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ORIGINAL ARTICLE

Comparison of Self-Esteem and Internet Addiction Levels in Obese and Non-Obese Adolescents

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Main Points

- There are conflicting results regarding obesity and self-esteem in the literature. Excessive internet use increases the risk of obesity.
- No relationship was found between obesity and internet use among adolescents.
- Obesity was found to be associated with only parental interest and relationship with father sub-scales of self-esteem.
- Male gender and psychic isolation variables but not obesity were found to be independently associated with risky internet use and addiction.

Abstract

Obese children have significantly lower self-esteem than their normal-weight peers. The duration of internet use and the severity of addiction are associated with obesity. There are a limited number of studies examining the relationship between internet addiction and self-esteem in obese people. Thirty-six adolescents with a diagnosis of obesity and 36 adolescents in the normal weight range were matched according to age and gender and were included in the study as the control group. Participants completed Rosenberg Self-Esteem Scale and Internet Addiction Scale. When the obese and non-obese groups were compared, parental interest and relationship with father were found to be higher in the obese group. Internet addiction scores did not differ between the two groups. Parental interest and relationship with father were independently associated with the obese group. Self-esteem, faith in people, daydreaming, psychosomatic symptoms, and psychic isolation differed among the groups determined according to internet use. Male gender and psychic isolation variables but not obesity were found to be independently associated with risky internet use and addiction. There was no difference between obese and non-obese adolescents in terms of self-esteem and internet addiction. Psychic isolation and male gender were found to be variables associated with risky internet use and internet addiction.

Keywords: Adolescent, internet addiction disorder, obesity, self-esteem

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Introduction

Obesity is defined as an abnormal or excessive accumulation of fat in the fat tissues to the extent of compromising health. The World Health Organization (WHO) has declared childhood obesity as one of the most serious public health problems of the 21st century and has become a global pandemic, and it classifies those above the 85th percentile as overweight and those above the 95th percentile as obese according to the reference ranges it has set for children and adolescents (World, 2016).

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The increased incidence of obesity globally and in our country has been caused by advancements in technology that have made life easier and decreased physical activity, as well as an imbalance between the energy intake from food and its expenditure (Atay & Bereket, 2016). The continuous rise in obesity rates exposes affected children and adolescents to increased risk of complications associated with obesity, including psychosocial, metabolic, and physical disorders. A review has shown evidence that overweight/obese children and adolescents experience more adverse psychological outcomes, such as depression, low self-esteem, and lower scores on health-related quality of life, compared to their normal-weight peers (Sanders et al., 2015).

Self-esteem, according to Rosenberg, is the positive or negative attitude of individuals toward themselves. If an individual has a positive attitude in self-evaluation, self-esteem is considered high, and if they have a negative attitude, self-esteem is considered low (Rosenberg, 1965). It has been shown that self-esteem does not just remain a distressing feeling, but it affects other areas of psychological health, including increasing the risk of developing depression and eating disorders (Griffiths et al., 2010). This leads to the conclusion that improving self-esteem could prevent more psychopathology.

In various studies conducted on obese children and adolescents, the relationship between obesity and self-esteem has been examined and inconsistent results have been found. Some studies examining the relationship between obesity and low self-esteem in children and adolescents showed a significant relationship (Wang et al., 2009), while others failed to detect any relationship (Swallen et al., 2005). However, most of these studies are cross-sectional and it has not yet been determined whether the existence of obesity affects self-esteem or if low self-esteem causes obesity (Wang et al., 2009).

The internet, which provides access to the world, has become an important part of daily life and changed people's habits. However, problematic internet use has emerged as a major public health issue and interest has been growing in recent years. The term internet addiction (IA) was first introduced by Goldberg, while Young defined diagnostic criteria for IA using the criteria for pathological gambling (Young et al., 1999). The prevalence of IA among adolescents worldwide has ranged from 1.4% to 20.3% over the past decade (Kuss et al., 2014). There are significant differences between studies conducted in different countries due to cultural and genetic variables, as well as differences in the scales and diagnostic criteria used for IA.

