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Comparison of Eating Behavior of Children with Attention Deficit Hyperactivity Disorder and Children with Normal Development

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Abstract

This study aims to compare the eating behavior of children with attention deficit hyperactivity disorder (ADHD) and normal children. In line with this purpose, the correlational survey model was used in the research. The study group consisted of children aged 7, 8, and 9 years who were diagnosed with ADHD (N=64) and with normal development (N=96). The study group was reached in Istanbul province through the institutions where children receive education. Children's ADHD symptoms were measured using the Vanderbilt Attention Deficit Hyperactivity Disorder Parent Rating Scale (Vanderbilt ADHD PRS) that was adapted into Turkish by Küçük-Doğaroğlu (2013), while their eating behavior was measured with the Children's Eating Behavior Questionnaire (CEBQ) that was adapted into Turkish by Yılmaz, Esmeray, and Erkorkmaz (2011). As the data set was not normally distributed, the Mann-Whitney U test and Kruskal-Wallis test, which are nonparametric tests, were used. The results of the study showed that children with ADHD had significantly higher scores in all subscales (food responsiveness, emotional overeating, enjoyment of food, desire to drink, satiety responsiveness, and slowness in eating) except emotional under-eating and food fussiness than children with normal development. Examining the children with ADHD, females were found to have significantly higher scores in the emotional overeating subscale than males, while males were found to have significantly higher scores in the hyperactivity subscale than females. No difference was found in ADHD symptoms by age.

Keywords

Attention deficit hyperactivity

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Introduction

Being characterized by a table of the main symptoms of excessive activity, weak impulse control, and difficulty paying attention, attention deficit hyperactivity disorder (ADHD) is seen as one of the problems in children, the symptoms of which mostly appear in the preschool period and become more evident with the expectation of following the rules in school (Polanczyk, Willcutt, Salum, Kieling, & Rohde, 2014). ADHD is one of the most common neurodevelopmental disorders in childhood with an average of 5% incidence in school-age children (Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007).

In DSM 5 (Diagnostic and Statistical Manual of Mental Disorders), three major types of ADHD were defined as follows: inattentive and distractible type, impulsive/hyperactive type, and combined type. In the inattentive and distractible type children in this group have the problem of concentrating and maintaining attention on any object or situation. In this group, children are reported to be more introverted, brood often and do not disturb others around themselves. As the children's movement was not dominant, it was reported that this was mostly recognized at the beginning of academic life, that is during primary education (Ergül, 2010; Kaplan & Sadock, 2004). In the impulsive/hyperactive type children are reported to be in constant motion (as if they have a motor inside them), have difficulty remaining in their seat, interrupt people, talk excessively, and shift from one task to another without bringing any to completion. Mostly because of their excessive movements and impulsive behaviors, in generals, this group was stated to be diagnosed in the preschool period. In the combined type children show the characteristics of both groups. This group was also mostly identified in the preschool period (Tahiroğlu & Avcı, 2005).

Studies on the causes of ADHD have reported that genetic susceptibility is important factor (Spodak & Stefano, 2014). In terms of comparing genders, studies report 4-8 times more prevalence among boys than girls. The findings in Turkey are similar to those in the general literature (Ercan et al., 2008; Görker, Korkmazlar, Durukan, & Aydoğdu, 2004). On the other hand, some researchers note that this rate drops to about 2/1 in adulthood (Cuffe, Moore, & McKeown, 2005).

The major symptoms ADHD (hyperactivity, impulsivity, attention deficit) were reported to differ between genders. Symptoms of hyperactivity-impulsivity were stated to be more characteristic in males, while attention deficit symptomps were more characteristic in females (Ramtekkar, Reiersen, Todorov, & Todd, 2010). The lifelong course of ADHD symptoms is another topic examined. Longitudinal studies revealed that ADHD symptoms in childhood continue in 60-70% of adults (Barkley, Fisher, Smallish, & Fletcher, 2002; Burke, Rowe, & Boylan, 2014).

It was reported that many diseases coexist with ADHD. A comprehensive review condected by Bulut (2007) stated that children with ADHD have a wide range of other problems, ranging from school life to the organizing of daily life, friendship relationships to mental problems, and even harming animals. The comorbidity in ADHD was reported as 50%. Some researchers suggested that this rate was above 70% (Eigenmann & Haenggeli, 2004). The most common other problems were learning disorders, sleep problems, eating disorders, substance use, depression, addiction, anxiety, and personality disorders (Boyacı, 2019; Corbisiero, Stieglitz, Retz, & Rosler, 2013; Lin, Yang, & Gau, 2015; Toros & Tataroğlu, 2002).

