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The Effect of Problematic Internet Use, Internet Gaming Disorder and Cyberbullying/Victimization Levels on Self-esteem in Obese Adolescents

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What is already known on this topic?

Studies have been conducted on problematic internet use, internet gaming disorder (IGD), self-esteem, and levels of cyberbullying/victimization among obese adolescents.

What this study adds?

In the present study, cyberbullying/victimization and withdrawal symptoms of IGD may be associated with self-esteem in obese adolescents. This is the first study to investigate the relationship between problematic technology use and self-esteem in obese adolescents.

Abstract

Objectives: To compare the levels of problematic internet use, self-esteem, internet gaming disorder (IGD) and cyberbullying/victimization in adolescents diagnosed with obesity with a control group and to examine the relationship between these variables and self-esteem.
Methods: Adolescents with and without obesity were recruited. The relationship between the scales of Problematic Internet Use, Cyberbullying/Victimization, IGD and the Piers-Harris Self-Esteem Scale was analyzed using linear regression methods.
Results: The study included a total of 164 adolescents (115 females; 70.1%). Of these, 93 (56.7%) were diagnosed with obesity (female n = 64; 68.8%). Self-esteem in adolescents diagnosed with obesity was lower compared to healthy controls ($p < 0.001$), and problematic internet use was higher in obese individuals compared to healthy controls ($p = 0.011$), although no difference was found between the groups in terms of IGD ($p = 0.494$) and cyberbullying/victimization ($p = 0.706$) levels. In obese individuals, cyber forgery ($p = 0.003$; $\beta = -0.103$) and verbal cyberbullying victimization ($p = 0.032$; $\beta = -0.057$), IGD withdrawal subscales ($p = 0.03$; $\beta = -0.084$), and total scores on the cyberbullying scale ($p = 0.017$; $\beta = -0.289$) were found to negatively affect self-esteem.
Conclusion: These findings suggest that taking measures to reduce problematic internet use, IGD, and cyberbullying/victimization in obese adolescents may be a protective measure for self-esteem and, consequently, mental health.
Keywords: Obese adolescents, self-esteem, problematic internet use, internet gaming disorder, cyberbullying/victimization

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Introduction

Obesity is a significant public health problem for both developed and developing countries (1). The prevalence and severity of obesity are reported to be increasing dramatically in children and adolescents in some populations (2). Obesity in childhood is associated with cardiometabolic and psychosocial comorbidities (3). In contemporary times, the increased use of technology has led to adolescents spending a proportion of their time online, thereby exposing them to environmental factors that undermine their self-esteem. Specifically, problematic internet use, cyberbullying, cyber victimization, and internet gaming addiction may pose significant issues that adversely affect the self-esteem of obese individuals.

Self-esteem refers to the way individuals perceive and value themselves (4). Specifically, it is the extent to which a person believes in their own talents, significance, success, and worth. The relationship between obesity and low self-esteem has been demonstrated in various studies (5,6,7). Low self-esteem in overweight adolescents may play an important role in the development of a range of mental disorders, such as inappropriate eating and dieting behaviors, depression, anorexia nervosa, bulimia nervosa, anxiety, violent behavior, and substance abuse (8,9). These findings suggest that maintaining self-esteem may help prevent the onset of psychopathology in individuals diagnosed with obesity.

A negative self-concept may trigger problematic internet use and internet gaming disorder (IGD). Problematic internet use is generally defined as the problematic, compulsive use of the internet, which in turn causes significant dysfunction in various life domains of the individual over a long period of time (10). There is a negative relationship between self-esteem and internet addiction (11). It has been reported that for every unit increase in self-esteem, the likelihood of internet addiction decreases by 11 % (12). Moreover, it has been demonstrated that individuals with low self-esteem spend more time on the internet compared to others (13,14). Furthermore, research examining the relationship between body weight and internet use has reported that adolescents with problematic internet use are more likely to be obese or overweight (15,16,17).

