Scholar] [Publisher]

Ergül, Ş., & Kalkım, A. (2011). Önemli Bir Kronik Hastalık : Çocukluk ve Ergenlik Döneminde Obezite/ A major chronic disease: Obesity in childhood and adolescence. *TAF Preventive Medicine Bulletin*, *10*(2), 223–230. [Crossref] [Google Scholar] [Publisher]

Erkuran, H., & Karadeniz, H. (2019). Çocukluk Çağında Obezite/ Childhood Obesity. *Sağlık ve Toplum, 29*(3), 12–19. [Publisher] [Google Scholar]

Folkvord, F., & Hermans, R. C. J. (2020). Food marketing in an obesogenic environment: A narrative overview of the potential of healthy food promotion to children and adults. *Current Addiction Reports*, *7*(4), 431–436. https://doi.org/10.1007/s40429-020-00338-4 [Crossref] [Google Scholar] [Publisher]

Gauthier, K. I., & Krajicek, M. J. (2013). Obesogenic environment: a concept analysis and pediatric perspective: Obesogenic Environment: A Concept Analysis and Pediatric Perspective. *Journal for Specialists in Pediatric Nursing: JSPN*, *18*(3), 202–210. https://doi.org/10.1111/jspn.12027 [Crossref] [PubMed] [Google Scholar] [Publisher]

Gül, E. (2018). Yetişkin bireylerde sağlık okuryazarlığının yeme davranışı ve sağlık algısı ile ilişkisinin incelenmesi/ Examining the relationship between health literacy and eating behavior and health perception in adult individuals. *İnönü Üniversitesi Sağlık Bilimleri Enstitüsü, Elazığ*. [Google Scholar] [Publisher]

Gümüş, D., Kızıl, M., Dikmen, D., & Uyar, M. F. (2015). Gelir düzeyinin ilköğretim öğrencilerinin besin tercihlerine etkisinin değerlendirilmesi/ Evaluation of the effect of income level on primary school students' food preferences. H.Ü. *Sağlık Bilimleri Fakültesi Dergisi, 2*(1), 22–38. [Google Scholar] [Publisher]

Güneş, N. B., Alkan, I., Işık, R. A., Dağ, O., & Özcebe, H. (2024). Childhood obesity: Pathways between mothers' health literacy and behaviors and self-efficacy of eating and physical activity in their children. *Journal of Education and Research in Nursing, 21*(1), 11–19. https://doi.org/10.14744/jern.2023.83009 [Crossref] [Google Scholar] [Publisher]

Guo, F., Bostean, G., Berardi, V., Velasquez, A. J., & Robinette, J. W. (2022). Obesogenic environments and cardiovascular disease: a path analysis using US nationally representative data. *BMC Public Health*, *22*(1), 703. https://doi.org/10.1186/s12889-022-13100-4 [Crossref] [PubMed] [Google Scholar] [Publisher]

Hammond, L., Morello, O., Kucab, M., Totosy de Zepetnek, J. O., Lee, J. J., Doheny, T., & Bellissimo, N. (2022). Predictive Validity of Image-Based Motivation-to-Eat Visual Analogue Scales in Normal Weight Children and Adolescents Aged 9-14 Years. *Nutrients*, *14*(3), 636. https://doi.org/10.3390/nu14030636 [Crossref] [PubMed] [Google Scholar] [Publisher]

Hayzaran, M. (2018). Üniversite öğrencilerinin hedonik açlık durumlarının farklı ölçekler ile belirlenmesi/ Determination of hedonic hunger status of university students using different scales. Başkent Üniversitesi Sağlık Bilimleri Enstitüsü, Ankara. [Google Scholar] [Publisher]

Inal, S., & Canbulat, N. B. (2013). General overview on childhood obesity /Çocukluk Çağı Obezitesine Genel Bakış. *Guncel Pediatri*, *11*(1), 27–30. [Google Scholar] [Publisher]

İzoğlu Toka, A., & Doğan, Ö. (2021). 15-17 yaş arası ergenlerin deneyimlerinden sağlık okuryazarlığı kavramı: Nitel bir çalışma. *Turkısh Journal of Publıc Health*, *19*(1), 79–91. [Google Scholar] [Publisher]