Considering ADHD literature, recent studies, showed that efforts are ongoing to examine to relationship relationship between ADHD and eating disorders. The eating disorder is thought to be one of the new comorbidities in ADHD (Cortese et al., 2016). Eating disorders were reported to be more common in children with ADHD than the normal population (Swanson, Crow, Le Grange, Swendsen, & Merikangas, 2011). Besides, several studies conducted with large groups revealed a relationship between ADHD and various eating disorders. It was reported that there is a relationship between the symptoms of ADHD in childhood and bulimia (Mikami et al., 2010), and between the symptoms of ADHD in adolescence and binge eating, and between bulimia and obesity (Bleck, DeBate, & Olivarda, 2015; Mikami, Hinshaw, Patterson, & Chang, 2008). In another study, the prevalence of eating disorders

in female children with ADHD was found to be six times higher than that in female children without ADHD (Biederman et al., 2007). Clinical studies revealed that 20-24% of adult patients with bulimia nervosa showed ADHD symptoms in their childhood (Seitz et al., 2013; Yılmaz, Kaplan, Zai, & Kennedy, 2011). In a study carried out with children showing signs of obesity (Agranat-Meged et al., 2005), school-age children who showed signs of obesity and applied to the hospital were matched with their peers who did not show such signs. Both groups were examined for ADHD symptoms, afterward, the rate of ADHD was found to be 57.7% in children admitted to the hospital with the complaint of obesity, and this rate was significantly higher than that in the control group.

A study conducted by Kim et al. (2014) with more than 10,000 primary school children in South Korea found a relationship between ADHD and overeating behavior. Apart from this study carried out with a large number of groups, the findings of other researchers (Davis, Levitan, Smith, Tweed, & Curtis, 2006; Strimas et al., 2008) also support a positive relationship between ADHD and the overeating disorder. In their cross-sectional study carried out with 62.887 children (age 5-17 years), Waring and Lapane (2008) stated that children with ADHD who do not use drugs have 1.5 times higher weight values than normal children.

Explanations on the causality of the relationship between ADHD and eating disorder focus mostly on low control and impulsivity in ADHD. The researchers reported that low control in ADHD explains the binge-eating disorder (Alfonsson, Parling, & Ghaderi, 2012; Reinblatt et al., 2015). Similarly, it was reported that impulsivity was related to obesity, and the behavior of going off a diet frequently and maintaining an unhealthy diet (Jasinska et al., 2012; Meule, 2013; Nederkoorn, Braet, Van Eijs, Tanghe, & Jansen, 2006). Weak organizing skills in ADHD were thought to be risk factors for the development of overeating (Agranat-Meged et al., 2005). The research results show that individuals with ADHD were included in the risk profile group for eating disorders (Patte et al., 2016). A relationship between ADHD and overeating was found; however, hyperactivity, which is one of the symptoms of ADHD, was reported to protect individuals from obesity; therefore, it was stated that some individuals with ADHD were of normal weight in their childhood (Cortese et al., 2016; Fairburn & Cooper, 1982).

Comparing individuals with ADHD by gender among themselves, it was seen that there was not only one conclusion. When they examined children who show signs of obesity among themselves, Agranat-Meged et al. (2005) reported that males with ADHD symptoms were significantly higher than females. Nederkoorn, Smulders, Havermans, Roefs, & Jansen (2006), on the other hand, reported that females showed more symptoms of eating disorders than males.

Investigating early-period studies on people with ADHD in the risk group for preventive measures against eating disorders and obesity is important (Agranat-Meged et al., 2005). While symptoms of ADHD appear in early childhood, symptoms of eating disorders appear mostly in adolescence or in adulthood (Kaplan, Howlett, Yilmaz, & Levitan, 2009). Although eating disorders appear as an illness at an advanced age, it is possible to see the first symptoms at an early age. However, as possibly more dominant problems such as those in school society, and behavior, were focused on in individuals with ADHD, it can be thought that this issue was less examined and fewer complaints were made by families.

A large number of relationship findings between ADHD and eating disorders in the literature make early research necessary. Therefore, it is important to investigate whether a relationship exists between ADHD and eating disorders in a group of children with ADHD and in children with normal development in Turkey. In addition, if there is a relationship between ADHD and eating disorders, determining the variables that play a role in this relationship is important in determining which children with ADHD are in the risk group for eating disorders. Understanding this relationship at an early age

may be a guide for the treatments to be developed in preventing obesity problems that will arise in the following years. This study aims to examine the eating behaviors of children with ADHD and children with normal development. For this purpose, answers to the following problems were sought.

1. Do the "Vanderbilt ADHD Scale" scores of children with ADHD and children with normal development differ significantly?
2. Do the "CEBQ" scores of children with ADHD and children normal development differ significantly?
3. Do the "CEBQ" and "Vanderbilt ADHD Scale" scores of children with ADHD differ significantly by gender?
4. Do the "CEBQ" and "Vanderbilt ADHD Scale" scores of children with ADHD differ significantly by age?