Individuals with IA are reported to neglect not only their home or work responsibilities but also physical activity (Vandelanotte et al., 2009). When IA occurs, a reduction in physical activity, an increase in unhealthy food consumption, irregular eating behaviors, and poor sleep quality may cause weight gain and obesity in adolescents. A recent meta-analysis found that high internet usage was associated with a 47% greater likelihood of being obese (Aghasi et al., 2020). Self-esteem is among the concepts focused on understanding the causes of problematic internet use. The desire for socialization during adolescence may lead individuals with low self-esteem, shyness, and timidity to various sources. In particular, they can realize relationships that they cannot achieve in real life by feeling safe in the virtual environment and this can increase the likelihood of developing an addiction to this environment. It has been reported that low self-esteem can lead to IA and that offering psychological support to problematic internet users can positively change their self-esteem, thus reducing the symptoms of IA (Widyanto & Griffiths, 2011).

When the literature is reviewed, there are limited studies investigating the relationship between IA and self-esteem in obese adolescents. Therefore, our primary aim in the study is to compare IA and self-esteem in obese and non-obese adolescents. Furthermore, our other aims are to evaluate the relationship between IA and self-esteem and to investigate other factors which may be related to IA and problematic internet use.

Material and Methods

The sample size in this study was calculated based on a similar study in the field using the G-Power program, with 90% power and 5% error rate, and a two-tailed hypothesis with a 0.8 effect size, with 36 cases and 36 controls, with a target of reaching at least 72 individuals (Cengiz, 2011). The study was approved by Aydın Adnan Menderes University Faculty of Medicine Non-interventional Ethics Committee (25.08.2022-2022/145). All participants were included in the study after obtaining verbal and written consent from volunteer participants and their parents. The Helsinki Declaration was followed in the implementation of the study.

The 36 obese (body mass index (BMI) 95th percentile or higher) adolescent patients with a diagnosis of obesity referred to the pediatric psychiatric outpatient clinic between 01.09.2022 and 01.12.2022 were taken as the case group. The 36 adolescent control group, which was matched by age and gender and either referred or attended the pediatric psychiatric outpatient clinic from other pediatric clinics with a normal weight range (BMI between 5th and 85th percentiles), was also included in the study. The weight, height, and BMI values of the participants who agreed to participate in the study were recorded.

The psychiatric diagnoses of the case and control groups were established through clinical examination and the Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version-DSM-5 (K-SADS-PL-DSM-5). The participants included in the study were those who did not have a serious psychiatric illness (bipolar, psychotic disorders, substance use disorder) and mental retardation or autism spectrum disorder, were literate, signed an informed consent form, did not have any chronic or acute medical illness (excluding conditions directly related to obesity such as insulin resistance), and did not have any previous psychiatric diagnosis or use of psychotropic drugs. After the diagnostic interview with all the adolescents included in the study, a sociodemographic data form was filled out and the adolescents were asked to fill out the IA Scale (IAS) and the Rosenberg Self-Esteem Scale (RSES).

Assessment Tools

Sociodemographic Data Form

A form containing demographic characteristics and clinical information of the participants and their families was used, created by the researchers. The adolescent's age, gender, BMI value,

parents' age, number of siblings, developmental characteristics, place and people of residence, marital status of the family, history of psychiatric disorders in the family, mode of delivery, gestational duration, and history of obesity in the family were recorded in this form.

The Internet Addiction Scale

In the study, IA was evaluated using the IAS developed by Young (Young, 1996). The scale is a Likert-type questionnaire consisting of 20 questions and is filled out by the participant. Participants respond by marking one of the options "Never," "Seldom," "Occasionally," "Often," "Very Often," and "Continuously." These options are scored as 0, 1, 2, 3, 4, and 5, respectively. Participants who score 80 or above on the scale are considered internet addicts, those who score 50 – 79 are considered at-risk limited symptom internet users, and those who score below 50 are considered normal non-symptomatic internet users. The Turkish validity and reliability study of the scale was conducted by Bayraktar et al. and the Cronbach's alpha value was found to be .91 (Bayraktar, 2001).

