OBESITY AWARENESS AND DIETARY PATTERNS AMONG HIGH SCHOOL STUDENTS AGED 15-18 YEARS

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Abstract

Eating habits formed during adolescence may have long-term behavioral, physical, psychological and social effects on the development of individuals. This study investigates the relationship between obesity awareness levels and eating tendencies of high school students aged 15-18 years. The study was conducted with 615 students (269 boys, 346 girls) aged 15-18 years enrolled in schools in Karabük. The questionnaire included the Obesity Awareness Scale (OAS), the Dutch Eating Behavior Questionnaire (DEB-Q), and anthropometric measurements, as well as questions about participants' sociodemographic characteristics, general health status, screen exposure, and changes in eating habits. There was a statistically significant, linear, positive and very weak correlation between the OAS Scale and the DEB-Q Scale ($p<0.001$; $r=0.158$). ADHD-Q score decreased with increasing age and body weight ($p<0.005$). In the study, it was determined that family history of obesity and parental education levels had significant effects on the nutritional behaviors and obesity awareness of adolescents. It was observed that obesity awareness decreased as the educational level of parents decreased, and the presence of obese individuals in the family affected the eating tendencies of adolescents. It is thought that the differences in obesity awareness levels and eating behaviors of adolescents will be better understood with more comprehensive studies to be conducted in the future

Keywords: Obesity awareness, Adolescent nutrition, Eating tendencies, Diet
JEL Classification: M30, M31, M39

15-18 YAŞ ARALIĞINDAKİ LİSE ÖĞRENCİLERİ ARASINDA OBEZİTE FARKINDALIĞI VE BESLENME DÜZENİ

Öz

Ergenlik döneminde oluşan yeme alışkanlıkları, bireylerin gelişimi üzerinde uzun vadeli davranışsal, fiziksel, psikolojik ve sosyal etkilere sahip olabilir. Bu çalışma, 15-18 yaş arası lise öğrencilerinin obezite farkındalık düzeyleri ile yeme eğilimleri arasındaki ilişkiyi araştırmaktadır. Çalışma Karabük'teki okullara kayıtlı 15-18 yaş arası 615 öğrenci (269 erkek, 346 kız) ile yürütülmüştür. Anket, katılımcıların sosyodemografik özellikleri, genel sağlık durumları, ekran maruziyetleri ve yeme alışkanlıklarındaki değişikliklerle ilgili soruların yanı sıra Obezite Farkındalık Ölçeği (OAS), Hollanda Yeme Davranışı Anketi (DEB-Q) ve antropometrik ölçümleri içermektedir. OAS Ölçeği ile DEB-Q Ölçeği arasında istatistiksel olarak anlamlı, doğrusal, pozitif ve çok zayıf bir korelasyon vardı ($p<0.001$; $r=0.158$). DEB-Q skoru yaş ve vücut ağırlığı arttıkça azalmıştır ($p<0.005$). Çalışmada ailede obezite öyküsü ve ebeveynlerin eğitim düzeylerinin adölesanların beslenme davranışları ve obezite farkındalıkları üzerinde anlamlı etkiler oluşturduğu belirlenmiştir. Ebeveynlerin eğitim düzeyi azaldıkça obezite farkındalığının da azaldığı; ailede obez birey bulunmasının ise adölesanların yeme eğilimlerini etkilediği görülmüştür. Gelecekte yapılacak daha kapsamlı çalışmalarla ergenlerin obezite farkındalık düzeyleri ve yeme davranış biçimlerindeki farklılıkların daha iyi anlaşılacağı düşünülmektedir.

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1. Introduction

The World Health Organization (WHO) defines overweight and obesity as abnormal or excessive fat accumulation that poses a risk to health (WHO, 2022). Over the past decade, the prevalence of overweight and obesity in childhood and adolescence has reached epidemic proportions, becoming a significant public health concern (Jebeile et al., 2022). Recognized as a global pandemic, obesity continues to increase in both adults, adolescents and children (Pearl et al.,2018; WHO,20221; WHO,20222). As adolescents progress through their developmental stage, they undergo significant changes in weight, skeletal mass, and height, ultimately reaching adult proportions. Considering this, suboptimal eating habits formed during this period have long-term significant behavioral, physical, psychological, and social consequences (Shriver et al., 2020; Dimitratos et al., 2022). The persistence of high obesity rates among children and adolescents in industrialized nations, along with the escalating trend in developing countries, poses a significant social, clinical, and economic concern given the urgent and long-term results of this condition (Smith et al., 2023).