Research Assumptions and Limitations

The assumptions of this research are as follows: the participants of the research answered the items of the scales honestly. Children with ADHD were diagnosed correctly by physicians or the medical board.

The limitations of the research are as follows: the results of the study were limited with measuring tools and 160 children aged 7, 8, and 9 years, whose data were collected in Istanbul. Therefore, the results obtained in the study can be associated with the scales used, the age group, and the province of Istanbul.

Method

Research Model

This research is a correlational survey model, one of the general survey models. As the research aims to determine the current situation, it is a correlational survey model, one of the screening models. Screening models are research approaches that describe the situations that existed in the past or still exist. The thing, individual or object of the research is defined in their own conditions and as they are. No effort is made to change or influence them in any way (Karasar, 1995). In this study, on the other hand, we tried to determine the eating behaviors of children with ADHD and children with normal development. In this aspect, this study was designed as a descriptive and situation determinative research.

Study Group

While creating the study group for this research, which comparatively examines children with ADHD and children with normal development, a convenient sampling method, one of the improbable sampling types, was preferred. In the convenience sampling method, the convenience and willingness of the participants for the study are taken into consideration (Creswell, 2012). In this study, counseling centers where children with ADHD, who agreed to participate in the study, attend, and a school where normal children attend were selected as working groups.

The study group consisted of children diagnosed with ADHD (N=66) who participated in the study voluntarily and attended different educational centers in the European side of Istanbul province, and children with normal development (N=94) who attended a private primary school in the European side of Istanbul province. In line with the purpose of the study, especially young children were included in the research. As the literature findings show, the final diagnosis in ADHD has been established around the age of 7 years at the earliest; therefore, data were collected starting from the age of 7 as the lowest age group. Although there are children in the younger age group, as a certain number could not be reached in that age group, children in the younger age group were excluded from the study. Table 1 shows the demographic features of the study group.

Table 1. Demographic Features of the Study Group

Variable	Category	N	%
Diagnosis Status	DEHB	66	41.2
	Normal	94	58.8
Gender Distribution of Children with ADHD	Male	13	19.7
	Female	53	80.3
Gender Distribution of Children with Normal	Male	64	68.1
Development	Female	30	31.9
Age Distribution of Children with ADHD	7 years	23	34.8
	8 years	21	31.8
	9 years	22	33.3
Age Distribution of Children with Normal	7 years	39	41.5
Development	8 years	26	27.7
	9 years	29	30.9
Drug Usage in ADHD	User	12	7.5
	Non-user	54	92.5
Age Distribution of Mothers	25-28	25	15.6
	29-32	39	24.4
	33-36	45	28.1
	37-40	27	16.9
	41+	24	15.0
Age Distribution of Fathers	25-28	3	1.9
	29-32	28	17.5
	33-36	42	26.3
	37-40	56	35.0
	41+	31	19.4
Educational Status of Mothers	Primary	20	12.5
	Secondary	40	25.0
	High school	68	42.5
	University	32	20.0
Educational Status of Fathers	Primary	2	1.3
	Secondary	11	6.9
	High school	87	54.4
	University	60	37.5

Data Collection Tools

The Vanderbilt Attention Deficit Hyperactivity Disorder Parent Rating Scale (Vanderbilt ADHD PRS): In this study, this scale was used to measure the signs of attention deficit and hyperactivity of children. The Vanderbilt ADHD PRS was developed in 2003 by Wolraich, Lambert and Doffing to evaluate ADHD and other disorders accompanying ADHD (oppositional defiant disorder) in children aged 6-12 years, and it was adapted into Turkish by Küçük-Doğaroğlu (2013). The study included mothers of 343 children with ADHD diagnosis aged between 7 and 9 years. The study result showed that the scale has four factors as in its original form, and the Cronbach alpha coefficient of the dimensions of attention deficit, hyperactivity and impulsivity, oppositional defiant disorder, and depression and anxiety were found as .79, .95, .93, and .81, respectively. The scale consists of 52 questions in total (Küçük-Doğaroğlu, 2013). The Cronbach alpha coefficient of the Vanderbilt ADHD PRS measured for this study was .89.