The Rosenberg Self-Esteem Scale

The original scale, developed by Rosenberg (1965) to measure individuals' self-esteem, is in English (Rosenberg, 1965). The scale, adapted into Turkish by Çuhadaroğlu (1986), consists of 63 items and 12 sub-scales (Çuhadaroğlu, 1986). The sub-scales are as follows: (1) self-esteem, (2) stability of self, (3) faith in people, (4) sensitivity to criticism, (5) depressive affect, (6) daydreaming, (7) psychosomatic symptoms, (8) interpersonal threat, (9) intensity of discussion index, (10) parental interest, (11) relationship with father, and (12) psychic isolation. The self-esteem sub-scale includes a total of 10 questions with positive and negative meanings. In the test, positive items (questions 1, 2, 4, 6, and 7) and negative items (questions 3, 5, 8, 9, and 10) are consecutively arranged. Each question can be answered in four different ways: "very true/definitely agree," "true/agree," "false/disagree," and "very false/definitely disagree." The scale, which can be scored according to the Guttman measurement system, can categorize self-esteem as high (0 – 1 point), moderate (2 – 4 points), or low (5 – 6 points) through numerical measurements by evaluating questions 1, 2, and 3 together, questions 4 and 5 together, and questions 9 and 10 together.

Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version-DSM-5

The Kaufman et al. (Kaufman et al., 2016) semi-structured interview schedule, updated based on DSM-5 diagnostic criteria, has three sections. In the first section, the child and family's sociodemographic characteristics, complaints, developmental history, health status, and general functioning in school and at home are assessed through an unstructured interview. In the second section, over 200 specific symptoms are evaluated using screening questions both in the past and present (in the past 2 months). The third section consists of evaluations and observations to confirm DSM-5 diagnoses. The information gathered from each source is scored separately and then combined with the clinician's observations. The validity and reliability of the Turkish version have been established (Ünal et al., 2019). In the study, at least one parent capable of providing information about the child was involved in the assessment.

Statistical Analysis

The analysis of the data was carried out using the Statistical Package for the Social Sciences version 22.0 (IBM SPSS Corp.; Armonk, NY, USA) statistical software. The assumption of normal distribution of the data was evaluated using skewness-kurtosis values, normality tests, and histogram graphs. To determine the variables that showed a significant difference between obese adolescents and the control group, Student's *t*-test was used for continuous variables and the chi-square test (Fisher's exact test or Pearson) was used for categorical variables. Variables between three groups determined by the IAS were compared using the Kruskal – Wallis test, and Mann – Whitney *U* test was used for post hoc analysis. Logistic regression analysis was applied using the "enter" method to determine the variables associated with the obesity group, with IA score, age, and gender included as covariates. The "IA" group was merged with the "risky internet use" group due to a lack of sample in the former group, and logistic regression analysis was performed using the "enter" method to determine the associated variables. In this analysis, BMI, age, and gender were included as covariates along with the variables that showed a difference according to the self-esteem scale. A *p*-value of less than .05 was considered statistically significant in all analyses.

Results

In this study, 72 adolescents, including 36 with a diagnosis of obesity and 36 control group participants, were included in the sample group. There was no significant difference in terms of age and gender variables between the cases and control groups included in the study and the average age of obese adolescents was 15.51, while that of the control group was 15.41 ($p > .05$). It was found that 45.9% of obese adolescents and 52.8% of control group participants were male. No significant differences were found in the social demographic, clinical, or developmental variables except BMI ($p < .0001$) between cases and control groups ($p > .05$) (Table 1).

When the sub-scales and total scores evaluated by RSES were compared between the obesity and control groups, it was found that the score for parent's interest was lower ($p = .01$) and the score for relationship with the father was higher ($p = .01$) in the obesity group. Therefore, based on the scoring of the scale, it was concluded that the interest of parents and relationship with father are more in obese adolescents. In our study, there was no significant difference in IAS total score between obese adolescents and the control group ($p > .05$) (Table 2). Logistic regression analysis was performed to determine the variables associated with obesity, and it was found that parent's interest ($p < .05$) and relationship with father ($p < .05$) were independently associated with obesity (Table 3), with a Nagelkerke $R^2 = .21$.

In our study, groups determined according to the IAS(normal internet user (NIU), risky internet user (RIU), internet addicted (IA)) were compared in terms of RSES sub-scales, total score, and BMI. The analysis showed that self-esteem ($p < .01$), faith in people ($p = .02$), daydreaming ($p = .03$), psychosomatic symptoms ($p = .04$), and psychic isolation ($p = .02$) showed significant differences between groups, while BMI did not show a significant difference ($p > .05$) (Table 4). When post hoc analysis results and scale scores were evaluated together, it was found that self-esteem and faith in

Table 1.
Comparison of Sociodemographic and Developmental Variables Between Groups