Digital game addiction is described as children's continuous playing of games, associating the game with real life, preferring gaming over other activities, and avoiding their real-life responsibilities (18). Low self-esteem has been commonly reported to be associated with gaming and other internet-related disorders (19,20,21). Individuals with IGD are attracted to games because gaming fosters experiences of power and autonomy, thereby enhancing self-esteem (22). Furthermore, pathological gamers tend to overvalue game rewards, activities, identities (avatars), or other elements, which promotes increased gaming engagement and a diminished interest in less appealing, real-life activities (22). Avatars (simulated identities within a game) can amplify feelings of power and strength and facilitate an escape from real-life problems (22). A recent review of self-esteem in gaming disorders has shown a negative relationship between gaming disorders and physical and academic self-esteem (23).

Young people are spending increasing amounts of time using digital technology and, as such, are at great risk of being involved in cyber bullying as a victim, bully, or bully/victim (24). Cyberbullying is the use of information and communication technology in a deliberate, repetitive, and hostile manner to harass and harm (25). Cyberbullying actions include threatening and spreading rumors, sharing other people's private information, and promoting social isolation and exclusion (26). Studies examining the relationship between cyberbullying and obesity have reported contradictory findings (27,28). However, the negative association between cyberbullying victimization and self-esteem has been reported in various studies (29,30).

The aim of this study was to evaluate self-esteem, problematic internet use, IGD, and cyberbullying/victimization levels in adolescents with obesity and to compare them with a control group. In addition, a further aim was to evaluate the relationship between these variables (problematic internet use, cyberbullying/victimization, IGD and self-esteem. We hypothesize that adolescents with obesity will have higher levels of problematic internet use, IGD, and cyberbullying/victimization, compared to controls, and that their self-esteem will be lower compared to controls, and that these variables may be independently associated with the self-esteem of obese adolescents.

Methods

Subjects

Between March 2022 and September 2022, the eligibility of adolescents diagnosed with obesity who attended the Pediatric Endocrinology Clinic of Süleyman Demirel University Faculty of Medicine Hospital was assessed according to inclusion and exclusion criteria.

The inclusion criteria for the obesity group were: (1) aged between 12 and 18 years; (2) a body mass index (BMI) percentile value ≥95th; and (3) informed consent given by the adolescent and parent. According to reference curves for Turkish children and adolescents, patients with a BMI of

≥95th percentile were accepted as obese (31). All participants were evaluated by a pediatric endocrinology specialist and a child psychiatry specialist. Patients with obesity due to syndromic and endocrinological causes and those taking medications that can cause obesity (e.g., glucocorticoids, anticonvulsants such as carbamazepine and valproate, antidepressants, antipsychotics, or antihistamines) were excluded from the study. In addition, patients with a major psychiatric disorder, such as intellectual disability, autism spectrum disorder, bipolar disorder, or schizophrenia and/or a history of psychiatric drug use were excluded from the present study.

The healthy control group was formed from the children who applied to our outpatient clinic for consultancy services and who did not have any psychiatric complaints or history. The inclusion criteria for the healthy control group were: (1) aged 12-18 years; (2) BMI ≥5th to < 85th percentile; and (3) informed consent given by the adolescent and parent. The exclusion and inclusion criteria were the same for the control group, except for the presence of obesity. Similarly to the obesity group, all participants in the healthy control group were evaluated by both a pediatric endocrinology specialist and a child psychiatry specialist.

The study was approved by the Ethics Committee of Süleyman Demirel University Faculty of Medicine (protocol no: 72867572.050.01.04-216193, date: 11.02.2022). Written informed consent was obtained from the participants and their families.

Procedures

Measures/Instrumentation

The sociodemographic characteristics of all participants were assessed using a sociodemographic data form developed by the authors. In addition, using this form, the authors recorded information on internet and social media use duration, total internet connection time, parental online control, and the use of a filtering program. In this single-center, cross-sectional study, data was collected using the Turkish language versions of the Piers-Harris Self-Esteem Scale (PHCSES) (32), Problematic Internet Use Scale (PIUS) (33), Cyber Victim and Bullying Scale (34), and the Internet Gaming Disorder Scale (IGDS) (35). These scales were administered to adolescents in both the patient and control groups, and the data between the groups were compared.