The Children's Eating Behavior Questionnaire (CEBQ): This questionnaire was used to measure the eating behaviors of the children. The CEBQ, developed by Wardle et al., is a Likert-type scale that consists of 35 items and is rated over five points (1=never, 5=always). In the original study where the

scale was developed, eight subdimensional factor structures were formed during the development of the survey and the total variance explanation rates of these eight subscales were shown to be between 50% and 80%. The Cronbach alpha coefficients of the eight subscales ranged from 0.74 to 0.91. It was adapted into Turkish by Yılmaz et al. (2011). In the study conducted on 468 children, the CEBQ was evaluated by factor analysis and reliability analysis. *Eight* subscales obtained by exploratory factor analysis explained 58.2% of the total variance. The Cronbach alpha coefficients ranged between 0.61 and 0.84. The reliability coefficient of the entire scale was found to be 0.69. According to confirmatory factor analysis, the RMSEA compliance index was calculated as 0.049 (Yılmaz et al., 2011). The Cronbach alpha coefficient of CEBQ calculated for this study was .84.

Demographic Data Form: In the form developed by the researcher; there are questions on the gender of the children, the educational status and ages of the parents, the age of the children, and whether there is a drug that the children use regularly.

Data Collection Process

In this study, children diagnosed with ADHD were reached through private counseling centers where the children and families received education and counseling services. The relevant centers in the European side of Istanbul province were reached and consent was obtained first. Later, the families in the permitting institutions were reached and the children of families who voluntarily accepted to participate in the study were included in the study. The inclusion criteria were the fact that children were diagnosed with ADHD by a child psychiatrist or a board of health and they had no other diagnosis (growth retardation, mental disability, autism, etc.). The children with normal development, on the other hand, were reached through a private primary school. According to the accessibility, applications were made to private schools on the European side of Istanbul province and permission was requested. Among the schools giving permission, a school in which 7- 8- and 9 years-old age groups were crowded was included in the study. In the institutions that give permission, the purpose of the research was explained briefly to the mothers who could be reached face-to-face, and those who agreed to participate in the study were given forms and the forms were re-collected. For mothers who could not be reached face to face, a letter containing the purpose of the research briefly, a consent form, and scales were sent. Missing and incorrect data in the returned forms were excluded from the process (N=17). In the study, the participants were not asked to give any information likely to reveal their identities, such as their names and surnames, and the collected were numbered and saved. The data collection process was carried out between March and May 2018. Data were collected intentionally toward the end of the academic year. The reason for this was that there were questions on academic skills in the "Performance Subtest", one of the subtests in the Vanderbilt Scale. Therefore, considering that a certain period of time should be spent in school for children to be successful, the applications were carried out in the last months of school time. No financial payments were made to institutions or families for applications.

Data Analysis

The results obtained from the scales were analyzed using the SPSS program. The Kolmogorov-Smirnov and Shapiro-Wilk tests were used to determine whether the scores obtained from the scales were distributed normally. Accordingly, it was seen that there was no normal distribution in all subtests (Food responsiveness, Emotional overeating, Enjoyment of food, Desire to drink, Satiety responsiveness, Slowness in eating, Food fussiness, Attention deficit, Hyperactivity, Oppositional defiant disorder, Depression-Anxiety, and Performance) for both tests ($p<.05$). Therefore, the Mann-Whitney U test and the Kruskal-Wallis Test (nonparametric tests) were used for statistical analysis of the research. The Mann-Whitney U test was used for intergroup differences between ADHD symptoms (with its subdimensions) and eating behavior of children (with its subdimensions) with ADHD and children with normal development, while the Kruskal-Wallis test was used for the cases where there were three or more groups; if there was a difference between these groups, the Mann-Whitney U test was used to determine between which groups the difference was. Power analysis was performed using the G * Power 3.1 program for the study group. Accordingly, 90% power was calculated for the sample group reached (t=1.69; df=150; effect size: 0.90).

Results

Table 2. Mann Whitney-U Test Results for the Vanderbilt ADHD Scale for Participants with ADHD and with Normal Development

Subscales	Status	N	Mean Rank	Total Rank	U	z	p
Attention Deficit	DEHB	66	126.70	8362.50	52.500	-10.594	.000*
	Normal	94	48.06	4517.50			
Hyperactivity	DEHB	66	126.38	8341.00	74.000	-10.515	.000*
	Normal	94	48.29	4539.00			
Oppositional Defiant Disorder	DEHB	66	126.80	8368.50	46.500	-10.612	.000*
	Normal	94	47.99	4511.50			
Depression-Anxiety	DEHB	66	124.15	8194.00	221.000	-10.015	.000*
	Normal	94	49.85	4686.00			
Performance	DEHB	66	124.56	8221.00	194.000	-10.095	.000*
	Normal	94	49.85	4686.00			

**p<.05*

As seen in Table 2, the mean ranks of the children's score obtained from the Vanderbilt ADHD scale by the variable of whether they were diagnosed with ADHD differ significantly in the subtests of attention deficit (U= 52,500 p<.05), hyperactivity (U = 74.000 p <.05), oppositional defiant disorder (U = 46.500 p <.05), depression-anxiety (U = 221.000 p <.05), and performance (U = 19.000 p <.05). It was found that children with ADHD had higher scores in all subscales than children with normal development.