Jia P. (2021). Obesogenic environment and childhood obesity. *Obesity Reviews: An Official Journal of the International Association for the Study of Obesity*, *22 Suppl 1*, e13158. https://doi.org/10.1111/obr.13158 [Crossref] [PubMed] [Google Scholar] [Publisher]

Kaczynski, A. T., Eberth, J. M., Stowe, E. W., Wende, M. E., Liese, A. D., McLain, A. C., Breneman, C. B., & Josey, M. J. (2020). Development of a national childhood obesogenic environment index in the United States: differences by region and rurality. *The international journal of behavioral nutrition and physical activity*, *17*(1), 83. https://doi.org/10.1186/s12966-

020-00984-x [Crossref] [PubMed] [Google Scholar] [Publisher]

Kansra, A. R., Lakkunarajah, S., & Jay, M. S. (2020). Childhood and adolescent obesity: A review. *Frontiers in Pediatrics*, *8*, 581461. https://doi.org/10.3389/fped.2020.581461 [Crossref] [PubMed] [Google Scholar] [Publisher]

Karamelikli, E. (2021). Karabük İlindeki Ortaöğretim Öğrencilerinin Obezojenik Çevre Yönünden Değerlendirilmesi/ Evaluation of Secondary School Students in Karabük Province in Terms of Obesogenic Environment. Istanbul University Institute of Health Sciences, İstanbul-Turkiye. [Google Scholar] [Publisher]

Koçakoğlu, M. G., & Altunsu Sönmez, Özlem. (2025). The Impact of Parental Attitudes on Academic Performance and Obesity of Elementary School Students. *Pegem Journal of Education and Instruction*, *15*(2), 83–94. https://doi.org/10.47750/pegegog.15.02.09 [Google Scholar] [Publisher]

Kocalar, A. C. (2020). Rekreasyon/Rekreaktif-Oyun-Spor Alanlarının (ROSA) Kentsel Tasarımı ve Planlanması (Uygulama Örnekleri). *İDEALKENT*, *11*(31), 2054–2083. https://doi.org/10.31198/idealkent.613331 [Crossref] [Google Scholar] [Publisher]

Lister, N. B., Baur, L. A., Felix, J. F., Hill, A. J., Marcus, C., Reinehr, T., Summerbell, C., & Wabitsch, M. (2023). Child and adolescent obesity. *Nature Reviews. Disease Primers*, *9*(1), 24. https://doi.org/10.1038/s41572-023-00435-4 [Crossref] [PubMed] [Google Scholar] [Publisher]

MEB. (2016). Okul Sağlığı Hizmetleri İşbirliği Protokolü: Okulda Sağlığın Korunması ve Geliştirilmesi Programı Uygulama Kılavuzu/ School Health Services Cooperation Protocol: School Health Protection and Promotion Program Implementation Guide. Milli Eğitim Bakanlığı. [Publisher]

Mei, K., Huang, H., Xia, F., Hong, A., Chen, X., Zhang, C., Qiu, G., Chen, G., Wang, Z., Wang, C., Yang, B., Xiao, Q., & Jia, P. (2021). State-of-the-art of measures of the obesogenic environment for children. *Obesity Reviews: An Official Journal of the International Association for the Study of Obesity*, *22 Suppl 1*(S1), e13093. https://doi.org/10.1111/obr.13093 [Crossref] [PubMed] [Google Scholar] [Publisher]

Ng, M., Fleming, T., Robinson, M., Thomson, B., Graetz, N., Margono, C., Mullany, E. C., Biryukov, S., Abbafati, C., Abera, S. F., Abraham, J. P., Abu-Rmeileh, N. M. E., Achoki, T., AlBuhairan, F. S., Alemu, Z. A., Alfonso, R., Ali, M. K., Ali, R., Guzman, N. A., … Gakidou, E. (2014). Global, regional, and national prevalence of overweight and obesity in children and adults during 1980-2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet*, *384*(9945), 766–781. https://doi.org/10.1016/S0140-6736(14)60460-8 [Crossref] [PubMed] [Google Scholar] [Publisher]

Nogueira-de-Almeida, C. A., Weffort, V. R. S., Ued, F. da V., Ferraz, I. S., Contini, A. A., Martinez, E. Z., & Ciampo, L. A. D. (2024). What causes obesity in children and adolescents? *Jornal de Pediatria*, *100 Suppl 1*, S48–S56. https://doi.org/10.1016/j.jped.2023.09.011 [Crossref] [PubMed] [Google Scholar] [Publisher]