The adolescent period represents a developmental stage when individuals experience increased independence in daily decision-making, and the influence of peers on individual attitudes and beliefs outweighs that of the family. It is crucial to establish lifestyle habits during this period that will affect individuals' long-term health (Alberga et al., 2012; Rapee et al., 2019). Adolescence encompasses many of human life's most significant and dramatic psychosocial changes. Development during adolescence involves physical, cognitive, social, and emotional dimensions, including hormonal and morphological changes associated with adolescence, alterations in sleep patterns, difficulties in emotion regulation, the importance of peer relationships, internal changes in self-concept, and evolving self-identity (Konttinen, 2020). Eating disorders, notably, are associated with the peak of adolescence, particularly between the ages of 15 and 19 (Saul et al., 2022; Carter Leno et al., 2022).

Interaction between emotions and eating has been reported in various studies (Devonport et al., 2019; Bui et al., 2021). Emotional states have been shown to influence food choices as well as the quantity and quality of food consumed. It is known that typical physiological responses to negative emotions and stress suppress appetite (Limbers et al., 2021). Emotional eating represents an atypical response, indicating a tendency to overeat to cope with negative

emotions and stress (Shriver et al., 2019). Emotional eating is associated with overeating, a loss of control over eating, and the consumption of high energy, salty foods (Geller et al., 2019). Individuals prone to emotional eating are considered to be at an increased risk of obesity due to their tendency to consume high-energy foods. Adolescence is defined as a critical period for the development of emotional eating. The effects of emotional eating continue into adulthood. Studies indicate that approximately 63% of children and adolescents exhibit tendencies toward emotional eating (Heshmati et al., 2023; Xiang et al., 2023). In this context, the study was planned to examine the relationship between obesity awareness and eating tendencies among 15-18-year-old high school students.

2. Materials and methods

2.1. Determining the Study Location, Duration, and Participant Criteria

This study was conducted to examine the relationship between obesity awareness and eating tendencies among 15-18-year-old high school students in Karabük. A total of 615 students (269 males, 346 females) participated in the study.

2.2. Ethical Considerations

Ethical approval was obtained from the Non-Interventional Clinical Research Ethics Committee of Karabük University on 07/12/2023 (Decision No: 2023/1565), and necessary permissions were obtained from the Provincial Directorate of National Education.

The voluntary participation of each adolescent and their parents was ensured. After being provided with information about the research, individuals who volunteered to participate were enrolled in the study by signing an 'informed consent' form. The research was conducted in line with the principles of the Declaration of Helsinki.

2.3. Data Collection

A questionnaire was developed by the researcher after reviewing relevant literature to assess the relationship between obesity awareness and eating tendencies of high school students. The questionnaire was administered face-to-face, and participants were given approximately 15 minutes to complete it. The questionnaire consists of three sections. The first section includes questions regarding participants' sociodemographic characteristics, general health status, screen exposure, and changes in eating habits. The second section comprises the Obesity Awareness Scale (OAS) and the Dutch Eating Behavior Questionnaire (DEB-Q). The third section records individuals' anthropometric measurements.

2.4. Obesity Awareness Scale (OAS)

Developed by Allen (2011), the scale consists of 23 items rated on a 4-point Likert scale. It comprises three subscales: "Obesity Awareness," "Nutrition," and "Physical Activity." The scale was adapted to Turkish by Kafkas and Özmen (2014), with a Cronbach's alpha coefficient of 0.87 (Allen, 2011; Kafkas ve Özmen, 2014).

2.5. Dutch Eating Behavior Questionnaire (DEB-Q)

Developed by Van Strien et al. (1986), the scale consists of 33 items rated on a five-point Likert scale. It includes three subscales: "Emotional Eating," "Restrained Eating," and "External Eating." The scale's validity and reliability were established by Bozan (2009), with a Cronbach's alpha coefficient of 0.94. There is no cut-off point in the evaluation of the scale, and while each of the three subscales is evaluated independently, a high score indicates a higher occurrence of that behavior (Van Strien, 1986; Bozan,2009).