Table 3. Mann Whitney-U Test Results for ADHD Scores of Participants with ADHD and with Normal Development

Subscales	Status	N	Mean Rank	Total Rank	U	z	p
Food Responsiveness	DEHB	66	126.13	8324.50	90.500	-10.461	.000*
	Normal	94	48.46	4555.50			
Emotional Overeating	DEHB	66	104.03	6866.00	1549.000	-5.410	.000*
	Normal	94	63.98	6014.00			
Enjoyment of Food	DEHB	66	124.47	8215.00	200.000	-10.083	.000*
	Normal	94	49.63	4665.00			
Desire to Drink	DEHB	66	11758	7760.50	654.500	-8.548	.000*
	Normal	94	54.46	5119.50			
Satiety Responsiveness	DEHB	66	126.33	8338.00	77.000	-10.549	.000*
	Normal	94	48.32	4542.00			
Slowness in Eating	DEHB	66	100.42	6628.00	1787.000	-4.600	.000*
	Normal	94	66.51	6252.00			
Emotional Undereating	DEHB	66	83.42	5506.00	2909.000	-.674	.501
	Normal	94	78.45	7374.00			
Food Fussiness	DEHB	66	84.84	5599.50	2815.500	-1.001	.317
	Normal	94	77.45	7280.50			

**p<.05*

As seen in Table 3, according to the ADHD diagnosis status, a significant difference was found between the mean rank scores from food responsiveness (U: 90.500, *p<.05)*, emotional overeating (U: 1549.000, p<.05), enjoyment of food (U: 200.000, p<.05), desire to drink (U: 654.500, p<.05), satiety responsiveness (U: 77.000, p<.05), and slowness in eating (U: 1787.000, p<.05) subscales of the CEBQ scale. Considering the mean ranks, it was seen that children with ADHD had higher mean ranks than children with normal development in all subtests. There was no significant difference between the participants' emotional under-eating (U: 2909.000, p<.05) and food fussiness (U: 2815.500, p<.05) scores.

Table 4. Mann-Whitney U Tests of Children with ADHD for CEBQ and Vanderbilt Scores According to Gender Variable

	Gender	N	Mean Rank	Total Rank	U	z	p
CEBQ							
Food Responsiveness	Female	13	31.77	413.00	322.000	-.365	.715
	Male	53	33.92	1798.00			
Emotional Overeating	Female	13	50.46	656.00	124.000	-3.564	.000*
	Male	53	29.34	1555.00			
Enjoyment of Food	Female	13	39.81	517.50	262.500	-1.329	.184
	Male	53	31.95	1693.50			
Desire to Drink	Female	13	27.77	361.00	270.000	-1.216	.224
	Male	53	34.91	1850.00			
Satiety Responsiveness	Female	13	35.08	456.00	324.000	-.331	.740
	Male	53	33.11	1755,00			
Slowness in Eating	Female	13	30.12	391.50	300.500	-.714	.475
	Male	53	34.33	1819.50			
Emotional Undereating	Female	13	26.50	344.50	253.500	-1.476	.140
	Male	53	35.22	1866.50			
Food Fussiness	Female	13	35.00	455.00	325.000	-.317	.752
	Male	53	33.13	1756.00			
Vanderbilt Scale							
Attention Deficit	Female	13	35.77	465.00	315.000	-.478	.633
	Male	53	32.94	1746.00			
Hyperactivity	Female	13	23.69	308.00	217.000	-2.065	.039*
	Male	53	35.91	1903.00			
Oppositional Defiant Disorder	Female	13	31.35	407.50	316.500	-.452	.651
	Male	53	34.03	1803.50			
Depression-Anxiety	Female	13	32.15	418.00	327.000	-.285	.776
	Male	53	33.83	1793.00			
Performance	Female	13	31.85	414.00	323.000	-.348	.728
	Male	53	33.91	1797.00			

*$p<.05$

Table 4 shows the scores of the children with ADHD on the CEBQ and Vanderbilt scales according to the gender variable. Accordingly, a significant difference was determined in the mean ranks of the emotional overeating (U:124,000, p<.05) subtest scores on the CEBQ scale, and in the hyperactivity (U:217,000, p<.05) subtest of the Vanderbilt scale. Females were found to have higher emotional overeating scores in the emotional overeating subtest than males, while males were found to have higher hyperactivity scores in the hyperactivity subtest. On the other hand, there was no significant difference in terms of mean ranks of CEBQ subtests including food responsiveness (U:322,000, p>.05), enjoyment in food (U: 262,500, p>.05), desire to drink (U: 270,000, p>.05), satiety responsiveness (U: 324,000, p>.05), slowness in eating (U: 300,500, p>.05), emotional undereating (U: 253,500, p>.05), food fussiness (U: 235,000, p>.05), and in terms of mean ranks of Vanderbilt scale sub-tests including attention deficit (U: 315,000. p>.05), oppositional defiant disorder (U: 316,500, p>.05), depression-anxiety (U: 327,000, p>.05), and performance (U: 323,000, p>.05).