Variables	Obese Group (n = 36)	Control Group (n = 36)	Statistical Analysis	
	Mean ± SD	Mean ± SD	T^a	p
Age (year)	15.51 ± 1.12	15.41 ± 1.25	0.34	.72
Body mass index (percentile)	97.45 ± 1.78	41.63 ± 26.91	12.41	<.0001
Mother's age (year)	43.05 ± 5.61	44.83 ± 4.96	−1.43	.15
Father's age (year)	47.85 ± 5.03	47.38 ± 9.55	0.25	.79
Number of siblings	1.16 ± 0.77	1.58 ± 1.02	−1.94	.05
Birth weight (g)	3910.81 ± 3948.41	3264.16 ± 574.70	0.97	.33
Age of first walking (month)	13.05 ± 2.86	13.54 ± 3.78	−0.62	0.53
First word (month)	13.64 ± 6.68	12.97 ± 4.65	0.50	.61
Breast milk intake duration (month)	17.64 ± 11.43	15.75 ± 10.17	0.74	.45
	n (%)	n (%)	χ^2	p
Gender (male)	16 (45.7)	19 (54.3)	0.50[b]	.47
Place of residency (city center)	22 (62.2)	22 (62.9)	0.98[b]	.61
People living with core family	35 (97.2)	33 (91.7)	-[b]	.30
Parent's marital status (married)	28 (77.8)	33 (91.7)	2.68[b]	.10
Mental illness in parents (yes)	4 (11.1)	3 (8.3)	-[b]	.50
Siblings (yes)	30 (83.3)	31 (86.1)	0.10[b]	.74
Type of delivery (normal)	24 (66.7)	21 (58.3)	0.53[b]	.46
Birth time (full-term)	32 (88.9)	29 (80.6)	0.96[b]	.32
Family history of obesity (yes)	4 (11.1)	0 (0)	-[b]	.06

Note: RSES = Rosenberg Self-Esteem Scale.
[a]Student's t-test.
[b]Pearson chi-square test.
[c]Fisher's exact test.

Table 2.
Comparison of Self-Esteem and Internet Addiction Scores Between Groups

Variables (RSES)	Obese Group (n = 36)	Control Group (n = 36)	Statistical Analysis	
	Mean ± SD	Mean ± SD	t^*	p
Self-esteem	2.06 ± *3.51*	1.85 ± *1.34*	0.34	.73
Stability of self	3.43 ± *1.25*	3.55 ± *1.42*	−0.39	.69
Faith in people	3.10 ± *1.34*	3.16 ± *1.10*	−0.20	.84
Sensitivity to criticism	1.75 ± *1.06*	1.41 ± *1.07*	1.35	.18
Depressive affect	2.24 ± *1.40*	2.58 ± *1.42*	−1.02	.30
Daydreaming	2.54 ± *1.48*	2.11 ± *1.61*	1.18	.24
Psychosomatic symptoms	4.32 ± *2.80*	3.91 ± *2.66*	0.63	.52
Interpersonal threat	1.81 ± *0.96*	1.52 ± *1.05*	1.19	.23
Intensity of discussion index	0.97 ± *1.11*	0.61 ± *0.68*	1.66	.10
Parental interest	1.24 ± *1.34*	2.16 ± *1.90*	−2.40	**.01**
Relationship with father	1.08 ± *1.18*	0.47 ± *0.81*	2.55	**.01**
Psychic isolation	1.24 ± *0.76*	0.91 ± *0.80*	1.78	.07
Internet Addiction Total Score	49.97 ± *19.03*	51.41 ± *17.70*	−0.33	.73

RSES = Rosenberg Self-Esteem Scale.
*Student's t-test.

people were higher in the NIU group compared to the RIU and IA groups; daydreaming and psychic isolation were lower in the NIU group compared to the other groups; and psychosomatic symptoms were more in the RIU group compared to the other groups. Due to the small number of cases in the IA group, the IA and RIU groups were combined for regression analysis, and associated variables were analyzed by logistic regression analysis. The analysis showed that male gender ($p < .05$) and psychic isolation ($p < .05$) were independently associated with RIU and IA (Table 5).