Piers-Harris Children's Self-Esteem Scale: PHCSES is also referred to as "Thoughts About Myself". A high score indicates a positive self-concept, while a low score indicates a negative self-concept. The scale consists of six sub-scales. The sub-scales are as follows: 1. Happiness-satisfaction, 2. Anxiety, 3. Popularity, social approval, and being favored, 4. Conduct and compliance, 5. Physical appearance, 6. Mental and school status. The Turkish validity-reliability study of the scale was conducted by Öner (32,36).

Problematic Internet Use Scale-Adolescent: PIUS-A consists of three subscales: negative consequences of internet (NCI), social benefit/social comfort and excessive usage (EU). High scores from the scale indicate a high level of PIU. The validity-reliability study of the scale was conducted by Ceyhan and Ceyhan (33).

Cyber Victim and Bullying Scale: The cyberbullying and victimization form consists of three sub-dimensions: Cyber Forgery (CF-10 items), Cyber Verbal Bullying (CVB-7 items), and Hiding Identity (HI-5 items). The validity and reliability study of the scale developed by Çetin et al. (34) has been conducted on adolescents.

Internet Gaming Disorder Scale: The IGDS was developed by Pontes et al. (37). In this scale, (1) salience, (2) mood modification, (3) tolerance, (4) withdrawal symptoms, (5) conflict, and (6) relapse are assessed with 20 items. Cases scoring 69 or above are defined as having a disorder, while those scoring 60 or above are classified as being at risk. The Turkish validity and reliability of the scale was conducted by Çakıroğlu and Soylu (35).

Statistical Analysis

Statistical analyses were performed using Statistical Package for the Social Sciences for Windows, version 26.0 (IBM Corp., Armonk, NY, USA). The Kolmogorov-Smirnov test was used to assess the normality of data distribution. Continuous variables were compared between groups using the Student's t-test or Mann-Whitney U test based on the distribution characteristics of the data. The chi-square test was employed to compare categorical variables. Descriptive statistics for categorical variables are presented as frequencies (n), while continuous variables were summarized using means and standard deviations for normally distributed data or medians and interquartile ranges, defined as the range between the 25th percentile (p25) and the 75th percentile (p75), for non-normally distributed data. Linear regression analysis was used to examine associations between clinical variables and self-esteem. The significance level was set at $p < 0.05$ for all analyses.

A post-hoc power analysis was performed using G*Power 3.1.9.7 to assess the statistical power of the study for comparing two independent groups ($\alpha = 0.05$, Cohen's $d = 0.50$, group 1 sample size = 93, group 2 sample size = 71). The analysis indicated that the study had approximately 88 % statistical power based on the Student's t-test.

Results

A total of 164 adolescents aged 12-18 years, of whom 115 (70.1%) were included in the study. There were 93 patients in the obesity group (64 females; 68.8%), the average age was 15.2 ± 1.5 years, while in the control group consisting of 71 adolescents (51 female; 71.8%), the mean age was 15.6 ± 1.6 years. There was no difference between gender and age in these groups. The mean BMI percentile for the obese group was 98.8 ± 1.5, while that of the control group was 29.4 ± 26.4. The demographic characteristics of obese adolescents and controls are given in Table 1.

The total PHCSES score of the obesity group was significantly lower than that of the healthy control group (Table 2). The obesity group scored lower than the control group for the PHCSES sub-scales of physical appearance, behavior, popularity, anxiety, and happiness satisfaction (Table 2). In the obesity group, the total PIUS score and the PIUS sub-scale scores NCI and EU were significantlyt worse than in the healthy control (Table 2). No difference was found between the groups in the total scores of IGDS, CVBS, and their sub-scale scores (Table 2).