Table 5. The Kruskal-Wallis H Test Results for the CEBQ and Vanderbilt Scores According to the Age Variable of Children with ADHD

	Age	N	Mean Rank	X^2	sd	p
CEBQ						
Food Responsiveness	7 years	23	31.57	1.292	2	.524
	8 years	21	31.67			
	9 years	22	37.27			
Emotional Overeating	7 years	23	34.63	3.073	2	.215
	8 years	21	27.76			
	9 years	22	37.80			
Enjoyment of Food	7 years	23	35.39	4.128	2	.127
	8 years	21	26.69			
	9 years	22	38.02			
Desire to Drink	7 years	23	33.26	7.764	2	.021*
	8 years	21	25.38			
	9 years	22	41.50			
Satiety Responsiveness	7 years	23	38.11	2.510	2	.285
	8 years	21	29.00			
	9 years	22	32.98			
Slowness in Eating	7 years	23	38.76	4.691	2	.096
	8 years	21	26.48			
	9 years	22	34.70			
Emotional Undereating	7 years	23	32.59	.739	2	.691
	8 years	21	36.40			
	9 years	22	31.68			
Food Fussiness	7 years	23	32.74	2.395	2	.302
	8 years	21	29.36			
	9 years	22	38.25			
Vanderbilt Scale						
Attention Deficit	7 years	23	32.74	.829	2	.661
	8 years	21	31.29			
	9 years	22	36.41			
Hyperactivity	7 years	23	31.39	.442	2	.802
	8 years	21	34.95			
	9 years	22	34.32			
Oppositional Defiant Disorder	7 years	23	28.28	2.655	2	.265
	8 years	21	35.67			
	9 years	22	36.89			
Depression-Anxiety	7 years	23	32.39	1.078	2	.583
	8 years	21	37.00			
	9 years	22	31.32			
Performance	7 years	23	36.70	1.549	2	.461
	8 years	21	29.55			
	9 years	22	33.93			

**p<.05*

Table 5 shows the scores of children with ADHD which were obtained from the CEBQ and Vanderbilt scales by the age variable. Accordingly, while there was no significant difference in the food responsiveness (x^2: 1.292, p>.05), emotional overeating (x^2:1.292, p>.05), enjoyment of food (x^2: 4.128, p>.05), satiety responsiveness (x^2: 2.510, p>.05), slowness in eating (x^2: 4.691, p>.05), emotional under-eating (x^2: .739, p>.05), and food fussiness (x^2: 2.395, p>.05) subscales of CEBQ scale; a significant

difference was found between the scores of the slowness in eating sub-scale (x^2: 4.691, p<.05). On the other hand, there was no significant difference in attention deficit (x^2: ,829, p>.05), hyperactivity (x^2: .442, p>.05), oppositional defiant disorder (x^2: 2.655, p>.05), depression-anxiety (x^2: 1.078, p>.05), and performance (x^2: 1.549, p>.05) scales, which are subscales of the Vanderbilt scale.

In terms of the slowness in eating subscale where there was a difference; Table 6 shows the results of the Mann-Whitney U test, which was performed to determine from which group the difference had arisen.

Table 6. Mann-Whitney U Test Results of Desire to Drink Subscale by the Age Variable

	Age	N	Mean Rank	Total Rank	U	Z	p
Desire to Drink	7 years	23	24.85	571.50	187.500	-1.281	.200
	8 years	21	19.93	418.50			
Desire to Drink	7 years	23	20.41	469.50	193.500	-1.375	.169
	9 years	22	25.70	565.50			
Desire to Drink	8 years	21	16.45	345.50			
	9 years	22	27.30	600.50	114.500	-2.865	.004*

**p<.05*

Table 6 shows the results of the desire to drink the subtest. Accordingly, no significant difference was found between the ages of 7 and 8 years (U: 187.500, p>.05) and between the ages of 7 and 9 years (U: 193.500, p>.05), whereas a significant difference was found between the ages of 8 and 9 years (U: 114.500, p<.05). It was seen that children aged 9 years old had higher mean rank scores in subtest of desire to drink than children aged 8 years old.

Discussion and Conclusion

In this study, the relationship between ADHD signs and eating behaviors of children with ADHD and children with normal development was investigated.