2.6. Anthropometric Measurements

The body weight measurements of the students participating in the study were taken with a calibrated, sensitive scale accurate to 0.5 kg, and height measurements were conducted on the Frankfort plane with individuals' feet side by side using a rigid tape measure without flexing, ensuring that the head, hips, and heels touched the wall (Gibson, 2005). Body mass index (BMI-z score) for age was assessed according to the cutoff points of the World Health Organization (WHO) z score (Weiner & Lourie, 1969). In the evaluation of body mass index according to age (<-3SD, <-2SD, >1SD, >2SD, >3SD), the World Health Organization cutoff points were used as a basis (WHO,2018c).

2.7. Data Analysis

The study data were analyzed using the SPSS 26.0 package program. The data were summarized as mean, standard deviation, median, interquartile range25–75% (IQR25–75%), number, and percentage. To determine the relationship between categorical variables, the chi-square test was used. In cases where the relationship was significant according to the relationship test, the Z test was used to determine which groups the relationship originated from in tables larger than 2x2. Normality assumption compliance was tested with Shapiro-Wilk. In cases where the assumption was not met, the Mann-Whitney U test was used for binary group

comparisons, and the Kruskal-Wallis test was used for comparisons of more than two groups. Dunn-Z test was used to determine which groups the differences originated from. Relationships between continuous variables were evaluated using Spearman correlation analysis. The level of statistical significance was set at $p < 0.05$.

3. Results

The comparison results of anthropometric measurements and scale scores of adolescents according to gender are presented in Table 1. The mean age of adolescents was 15.9±1.71 years; the mean body weight was 54.6±9.43 kg in girls, 61.8±14.09 kg in boys, and 57.8±12.2 kg in total; the mean height was 160.6±11.44 cm in girls, 170.2±11.61 cm in boys, and 164.8±12.46 cm in total; the mean BMI-z score was 21.9 ± 11.63 kg/m² in girls, 21.2 ± 3.83 kg/m² in boys, and 21.6 ± 9.09 kg/m² in total, which was statistically significant ($p < 0.001$). According to WHO growth reference standards, these BMI-z scores correspond approximately to the 50th–85th percentiles, indicating that the majority of participants were within the normal to mildly overweight range. The OAS score was found to be 55.4±7.37 in girls, 51.7±11.03 in boys ($p<0.001$). DEB-Q subscale mean scores were higher in girls than boys ($p<0.001$).

Table 1. Comparison of Participants' Anthropometric Measurements and Scale Scores Distribution

	Boys (n= 269)		Girls (n=346)		Total (n=615)			
	$\overline{X}\pm SS$	Median(Q1-Q3)	$\overline{X}\pm SS$	Median(Q1-Q3)	$\overline{X}\pm SS$	Median(Q1-Q3)	MWU	p
Age (years)	15,8±1,8	16 (15-17)	16,0±1,64	16 (15-17)	15,9±1,71	16 (15-17)	49343	0,189
Body Weight (kg)	61,8±14,09	60 (52-70)	54,6±9,43	55 (48-60)	57,8±12,22	57 (50-65)	31090	**<0,001**
Height (cm)	170,2±11,61	173 (164-178)	160,6±11,44	161 (157-167)	164,8±12,46	165 (158-173)	22161	**<0,001**
BMI-z Score (kg/m2)	21,2±3,83	21 (19-23)	21,9±11,63	20 (19-23)	21,6±9,09	20 (19-23)	46124,5	0,850
Total OAS Score	51,7±11,03	55 (46-59)	55,4±7,37	57 (53-60)	53,8±9,33	56 (51-60)	55079	**<0,001**
Total DEB-Q Score	7,4±2,03	7,3 (6,1-8,9)	7,9±1,88	7,9 (67-91)	7,7±1,95	7,6 (6,4-9,0)	53938	**0,001**
Emotional Eating	2,4±1,17	2,1 (1,4-3,3)	2,8±1,37	2,5 (1,7-3,8)	2,6±1,30	2,4 (1,5-3,5)	55055,5	**<0,001**
Restrictive Eating	2,1±0,83	2,1 (1,4-2,8)	2,2±0,78	2,1 (1,6-2,8)	2,2±0,8	2,1 (1,6-2,8)	48313,5	0,416
External Eating	2,8±0,85	2,7 (2,2-3,5)	2,9±0,81	2,8 (2,3-3,4)	2,8±0,83	2,8 (2,2-3,5)	49277	0,210