Nutbeam, D. (2000). Health literacy as a public health goal: a challenge for contemporary health education and communication strategies into the 21st century. *Health Promotion International*, *15*(3), 259–267. https://doi.org/10.1093/heapro/15.3.259 [Crossref] [Google Scholar] [Publisher]

Özilbey, P., & Ergör, G. (2015). İzmir İli Güzelbahçe İlçesi'nde ilköğretim öğrencilerinde obezite prevalansı ve beslenme alışkanlıklarının belirlenmesi. *Turkish Journal of Public Health*, *13*(1), 30. https://doi.org/10.20518/thsd.45885 [Crossref] [Google Scholar] [Publisher]

Pazarcikci, F., Ağrali, H., & Aydinli, A. (2022). Annelerin Dijital Ebeveynlik Farkındalığının Sağlık Okuryazarlığı ve Çeşitli Değişkenler ile İlişkisi. *Bağımlılık Dergisi*, *23*(3), 292–301. https://doi.org/10.51982/bagimli.1004480 [Crossref] [Google Scholar] [Publisher]

Pekcan, G., & Beğenmez, N. (1988). Ergenlik çağı gençlerin beslenmesine annenin çalışma durumunun etkisi/ The effect of the mother's working status on the nutrition of adolescents. *Beslenme ve Diyet Dergisi*, *17*(1), 59–66. [Google Scholar] [Publisher]

Rashad H. World Health Organization. (2016). Report of The Commission on Ending Childhood Obesity. WHO Document Production Services. Retrieved from https://iris.who.int/bitstream/handle/10665/204176/9789241510066_eng.pdf?sequence=1&isAllowed=y [[Google Scholar] [Publisher]

Safeer, R. S., & Keenan, J. (2005). Health literacy: the gap between physicians and patients. *American Family Physician*, *72*(3), 463–468. [PubMed] [Google Scholar] [Publisher]

Sağlık İstatistikleri Yıllığı 2021/ Health Statistics Yearbook 2021. (2023). *Sağlık Bilgi Sistemleri Genel Müdürlüğü*. [Google Scholar] [Publisher]

Sarıalioğlu, A., Küçükoğlu, S., Aytekin Özdemir, A., Köse, S., & Çelebioğlu, A. (2021). The effect of obesogenic environment and Socio-demographic characteristics on obesity awareness levels of children. *Güncel Pediatri*, *19*(3), 292–302. https://doi.org/10.4274/jcp.2021.34603 [Crossref] [Google Scholar] [Publisher]

Savcı, R. G., & Yalçın, S. S. (2025). Maternal perception and childhood overweight: Examining parenting styles and eating behaviors among preschoolers: A cross-sectional study from Samsun, Türkiye. *Nutrients*, *17*(1), 195. https://doi.org/10.3390/nu17010195 [Crossref] [PubMed] [Google Scholar] [Publisher]

Scaglioni, S., De Cosmi, V., Ciappolino, V., Parazzini, F., Brambilla, P., & Agostoni, C. (2018). Factors influencing children's eating behaviours. *Nutrients*, *10*(6). https://doi.org/10.3390/nu10060706 [Crossref] [PubMed] [Google Scholar] [Publisher]

Seremet Kürklü, N., & Özel, HG (2015). Determination of Nutritional Status and Obesity Prevalence of Secondary School Students with Different Socioeconomic Levels. *Journal of Nutrition and Diet*, *43* (2), 100–110. [Google Scholar] [Publisher]

Severcan, Y. (2015). Rekreasyon Alanları ve çocuk güvenliği/ Recreation Areas and child safety. *ODTÜ Mimarlık Fakültesi, Şehir ve Bölge Planlama Bölümü*. [Google Scholar] [Publisher]

Smith, R., Kelly, B., Yeatman, H., & Boyland, E. (2019). Food marketing influences children's attitudes, preferences and consumption: A systematic critical review. *Nutrients*, *11*(4), 875. https://doi.org/10.3390/nu11040875 [Crossref] [PubMed] [Google Scholar] [Publisher]