Compared to the healthy control group, the obesity group spent significantly more time on the internet and using social media (Table 3). Internet use at night was more prevalent in the obese group (30.1%; n = 28) than in the control group (16.9%; n = 12) (Table 3).

When comparing the monitoring of internet use by family members and the use of filtering programs for internet access between the obesity and control groups, no significant difference was found between the groups (Table 3).

Table 4 shows the results of linear regression analysis of psychiatric scale scores that are thought to be effective on self-esteem in the obesity group. The PHCSES was used as the dependent variable while PIUS-A, IGD, CV, CB scale sub-scores, BMI percentiles, gender, and time spent on the internet were taken as independent variables. The analysis showed that the CV-CF sub-scale ($p = 0.003$; $\beta = -0.103$), CV-CVB sub-scale ($p = 0.032$; $\beta = -0.057$), and the IGD-withdrawal sub-scale ($p = 0.03$; $\beta = -0.084$) were identified as factors that decrease self-esteem in the obesity group.

Table 5 presents the results of the linear regression analysis using the Enter method for the total scores of psychiatric scales that we hypothesized could have an effect on self-esteem in the obesity group. While the PHCSES was taken as the dependent variable, the total scores of the scale were taken as the independent variable. The analysis indicated that the total CB score ($p = 0.017$; $\beta = -0.289$) was a negative predictor of self-esteem in the obesity group.

Table 1. Demographic features of adolescents with obesity and control subjects

	Obesity (n = 93)	Controls (n = 71)	x^2, t, z	p value
BMI percentile (mean ± SD)	98.82 ± 1.54	29.45 ± 26.48	6.345[b]	< 0.001
Age, years (mean ± SD)	15.2 ± 1.5	15.6 ± 1.6	-1.803[b]	0.073
Gender (M/F)	29/64	20/51	0.175[a]	0.676

[a]Chi-square test; [b]Student's t-test; Mann-Whitney-U test.
BMI: body mass index, SD: standard deviation, M: male, F: female

Table 2. Clinical characteristics of the groups

	Obesity (n = 93)	Controls (n = 71)	t/z	p value
PHCSES				
Total (IQR; median [p25-p75])	49 [40-58.5]	59 [48-64]	-3.660[a]	< 0.001
Mental state (mean ± SD)	3.81 ± 1.75	4.28 ± 1.73	-1.691[b]	0.093
Physical appearance (IQR; median [p25-p75])	5 [3-7]	7 [4-8]	-2.660[a]	0.009
Behaviour (mean ± SD)	10.66 ± 3.06	12.05 ± 2.41	-3.125[b]	0.002
Popularity (IQR; median [p25-p75])	8 [5.5-10]	9 [7-11]	-2.916[a]	0.004
Anxiety (mean ± SD)	5.52 ± 2.80	6.73 ± 3.10	-2.603[b]	0.011
Happiness satisfaction (IQR; median [p25-p75])	8 [4-10]	9 [6-11]	-2.539[a]	0.012
PIUS-A				
Total (IQR; median [p25-p75])	41 [25.5-50.5]	36 [26-47]	-2.551[a]	0.011
NCI (IQR; median [p25-p75])	28 [20-38]	24 [18-30]	-2.267[a]	0.023
EU (IQR; median [p25-p75])	21 [16-24]	18 [15-22]	-2.359[a]	0.018
SB/SC (mean ± SD)	15.95 ± 6.73	14.52 ± 6.12	1.407[b]	0.161