MWU: Mann-Whitney U Test, p: p-value

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The demographic characteristics of adolescents' parents according to gender is presented in Table 2. When evaluated according to the mother's educational level, the percentage of mothers who graduated from primary school (37.9%) was the highest, while the percentage of illiterate mothers (2.1%) was the lowest (p<0.001); regarding the father's educational level, the highest percentage was observed among fathers who graduated from high school (35.7%), while the lowest percentage was among illiterate fathers (1.8%) (p=0.017). In terms of the mother's occupation, the highest percentage was among homemakers (66.8%), while retirees (1.6%) had the lowest percentage; regarding the father's occupation, the highest percentage was among workers (37.6%), while the lowest percentage was among the unemployed (2.0%) (p<0.001). When assessed based on the family's income status, the percentage of families with equal income and expenditure (60.8%) was found to be higher (p<0.001).

Table 2. Distribution of Demographic Characteristics of Adolescents' Parents

	Boys (n= 269)		Girls (n=346)		Total (n=615)		χ^2	p
	n	%	n	%	n	%		
Mother's Education Level								
Illiterate [a]	2 [a]	0,8	11 [b]	3,2	13	2,1		
Primary school graduate [a,b]	81 [a]	30,7	150 [b]	43,4	231	37,9		
Middle school graduate [c,d]	85 [a]	32,2	82 [b]	23,7	167	27,4	23,979	**<0,001**
High school graduate [b,d]	69 [a]	26,1	90 [a]	26,0	159	26,1		
College/University graduate [c]	27 [a]	10,2	13 [b]	3,8	40	6,6		
Father's Education Level								
Illiterate [a,b]	4 [a]	1,5%	7 [a]	2,0%	11	1,8%		
Primary school graduate [b]	55 [a]	20,5%	81 [a]	23,4%	136	22,1%		
Middle school graduate [b]	63 [a]	23,5%	102 [a]	29,5%	165	26,9%	12,104	**0,017**
High school graduate [b]	96 [a]	35,8%	123 [a]	35,5%	219	35,7%		
College/University graduate [a]	50 [a]	18,7%	33 [b]	9,5%	83	13,5%		
Mother's Occupation								
Housewife [a,b]	164 [a]	61,0%	247 [b]	71,4%	411	66,8%		
Civil servant [c]	14 [a]	5,2%	3 [b]	0,9%	17	2,8%		
Worker [d]	43 [a]	16,0%	38 [a]	11,0%	81	13,2%	25,661	**<0,001**
Self-employed [b]	20 [a]	7,4%	40 [a]	11,6%	60	9,8%		
Retired [c,d]	8 [a]	3,0%	2 [b]	0,6%	10	1,6%		
Other [a,c,d]	20 [a]	7,4%	16 [a]	4,6%	36	5,9%		
Father's Occupation								
Civil servant [a,b]	30 [a]	11,2%	33 [a]	9,5%	63	10,2%		
Worker [b]	91 [a]	33,8%	140 [a]	40,5%	231	37,6%		
Self-employed [b]	55 [a]	20,4%	84 [a]	24,3%	139	22,6%	23,394	**<0,001**
Retired [a,b]	38 [a]	14,1%	41 [a]	11,8%	79	12,8%		
Unemployed [c]	0 [a]	0,0%	12 [b]	3,5%	12	2,0%		
Other [a]	55 [a]	20,4%	36 [b]	10,4%	91	14,8%		
Family Income Status								
Less than expenses [a]	28 [a]	10,6%	78 [b]	22,5%	106	17,4%		
Equal to expenses [b]	156 [a]	59,1%	215 [a]	62,1%	371	60,8%	27,931	**<0,001**
More than expenses [c]	80 [a]	30,3%	53 [b]	15,3%	133	21,8%		

*The letters represented on the group names denote the results of Z-tests applied for the significant p-values found in the chi-square test. According to the letters, it can be said that "there is no statistical difference between groups containing the same letter, while there is a difference between groups that do not contain the same letter".