Discussion

Our study aimed to investigate the relationship between obesity in adolescents and self-esteem and internet use. The investigation of the relationship between internet use and self-esteem constitutes the secondary objective of our study. Upon reviewing the studies in this field, it is observed that self-esteem is generally investigated with the RSES, while IA is investigated with the IAS. This situation and the widespread use of the scales used in our study provide consistency in interpreting our data. In addition to the data from studies in the field, other sub-scales of the RSES have been included in the analyses in our study and significant findings have been obtained. Furthermore, it is considered that

Table 3.
Determining the Associated Variables With the Obesity Group Through Logistic Regression Analysis

	B	Standard Error	Odds Ratio	Confidence Interval
Obesity × Control				
Constant	1.31	3.46	3.73	-
Age	−0.12	0.21	0.88	0.57 – 1.35
Parental interest	0.37*	0.17	1.45	1.03 – 2.04
Relationship with father	−0.67*	0.28	0.51	0.29 – 0.89
Internet addiction	0.01	0.01	1.01	0.98 – 1.03
Gender (male)	−0.00	0.53	0.99	0.34 – 2.83

Reference category: Obesity, *$p < .05$, Nagelkerke $R^2 = .21$, $p = .026$.

Table 4.
Comparison of Self-Esteem and Body Weight Variables Between Groups Determined by the Internet Addiction Scale

	Normal Internet User (a) (n = 37)	Risky Internet User (b) (n = 27)	Internet Addicted (c) (n = 8)	Statistical Analysis		
Variables (RSES)	**Mean ± SD**	**Mean ± SD**	**Mean ± SD**	χ^2	***p****	**Post Hoc**
Self-esteem	1.28 ± 0.99	2.96 ± 3.99	1.83 ± 1.34	10.09	**<.01**	a < b = c
Stability of self	3.44 ± 1.38	3.70 ± 1.20	3.00 ± 1.51	1.65	.43	
Faith in people	2.76 ± 1.30	3.55 ± 1.01	3.50 ± 1.06	7.17	**.02**	a < b = c
Sensitivity to criticism	1.34 ± 1.02	1.81 ± 1.11	2.00 ± 1.06	4.55	.10	
Depressive affect	2.07 ± 1.54	2.81 ± 1.11	2.62 ± 1.40	5.70	.05	
Daydreaming	1.86 ± 1.57	2.85 ± 1.29	2.75 ± 1.75	6.92	**.03**	a < b = c
Psychosomatic symptoms	3.50 ± 2.64	5.18 ± 2.84	3.50 ± 1.60	6.12	**.04**	a = c < b
Interpersonal threat	1.63 ± 0.88	1.74 ± 1.19	1.62 ± 1.06	0.31	.85	
Intensity of discussion index	0.78 ± 0.81	0.74 ± 0.81	1.00 ± 1.77	0.27	.87	
Parental interest	1.55 ± 1.68	2.11 ± 1.82	1.00 ± 0.92	3.14	.20	
Relationship with father	0.73 ± 0.97	0.81 ± 1.24	0.87 ± 0.83	0.58	.74	
Psychic isolation	0.84 ± 0.78	1.37 ± 0.68	1.25 ± 0.88	7.32	**.02**	a < b = c
Body mass index	26.14 ± 5.83	25.99 ± 6.91	26.79 ± 6.61	0.17	.91	
Body mass index (percentile)	73.86 ± 32.42	63.66 ± 36.89	72.37 ± 30.07	0.55	.75	

Note: RSES = Rosenberg Self-Esteem Scale.
*Kruskal – Wallis test.

Table 5.
Determining Associated Variables With Risky Internet Use and Internet Addicted Through Logistic Regression Analysis

	B	**Standard Error**	**Odds Ratio**	**Confidence Interval**
Normal User × Risky Internet User and Internet Addicted				
Constant	−3.59	4.25	0.02	-
Age	0.00	0.26	1.00	0.60 – 1.67
Self-esteem	0.25	0.17	1.29	0.91 – 1.82
Faith in people	0.40	0.29	1.50	0.83 – 2.69
Daydreaming	0.20	0.21	1.22	0.80 – 1.86
Psychosomatic symptoms	0.08	0.12	1.09	0.85 – 1.39
Psychic isolation	**0.94***	0.45	2.56	1.04 – 6.30
Body mass index (percentile)	−0.01	0.00	0.98	0.96 – 1.00
Gender (male)	**1.67***	0.67	5.31	1.40 – 20.04

Reference category: Normal user, *$p < .05$, Nagelkerke $R^2 = .43$, $p < .001$.

examining obesity, internet use, and self-esteem together will make an important contribution to the literature.