Examining the research results, ADHD scores (Vanderbilt ADHD PRS) of children diagnosed with ADHD and children with normal development differed significantly. The scale scores of children with ADHD were significantly higher than those of children with normal development. This finding shows that the diagnoses are correct.

When the results of eating behavior, which was the main purpose of the research, were examined, children with ADHD were found to have significantly higher scores than children with normal development in all subscales except for the emotional under-eating and food fussiness subscales. In other words, children with ADHD appear to be more food responsive, to emotionally overeat, to enjoy food, have the desire to drink, have satiety responsiveness, and eat slower. This finding of our research shows consistency with previous research findings. Numerous studies (Biederman et al., 2007; Bleck et al., 2015; Davis et al., 2006; Fernandez-Aranda et al., 2013; Hudson, Coit, Lalonde, & Pope, 2012; Mikami et al., 2008; Seitz et al.,2013; Strimas et al., 2008; Swanson et al., 2011; Yılmaz et al., 2017) show that there was a relationship between ADHD and eating disorders. Explanations on where this relationship originated point to low control in ADHD, impulsive behavior, emotional weakness, and weakness in behavioral regulation, and problems in organization and planning. Impulsivity, which is characterized in ADHD, is thought to play a key role in the relationship between ADHD and eating disorders and obesity (Davis, 2010). Factors such as low self-esteem, low level of control, poor organizational skills for age, forgetfulness, poor emotional regulation skills, and impulsivity, which are common in ADHD, were stated to be the underlying causes of overeating behavior (Seitz vd., 2013, Yılmaz vd., 2011, 2017). Impulsivity in ADHD leads to poor planning and also causes difficulties in

self-monitoring behavior. Executive functions of individuals who cannot self-monitor well enough and show impulsive features also deteriorate after a while; this situation leads to deviations from normal eating habits (Cortese et al., 2008). These findings in the literature explain why children with ADHD have more eating problems than children with normal development.

It can be thought that children with poor emotional regulation skills and impulsivity could not postpone their desire to eat and drink, and this situation may cause them to be food responsive and have the desire to drink. Impulsivity can be summarized as "I want it right now-immediately-quickly". Impulsive individuals respond to all kinds of stimuli that trigger them. They want the immediate realization of what they think. Because of all these symptoms, they are called "impulsive". When we think about individuals without ADHD, when thoughts about eating and drinking come to their mind during the day, their capacity to wait for the meal, to search for a suitable environment, or to stop this desire for various reasons may be higher than those without ADHD. Considering that food and beverage products are quite accessible at home, school, and outdoors, we believe that children with ADHD respond quickly to this desire or stimulus by being unable to postpone it, as a result of seeing or hearing these products, or feeling slightly hungry. Thus, impulsivity and poor emotional regulation behaviors in ADHD can lead to overeating and drinking behavior. Likewise, poor organizational skills and difficulty paying attention are thought to lead to slowness in eating. Again, it can be thought that children in this group with attention problems may make mistakes in interpreting intrinsic signals (such as hunger or thirst). It should be noted that being hyperactive can also lead to overeating and over-drinking. On the other hand, the finding of overeating behavior can be interpreted by the fact that children with ADHD failed to apply education or advice given by their parents about eating and drinking. Although they were not in the same age group, Levy (2009) stated that adult patients who had obesity problems, surgery, and symptoms of ADHD are in the same condition and do not comply with the recommendations of the doctor after surgery compared to the group who do not show symptoms of ADHD. While it was difficult to comply with medical advice even in adult patients, with ADHD, similar problems may be much higher in pediatric patients with ADHD.

In the research carried out, depression-anxiety scores in children with ADHD were higher those in than children with normal development. A relationship was said to exist between ADHD symptoms and depression and anxiety, and at the same time, depression and anxiety symptoms were risk factors for eating disorders (Kaye, Bulik, Thornton, Barbarich, & Masters, 2004; Puccio, Fuller-Tyszkiewicz, Ong, & Krug, 2016). External factors such as the breakdown of social relationships of children with ADHD, social exclusion, and problematic academic life were thought to have an effect on depression and anxiety symptoms. Depression and anxiety were also thought to affect eating behavior.

When children with ADHD are examined among themselves, in this study, we found that the male-female ratio was higher in favor of males, at approximately 2.3/1. This finding seems to be close to the results of the study with large groups carried out by Cuffe et al. (2005), in which they reported that the ADHD rate was 4.2% in males and 1.8% in females. Similarly, in the review conducted by Williamson and Johnston (2015), ADHD symptoms were reported to be very high (10/1 in some studies) in males compared to females, especially in the childhood period, but this rate decreased to approximately two times in adulthood. The fact that the rate in this study was higher in males was consistent with previous research findings. However, it was seen that the rate was not as high (10/1) as that claimed previously.