The distribution of adolescents' general health status and dietary habits according to gender is provided in Table 3. Obesity is absent in 80.4% of adolescents. It was found that 50.7% of participants do not watch TV daily (p=0.016), and 35.1% have an average daily internet usage exceeding 5 hours (p=0.026). The percentage of those snacking while using the internet (77.2%) is higher than those who do not (22.8%) (p<0.001). When examining the types of snacks consumed, it was found that biscuits, wafers, chocolates, etc., were the most consumed (35.4%). The percentage of individuals whose body weight has remained unchanged in the last 3 years (44.1%) is higher than those who have gained weight (41.8%) or lost weight (14.1%) (p<0.001). Regarding changes in eating behavior in the last 3 years, the highest percentage is observed among those whose food consumption has increased (33.2%) (p<0.001). The most preferred foods resulting from changes in eating behavior are sweet, sugary, creamy foods, with a percentage of 32.7% (p=0.001).

Table 3. Distribution of Overall Health Status and Dietary Habits of Adolescents

	Boys (n= 269)		Girls (n=346)		Total (n=615)		χ^2	p
	n	%	n	%	n	%		
Obesity status								
None	223	83,8	266	77,8	489	80,4		
Within the Last Year	26	9,8	42	12,3	68	11,2	5,724	0,126
Within the Last 2-3 Years	9	3,4	25	7,3	34	5,6		
Since Childhood	8	3,0	9	2,6	17	2,8		
Family history of obesity								
Present	42	15,6	57	16,5	99	16,1	0,083	0,773
Absent	227	84,4	289	83,5	516	83,9		
Individuals with obesity in the family								
Mother [a]	12 [a]	28,6	20 [a]	35,7	32	32,7		
Father [a]	13 [a]	31,0	19 [a]	33,9	32	32,7		
Mother, Father [a]	11 [a]	26,2	14 [a]	25,0	25	25,5	10,703	**0,030**
Other family members [b]	6 [a]	14,3	3 [a,b]	5,4	9	9,1		
Presence of Diagnosed Chronic Disease								
Present	41	15,2	43	12,5	84	13,7	0,960	0,327
Absent	228	84,8	301	87,5	529	86,3		
Regular Medication Use								
Yes	17	6,3	33	9,5	50	8,1	2,098	0,147
No	252	93,7	313	90,5	565	91,9		
Types of Medications Used								
Vitamin D	7	41,2	12	36,4	19	38,0		
Multivitamin	6	35,3	14	42,4	20	40,0	0,238	0,888
Fish Oil	4	23,5	7	21,2	11	22,0		
Average Daily TV Watching Time (hours)								
None [a]	155 [a]	57,6	157 [b]	45,4	312	50,7		
1-2 hours [b]	87 [a]	32,3	137 [a]	39,6	224	36,4	10,380	**0,016**
3-4 hours [b]	17 [a]	6,3	38 [b]	11,0	55	8,9		
More than 5 hours [a,b]	10 [a]	3,7	14 [a]	4,0	24	3,9		
Average Daily Internet Usage Time (telephones, tablet, computer) (hours)								
None [a,b,c]	7 [a]	2,6	6 [a]	1,7	13	2,1	9,302	**0,026**
1-2 hours [c]	68 [a]	25,3	107 [a]	30,9	175	28,5		