In our study, first, self-esteem and other sub-scales of the RSES were compared between obese and normal-weight adolescents, and no significant differences were found in terms of self-esteem. It is known that low self-esteem can be caused by many factors such as emotional experiences, socioeconomic status, mental disorders, genetic factors, and physical appearance (Bale & Archer, 2013). In a recent review study conducted in the adolescent age group, it was found that both being overweight and obese were associated with lower self-esteem (Moradi et al., 2022). When the studies in this field are reviewed, it can be seen that psychiatric disorders of obese cases are generally not evaluated and are not among the exclusion criteria. After the patients were selected from those who applied to the pediatric endocrinology clinic in our study, all cases were excluded for psychiatric disorders through a structured clinical interview (K-SADS). This has enabled the relationship between obesity and self-esteem to be examined more independently. It has been considered that the exclusion of psychiatric disorders in the case group may have led to higher levels of self-esteem being detected and therefore no differences between the groups being observed.

Parental interest and relationship with father as determined by RSES were found to be higher in obese adolescents compared to

the control group according to our study. Regression analysis also showed that both factors were independently associated with obesity, regardless of other variables. Although previous studies in this field have attempted to identify parental attitudes related to eating that are not appropriate, there are few studies that examine the relationship between parent – child relationships and obesity in adolescents. In a recent study in the adolescent age group, it was thought that perceived parental responsiveness was associated with lower BMI and that parental concern about the child's weight led to higher BMI (Loncar et al., 2021). In this study, restrictive approaches by parents were associated with reduced self-efficacy related to eating in adolescents. Adolescents who receive more warmth, affection, and acceptance from their parents may be more competent in terms of healthy eating. In an adult study, overprotective parental attitudes were associated with obesity, and the relationship between obesity and the concept of "emotional non-control" was emphasized (Amianto et al., 2021). Although our findings seem to conflict with previous studies in this field, it can be argued that excessive parental interest in our study, which has been associated with unhealthy eating in previous studies, may be evaluated as parental overprotection, demandingness, and other characteristics. However, since no study has examined the relationship between these RSES sub-items and eating problems, it is considered that our findings are still insufficient to reach a conclusion in terms of causality. Additionally, the emotional dimension of perceived parental interest cannot be clearly evaluated with the scale used in the study. Further studies are needed to examine the relationship between parental interest and eating problems and the nature of these problems.

In our study, no significant difference was detected in the scores of IA between obese and non-obese adolescents. Similarly, no significant differences were found in the values of BMI between the three groups determined by the IAS, contrary to our expectations. When the studies in this field are reviewed, it is seen that there are conflicting findings in the literature, but the general belief is that there is a clear relationship between obesity and internet use. Studies conducted in the adolescent age group in our country also support the relationship between internet use and obesity. According to the results of these studies, there is a relationship between the increase in IA and the increase in obesity risk due to a sedentary lifestyle (Eliacik et al., 2016), and it has been determined that the increase in BMI is correlated with the IAS and weekly internet usage time (Canan et al., 2014). In a prospective study conducted in the young adult age group, a similar relationship was not found between internet use and being overweight, as in our study (Melchior et al., 2014). In another study that supports the findings of our study, it was found that technology use in children is not associated with BMI, especially after controlling for sociodemographic factors (Jackson et al., 2011). In a recent meta-analysis study, it was confirmed that internet use is a risk factor for obesity and overweight. But the researchers emphasized that the conflicting results from previous studies may be due to heterogeneity in the selection of the sample, differences in gender distribution, and differences in study design (Aghasi et al., 2020). Our study is a study conducted in a clinical sample with the exclusion of potential psychiatric disorders, unlike some of the studies reviewed. In addition, the IA scores determined by the IAS were found to be relatively low, and IA was detected in only 8% of the participants. Furthermore, to reduce confounding factors, only obese adolescents were included as the case group and overweight cases were not included in the study. Unlike previous studies, the examination of obese adolescents as a single group without taking into account the overweight individuals may have led to our findings being different from the literature.