When children with ADHD are compared according to the gender variable among themselves, a significant difference was found in the hyperactivity subtest. Males obtained higher scores in the hyperactivity subtest than females. This finding is consistent with the findings of some researchers

(Fischer, Smith, & Cyders, 2008; Gaub & Carlson, 1997; Rastam et al., 2013; Seitz et al., 2013; Williamson & Johnston, 2015). One of the most important pieces of evidence of researchers who claim that biological factors play a role especially in ADHD was the difference in the incidence rates between males and females. Ramtekkar et al. (2010) state that hyperactivity-impulsivity symptoms were more characteristic in males than in females.

Another difference emerged in the emotional under-eating subdimension. It was found that females received higher emotional under-eating scores than males. The literature does not indicate a consistent result in this regard. While some researchers (Fischer et al., 2008; Rastam et al., 2013; Seitz et al., 2013) stated that eating disorders are more common in males than in females, others (Mikami et al., 2010; Surman, Randall, & Biederman, 2006) stated that females have higher symptoms of eating disorders.

When children with ADHD are compared according to the age variable (7,8, and 9 years), no significant difference was found in ADHD symptoms. Despite these results, some research studies (Yılmaz et al., 2017) indicate that hyperactivity and impulsivity decrease with age. However, in our study, such a result was not reached. It was observed that ADHD symptoms (attention deficit, hyperactivity, and impulsivity) and common complaints such as oppositional defiant disorder, depression-anxiety, and low school performance, accompanied by ADHD continued, with their full severity in the first 3 years of the academic year in particular, which is critical for the school years of children. ADHD was stated to be a lifelong permanent disorder that creates problems in academic and personal life (Bulut, 2007).

The last finding of the study revealed a difference in the eating behavior of children with ADHD only in the desire to drink subtest according to the age variable. Nine-year-old children received higher scores in the desire to drink subtest than 8-year-old children. There was no difference in all subtests except this subtest. No specific research on the desire to drink subtest was found in the literature. It is thought that this difference between the two age groups may be due to the study group.

Suggestions

Within the framework of the findings of the research, the following suggestions were made.

One of the findings of this study was the difference in eating behavior between children with ADHD and without ADHD. It was seen that the group showing ADHD symptoms was more eager to eat and drink. The place of diet in the treatment of ADHD is controversial (Pelsser, Frankena, Toorman, & Rodrigues Pereira, 2017). However, as children who show ADHD symptoms in their childhood period have more frequent adolescence and subsequent eating disorders, the fact that these children are under the control of dietitians from an early age is thought to be preventive for future eating disorders. In addition, informative counseling on diet was recommended to the families of children with ADHD. On the other hand, this finding suggests that especially children with overeating and obesity problems should be examined for ADHD symptoms. Some children with eating problems may have symptoms of ADHD that are not noticed. Therefore, it was thought that evaluating children with problems of persistent obesity, overeating, or going off the diet in their childhood by child psychiatry services can contribute to finding appropriate treatment.

Another result of our research was that children with ADHD obtain significantly lower academic achievement scores than children without ADHD. Besides, it was seen that although the ages of children with ADHD progress, there is no significant increase in their academic skills. It was reported that specific teaching methods are needed for children with ADHD who have lower academic skills than children with normal development (Bulut, 2007). As seen in this study, the fact that the academic

skills of children with ADHD in the first 3 years of primary education were significantly behind their peers necessitates special education programs for these children. In addition, primary school teachers should be counseled and trained on how to adapt their programs to children with ADHD. In some respects, children with ADHD were reported to have an advantage over their peers with normal development as they benefit positively from small classroom interventions (Bulut, 2005).

Males were found to obtain higher scores in hyperactivity the subtest than females, while females, were found to obtain higher scores in the subtest of emotional eating than males. Research can be designed to reveal the causes of this situation.

Again, a longitudinal examination of a group of children with ADHD will contribute to the literature to see the changes over the years and to follow the course of ADHD and eating disorders.

In this study, the body mass index of the children was not measured. The relationship between ADHD and eating disorders can be studied by combining it with physical findings by measuring the body mass indices of children.

It should be taken into consideration that the data collected in this study were children aged 7, 8, and 9 years and that the ADHD and eating behaviors of children were examined within the framework of the opinions of the mothers. Eating behaviors in the study were not based on tangible data such as an observation or the body mass index. In addition, some children with ADHD who participated in the study went to public schools, while others went to private schools. However, all the children with normal development attended a private school. This may have made a difference in the income status of families, the eating habits of children and families, and how mothers evaluate their children. Therefore, it should be considered that the research has limitations in this respect and these limitations should be considered in evaluations and interpretations to be made.

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