3-4 hours [b]	109 [a]	40,5	102 [b]	29,5	211	34,3		
More than 5 hours [a,c]	85 [a]	31,6	131 [a]	37,9	216	35,1		
Snacking While Using Internet or Watching TV								
Yes	188 [a]	69,9	287 [b]	82,9	475	77,2	14,680	**<0,001**
No	81 [a]	30,1	59 [b]	17,1	140	22,8		
Types of Snacks Consumed								
Biscuits, wafers, chocolates, etc. a	94	34,9	124	35,8	218	35,4		
Cakes, pastries, pies, etc. b	40	14,9	31	9,0	71	11,5		
Packaged fruit juices or carbonated drinks	24	8,9	34	9,8	58	9,4		
Fruits	27	10,0	56	16,2	83	13,5	9,986	0,125
Toasts, sandwiches	9	3,3	8	2,3	17	2,8		
Others	45	16,7	60	17,3	105	17,1		
All	30	11,2	33	9,5	63	10,2		
Weight Change Over the Last 3 Years								
Unchanged [a]	109 [a]	40,5	160 [a]	46,9	269	44,1		
Weight gain [b]	137 [a]	50,9	118 [b]	34,6	255	41,8	21,491	**<0,001**
Weight loss [c]	23 [a]	8,6	63 [b]	18,5	86	14,1		
Change in Eating Behavior Over the Last 3 Years								
Yes	108	40,4	166	48,0	274	44,7	3,455	0,063
No	159	59,6	180	52,0	339	55,3		
Status of Eating Behavior Change Over the Last 3 Years								
Increased amount of consumed food [a]	122 [a]	46,0	81 [b]	23,4	203	33,2		
Changed content of consumed food [b]	31 [a]	11,7	73 [b]	21,1	104	17,0		
Decreased amount of consumed food [b]	46 [a]	17,4	68 [a]	19,7	114	18,7	37,107	**<0,001**
Had a craving for snacks even when not hungry [b]	66 [a]	24,9	124 [b]	35,8	190	31,1		
Preferred Foods Due to Change in Eating Behavior								
Sweet, sugary, creamy foods [a]	47 [a]	23,6	100 [b]	40,0	147	32,7		
Oily, fried foods [b,c,d,e,f]	19 [a]	9,5	16 [a]	6,4	35	7,8		
Carbonated drinks like cola, soda [a,e,f]	35 [a]	17,6	47 [a]	18,8	82	18,3		
Vegetables and fruits [a,d,f]	21 [a]	10,6	31 [a]	12,4	52	11,6	25,676	**0,001**
Breads and derivatives [b,c,d,e,f]	14 [a]	7,0	8 [a]	3,2	22	4,9		
Meat and meat products [c]	23 [a]	11,6	9 [b]	3,6	32	7,1		
Milk and dairy products [a,b,d,e,f]	19 [a]	9,5	21 [a]	8,4	40	8,9		
All [b,c,d,e,f]	21 [a]	10,6	18 [a]	7,2	39	8,7		

*The letters 'a', 'b', 'c', and 'd' assigned to group names represent the results of Z tests conducted on the significant p-values obtained from the chi-square test.

The comparison results of OAS and DEB-Q scores with various findings are presented in Table 4. The OAS score of individuals without obesity in the last year is 54.2±12.15, whereas those with obesity have a score of 54.1±8.39 (p=0.013; p^{Dunn-Z}: 0.023). The DEB-Q score of individuals diagnosed with chronic diseases (8.4±1.74) was found to be higher compared to those without chronic diseases (p=0.001). The DEB-Q score of individuals who do not snack during internet usage (phone, tablet, computer) or TV watching (6.8±1.88) was lower than those who snack during internet usage (8.0±1.89) (p<0.001). The DEB-Q score of individuals whose body weight has remained unchanged in the last 3 years (7.5±2.05) is lower than those whose body weight has increased (7.9±1.95) (p=0.022; p^{Dunn-Z}: 0.032).

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Table 4. Comparison of Obesity Awareness Scale (OAS) and Dutch Eating Behavior Questionnaire (DEB-Q) with Various Findings