In our study, the aim was to examine the conditions related to internet use. It was found that self-esteem and faith in people are lower in both the RIU and IA groups compared to the normal internet user group. Daydreaming and psychic isolation are higher in both groups compared to the normal internet user group, and psychosomatic symptoms are only higher in the RIU group. Upon examining research in this area, it is seen that the short form of the RSES is commonly used in measuring self-esteem and that a consistent relationship between internet use and self-esteem has been consistently identified. The use of the scale including other sub-items of the RSES in our study allowed for the examination of other variables related to self-esteem. A recent large-scale study investigating the relationship between problematic internet use and self-esteem and depressive symptoms found a significant relationship between internet use and self-esteem (Lai et al., 2022). In other studies, the relationship between self-esteem and IA has been confirmed, and it was found that low self-esteem predicts problematic internet use (Kim & Davis, 2009). The findings of our study are consistent with those of previous studies in this area. Individuals with lower self-esteem may turn to the virtual world to seek solace, believing that they can cope with difficulties. Internet use may be perceived as an important way to reduce some problems in adolescents with low self-efficacy (Widyanto & Griffiths, 2007). As a result, these adolescents with internet use problems may have lower expectations for help from others in the real world and may experience a disruption in the development of trust. Low self-esteem is an important factor for the development of depressive symptoms, and evaluating self-esteem in adolescents with problematic internet use is important for preventing future depressive symptoms. Furthermore, based on our findings, we believe that psychiatric support and positive change in self-esteem can improve IA symptoms in young people with risky internet use.

Studies examining the relationship between risky internet use and psychosomatic symptoms have found that individuals with risky internet use have demonstrated more physical fatigue, headaches, abdominal pain, and emotional-behavioral and social problems compared to those who do not. These findings have shown consistency across studies (Stiglic et al., 2022). The results of our research also support previous studies. Excessive internet use can lead to an increase in psychological arousal and result in various health problems. Psychosomatic symptoms in adolescents can be important signals related to mental health and should be carefully addressed.

In our study, finally, the variables related to risky internet use and IA were examined using logistic regression analysis and psychic isolation and male gender were determined as independent variables. When controlling for other variables in regression analysis, self-esteem lost statistical significance. The explanation for this may be that psychic isolation is more clearly associated with IA and that self-esteem may play a role in the relationship between

internet use and self-esteem. Although our findings are yet insufficient to reach this conclusion, based on our results, it can be argued that there may be important factors playing a regulatory role in the relationship between self-esteem and internet use and that these should be the subject of further research. When reviewing studies in the field, no study was found that investigated the relationship between psychic isolation and IA. Permanent low mood, lack of motivation, and interpersonal relationship problems are often seen in high-risk internet users with depressive symptoms (Malhi & Mann, 2018). These adolescents may increase their social and emotional support through the internet to alleviate their interpersonal relationship problems and loneliness. Loneliness and psychological stress have been found to be associated with risky internet use (Mamun et al., 2020). A significant finding of our study that shows the relationship between psychic isolation and risky internet use is that depression symptoms and loneliness in these adolescents may be associated. In a recent study, self-esteem showed differences between groups, similar to our study, but the relationship between them was lost in regression analysis. This study found that factors associated with IA were male gender, lack of restriction of internet use by parents, and depression (Chen et al., 2020). Similarly, in studies on risky internet use, male gender dominance has consistently been reported (Li et al., 2019). Our finding that male gender is significantly associated with risky internet use is in line with the literature.

Limitations and Directions/Suggestions for Future Research

Our study is one of the few in the field that examines the relationship between obesity, internet usage, and self-esteem, although there are some limitations. First, our study was designed as cross-sectional, and therefore, the direction and causality of relationships should be interpreted with caution. Second, the fact that our study was based on self-reported scales could have led to bias among the responding adolescents. Information from more sources or clinical interviews could allow for a more reliable interpretation of the data. However, considering the widespread use of similar methods and scales used in similar studies in this field, it was considered that the data collection method used in our study was valid. Additionally, the small sample size of the group forming the IA in our study may limit the generalizability of our findings. Longitudinal studies that examine the relationship between IA, obesity, and regulatory factors are needed in this field.

Our study is considered to contribute to the literature as it is one of the few studies investigating the relationship between internet use, obesity, and self-esteem. Additionally, our research has determined that psychic isolation is independently related to risky internet use, aside from other factors. Male gender is related to internet use, which is consistent with previous studies. Although no relationship was found between obesity and internet use, obesity was found to be associated with parental interest and relationship with father sub-scales. Longitudinal studies are needed in this area.

Ethics Committee Approval: Ethical committee approval was received from the Ethics Committee of Aydın Adnan Menderes University Faculty of Medicine Non-interventional (Approval no: 2022/145, Date: August 25, 2022).

Informed Consent: Written informed consent was obtained from all participants and their guardians who agreed to take part in the study.

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