Sonneville, K. R., Rifas-Shiman, S. L., Kleinman, K. P., Gortmaker, S. L., Gillman, M. W., & Taveras, E. M. (2012). Associations of obesogenic behaviors in mothers and obese children participating in a randomized trial. *Obesity (Silver Spring, Md.)*, *20*(7), 1449–1454. https://doi.org/10.1038/oby.2012.43 [Crossref] [PubMed] [Google Scholar] [Publisher]

Sørensen, K., Van den Broucke, S., Pelikan, J. M., Fullam, J., Doyle, G., Slonska, Z., Kondilis, B., Stoffels, V., Osborne, R. H., Brand, H., & HLS-EU Consortium. (2013). Measuring health literacy in populations: illuminating the design and development process of the European Health Literacy Survey Questionnaire (HLS-EU-Q). *BMC Public Health*, *13*(1), 948. https://doi.org/10.1186/1471-2458-13-948 [Crossref] [PubMed] [Google Scholar] [Publisher]

Speirs, K. E., Messina, L. A., Munger, A. L., & Grutzmacher, S. K. (2012). Health literacy and nutrition behaviors among low-income adults. *Journal of Health Care for the Poor and Underserved*, *23*(3), 1082–1091. https://doi.org/10.1353/hpu.2012.0113 [Crossref] [PubMed] [Google Scholar] [Publisher]

Stubbs, R. J., Hughes, D. A., Johnstone, A. M., Rowley, E., Reid, C., Elia, M., Stratton, R., Delargy, H., King, N., & Blundell, J. E. (2000). The use of visual analogue scales to assess motivation to eat in human subjects: a review of their reliability and validity with an evaluation of new hand-held computerized systems for temporal tracking of appetite ratings. *The British Journal of Nutrition*, *84*(4), 405–415. https://doi.org/10.1017/s0007114500001719 [Crossref] [PubMed] [Google Scholar] [Publisher]

Tanrıöver, M., Yıldırım, H. H., Ready, F. N., Çakır, B., & Akalın, H. E. (2014). Sağlık okuryazarlığı çalışmaları: Sınırlı sağlık okuryazarlığının prevalansı ve sonuçları. Türkiye Sağlık Okuryazarlığı Araştırması/Health Literacy Studies: Prevalence and Consequences of Limited Health Literacy. Türkiye Health Literacy Research. Sağlık-Sen Yayınları. [Google Scholar] [Publisher]

Taş, T. A., & Akış, N. (2016). Sağlık Okuryazarlığı/ Health Literacy. Sürekli Tıp Eğitimi Dergisi, 25(3), 119–124. [Google Scholar] [Publisher]

Tsochantaridou, A., Sergentanis, T. N., Grammatikopoulou, M. G., Merakou, K., Vassilakou, T., & Kornarou, E. (2023). Food advertisement and dietary choices in adolescents: An overview of recent studies. *Children (Basel, Switzerland)*, *10*(3). https://doi.org/10.3390/children10030442 [Crossref] [PubMed] [Google Scholar] [Publisher]

Vos, M., Deforche, B., Van Kerckhove, A., Michels, N., Poelman, M., Geuens, M., & Van Lippevelde, W. (2022). Determinants of healthy and sustainable food choices in parents with a higher and lower socioeconomic status: A qualitative study. *Appetite*, *178*(106180), 106180. https://doi.org/10.1016/j.appet.2022.106180 [Crossref] [PubMed] [Google Scholar] [Publisher]

World Health Organization. (2023). *Obesity and overweight* [Fact sheet]. https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight [Publisher]

World Health Organization. (2022). *World report on the health of refugees and migrants*. World Health Organization. https://iris.who.int/bitstream/handle/10

665/353747/9789289057738-eng.pdf [Google Scholar] [Publisher]

Yayan, E. H., & Çelebioğlu, A. (2018). Effect of an obesogenic environment and health behaviour-related social support on body mass index and body image of adolescents. *Global Health Promotion*, *25*(3), 33–42. https://doi.org/10.1177/1757975916675125 [Crossref] [PubMed] [Google Scholar] [Publisher]

Yıldırım, F., & Keser, D. A. (2015). Sağlık Okuryazarlığı/ Health Literacy (Yayın no:3). Ankara Üniversitesi Basımevi. [Publisher]