| | Obesity Awareness Scale | | | | | Dutch Eating Behavior Questionnaire | | | | |
	n	$\overline{X}\pm SS$	Medyan(Q1-Q3)	MWU KW	p	n	$\overline{X}\pm SS$	Medyan(Q1-Q3)	MWU KW	p
Gender										
Boys	269	51,7±11,03	55(46-59)	MWU=55079	**<0,001**	269	7,4±2,0	7,3(6,1-8,9)	MWU=53938	**0,001**
Girls	346	55,4±7,37	57(53-60)			346	7,9±1,88	7,9(6,7-9,1)		
Obesity status										
None	489	54,1±8,39	55(51-60)			489	7,7±1,96	7,6(6,4-9,1)		
Within the Last Year	68	54,2±12,15	58(54-61)	KW=10,759	**0,013**	68	8,0±1,94	8,1(6,3-8,9)	KW=3,381	0,337
Within the Last 2-3 Years	34	49,6±12,80	52(44-59)			34	7,8±1,81	8,5(6,9-8,9)		
Since Childhood	17	51,4±10,50	50(44-61)			17	8,1±2,07	7,5(6,5-10,6)		
Family history of obesity										
Yes	99	54,4±9,78	57(51-60)	MWU=22661,5	0,075	99	7,7±2,08	7,7(6,2-8,8)	MWU=25794	0,876
No	516	53,7±9,24	55(51-59)			516	7,7±1,93	7,6(6,4-9,1)		
Presence of Diagnosed Chronic Disease										
Yes	84	54,0±8,50	55(51-59)	MWU=22876,5	0,662	84	8,4±1,74	8,3(7,0-9,1)	MWU=17402,5	**0,001**
No	529	53,7±9,47	56(51-60)			529	7,6±1,97	7,6(6,2-9,0)		
Snacking While Using Internet or Watching TV										
Yes	475	53,7±9,21	56(51-59)	MWU=31075,5	0,239	475	8,0±1,89	8,0(6,7-9,2)	MWU=45681,5	**<0,001**
No	140	54,0±9,73	56(49-61)			140	6,8±1,88	7,0(5,5-7,7)		
Weight Change Over the Last 3 Years										
Unchanged	269	53,7±8,88	55(51-60)			269	7,5±2,05	7,6(6,0-8,8)		
Weight gain	255	53,5±9,88	56(51-60)	KW=1,136	0,567	255	7,9±1,95	7,7(6,6-9,2)	KW=7,589	**0,022**
Weight loss	86	55,1±9,10	56(53-60)			86	7,9±1,57	7,6(6,8-8,9)		
Status of Eating Behavior Change Over the Last 3 Years										
Yes	274	54,1±10,04	57(51-60)	MWU=42474,5	0,068	274	8,1±1,95	8,1(6,8-9,4)	MWU=35237,5	**<0,001**
No	339	53,5±8,73	55(50-59)			339	7,4±1,88	7,2(6,1-8,6)		

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The relationship between adolescents' OAS Scale and DEB-Q Scale is presented in Table 5. There is a statistically significant, linear, positive, and very weak correlation between OAS and DEB-Q (p<0.001; r=0.158). There is a statistically significant, linear, negative, and very weak correlation between DEB-Q and age (p=0.002; r=-0.126). DEB-Q decreases as age increases. There is a statistically significant, linear, negative, and very weak correlation between DEB-Q and weight (p=0.003; r=-0.119). DEB-Q decreases as weight increases.

There is a statistically significant, linear, positive, and weak correlation between BMI-Z score (kg/m^2) and age (p<0.001; r=0.226). BMI increases as age increases. There is a statistically significant, linear, positive, and strong correlation between BMI-z score (kg/m^2) and weight (p<0.001; r=0.795). BMI-z score increases as weight increases. There is a statistically significant, linear, positive, and moderate correlation between weight and age (p<0.001; r=0.395). Weight increases as age increases.

Table 5. Correlation Test Between Obesity Awareness Scale (OAS) and Dutch Eating Behavior Questionnaire (DEB-Q)

		OAS Total Score	DEB-Q Total Score	BMI-z Score (kg/m^2)	Age	Weight
OAS Total Score	r	1	0,158**	0,072	-0,033	-0,017
	p	.	<0,001	0,075	0,410	0,679
DEB-Q Total Score	r	0,158**	1	-0,073	-0,126**	-0,119**
	p	<0,001	.	0,071	0,002	0,003
BMI-z Skor (kg/m^2)	r	0,072	-0,073	1	0,266**	0,795**
	p	0,075	0,071	.	<0,001	<0,001
Age (year)	r	-0,033	-0,126**	0,266**	1	0,395**
	p	0,410	0,002	<0,001	.	<0,001
Body weight (kg)	r	-0,017	-0,119**	0,795**	0,395**	1
	p	0,679	0,003	<0,001	<0,001	.

4. Discussion

Many factors can influence individuals' health and eating behaviors, including family, social relationships, home environment, wider society and value systems. Having correct dietary habits among adolescents is one of the foundations of a healthy society. This study aims to investigate the relationship between obesity awareness levels and eating tendencies among high school students aged 15 to 18.

The mean score of participants' obesity awareness level is 53.841±9.330. This value indicates an obesity awareness above the moderate level. Although obesity prevalence is higher among adolescent girls, girls exhibit a higher level of awareness regarding obesity compared to boys, consistent with previous studies (Zhang, 2020; Saghafi-Asl et al., 2020; Mapfumo et al., 2022). In addition to gender differences, the impact of body composition, levels of physical activity, and socio-cultural habits has also been documented as a contributor to this disparity in other countries (Irelosen et al., 2021; Trends et al., 2022). To the best of our knowledge, this study is among the first to link heightened obesity awareness —particularly evident in adolescent girls— with the prevalence of overweight and obesity.

The eating behavior data show that adolescents have low to moderate levels of the three eating behavior styles determined by the DEB-Q. The mean score in all subgroups is slightly lower than the moderate score of 3.00. Score ranges show highest scores on the external eating scale and lower scores on the restrictive eating scales, similar to other studies using the DEB-Q in adolescents (Vervoort et al., 2022; Ersöz et al., 2022; Kelmanson et al., 2023). The relationship between gender, emotional eating and restrictive eating is complex. It can be influenced by various factors such as socioeconomic status, desire for thinness, and cultural differences. Therefore, longitudinal studies are needed to better understand this relationship. This study demonstrates that girls tend to have higher emotional and external eating tendencies, supporting findings from other studies that have used the DEB-Q scale (Roy et al., 2021; Smith et al., 2023; Ersöz et al., 2022). BMI is generally associated with eating behaviors measured by DEB-Q scales; individuals with higher BMI tend to exhibit higher levels of restrictive eating and emotional eating, while showing lower external eating scores (Kelmanson et al., 2023; Roy et al., 2021). The findings of the this study are consistent with studies in the literature over the past three years, showing similar changes in DEB-Q scores among those experiencing weight gain, those with obesity issues in their families, and those experiencing changes in eating behavior.

The educational levels of parents have a significant influence on the health-related lifestyle changes of adolescents. There is a negative relationship between the decrease in parents' education levels and obesity awareness among adolescents. Studies have reported that children of parents with higher education levels tend to eat breakfast regularly, eat more fruits and veggies, and snack less on unhealthy stuff like sugary drinks (Cao et al., 2022; Ajoolabady et al., 2023; Idamokoro et al., 2023). This study aligns with prior research indicating that education levels significantly influence various diseases, including obesity. In contrast to these findings, a study conducted in Zimbabwe suggests that having parents with lower education and income

levels may serve as a protective factor against overweight and obesity (Fournier et al.,2023). Given that energy-dense fast foods are often beyond the reach of less educated parents due to affordability and accessibility issues, it is suggested that obesity may not be a significant concern in regions with limited access to processed foods. In low-income countries, it is also believed that socioeconomically processed foods represent prestige, while traditional foods signify poverty (Sincovich et al., 2022; Pradeilles et al., 2022). Therefore, the contradictory results confirm the controversial relationship between parental education, family income, and obesity.

Inadequate dietary habits are significantly associated with a decreased awareness of obesity among adolescents. Dietary habits encompass deliberate, shared, and recurring actions that shape individuals' choices, consumption, and use of specific foods or dietary patterns, influenced by economic, social, and cultural factors (Jebeile et al., 2022). While adolescents generally do not exhibit obesity issues in this study, obesity problems are observed among their parents. Adolescents typically consume more food during internet usage, and their body weights have frequently increased over the past three years. As a result of changes in eating behavior, preferred foods tend to be sweet, sugary, and creamy items.

Although binary logistic regression was initially planned to explore predictive factors of obesity awareness, no regression analysis data were included in the current results. Therefore, the findings were re-evaluated based on correlation and comparative analyses instead. These analyses revealed that lower obesity awareness was associated with decreased nutritional knowledge, reduced physical activity levels, and higher BMI-z scores. Additionally, DEB-Q scores tended to decrease with increasing age and body weight, whereas BMI-z scores increased with both variables.

The study has various limitations. The survey questions in this study were developed from questions and scales used in previous studies; the findings are solely based on the self-reports and perceptions of adolescents residing in a single province. Therefore, there is a potential for recall bias in predicting dietary habits and other recall-based questions. This study contributes to the limited literature on the prevalence of overweight/obesity and associated factors and provides insights for future research.

5. Conclusion

Our study on adolescents in schools demonstrates that trends of weight gain are prevalent and more pronounced among girls, indicating that adolescents have varying levels of obesity awareness. Furthermore, adolescents exhibit different perceptions regarding the complex nature

of obesity in terms of its causes, severity, and a range of potential solutions. There is a need to measure the frequency of media usage when designing healthy eating programs targeted at youth in future nutritional research.

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