Table 2. Continued

	Obesity (n = 93)	Controls (n = 71)	t/z	p value
IGDS				
Total (mean ± SD)	41.29 ± 16.11	39.52 ± 16.73	0.685[b]	0.494
Salience (mean ± SD)	5.80 ± 3.05	5.54 ± 3.18	0.524[b]	0.601
Mood (mean ± SD)	7.98 ± 3.11	7.49 ± 3.10	1.012[b]	0.313
Tolerance (mean ± SD)	5.81 ± 2.96	5.81 ± 3.05	0.001[b]	0.999
Withdrawal (mean ± SD)	5.46 ± 3.09	5.28 ± 2.87	0.382[b]	0.703
Conflict (mean ± SD)	10.32 ± 4.17	10.02 ± 4.18	0.449[b]	0.654
Recurrence (mean ± SD)	5.89 ± 3.00	5.35 ± 2.79	1.175[b]	0.242
CVBS				
CB-total (mean ± SD)	25.76 ± 6.45	25.40 ± 5.25	0.378[b]	0.706
CV-total (mean ± SD)	28.18 ± 11.1	27.35 ± 7.6	0.263[b]	0.592
CVB-CB (mean ± SD)	8.52 ± 2.97	8.46 ± 2.77	0.136[b]	0.892
CVB-CV (mean ± SD)	9.33 ± 4.25	9.14 ± 3.37	0.313[b]	0.755
HI-CB (mean ± SD)	6.31 ± 2.03	6.36 ± 2.07	-0.867[b]	0.867
HI-CV (mean ± SD)	6.7 ± 3.3	6.5 ± 2.4	0.436[b]	0.663
CF-CB (mean ± SD)	10.92 ± 2.96	10.57 ± 1.40	0.913[b]	0.363
CF-CV (Mean ± SD)	12.13 ± 5.06	11.7 ± 3.40	0.625[b]	0.533

[a]Mann-Whitney U test; [b]Student's t-test.
Interquartile ranges (IQR), defined as the range between the 25th percentile (p25) and the 75th percentile (p75). Bold values represent significant results.
PHCSES: Piers-Harris Children's Self-Esteem Scale, PIUS-A: Problematic Internet Use Scale-Adolescent, NCI: negative consequences of internet, SB/SC: social benefit/social comfort, EU: excessive usage, IGDS: Internet Gaming Disorder Scale, CVCB: Cyber Victim and Bullying Scale, CF: cyber forgery, CVB: cyber verbal bullying, HI: hiding identity, SD: standard deviation

Table 3. Comparison of the obesity and control groups internet and social media usage times, internet connection times, and supervision of internet use by family members

		Obesity (n = 93)	Controls (n = 71)	x²	p value
Internet usage time	Less than 1 hour (%)	1 (1)	4 (5)	37,410	< 0.001
	1-3 hours (%)	21 (22.5)	42 (59.1)		
	More than 3 hours (%)	71 (76.3)	25 (35.2)		
Social media usage time	Less than 1 hour (%)	24 (25.8)	25 (35.2)	11.610	0.021
	1-3 hours (%)	33 (35.4)	35 (49.2)		
	More than 3 hours (%)	36 (38.7)	11 (15.4)		
Internet connection time	Morning (%)	3 (3.2)	2 (2.8)	9.689	0.021
	Mid day (%)	23 (24.7)	10 (14)		
	Evening (%)	39 (41.9)	47 (66.1)		
	Night (%)	28 (30.1)	12 (16.9)		
Family control online	Yes (%)	32 (34.4)	31 (43.6)	1.457	0.227
	No (%)	61 (65.5)	40 (56.3)		
Filter program entity	Yes (%)	13 (13.9)	17 (23.9)	2.675	0.102
	No (%)	80 (86)	54 (76)		

Chi-square test. Bold values represent significant results

Table 4. Regression analyses of factors affecting Piers-Harris Self-Esteem Scale in obese adolescents

	Unstandardized coefficients	Standardized coefficients		95% confidence interval for B	
	B	Beta	p	Lower bound	Upper bound
CV-CF	-0.270	-0.103	0.003	-0.441	-0.099
CV-CVB	-0.177	-0.057	0.032	-0.336	-0.018
IGD-withdrawal	-0.358	-0.084	0.030	-0.674	-0.042

$F = 176.836$, $df = 28$, $p < 0.001$, adjusted $R^2 = 0.982$.
CV: cyber victim, CF: cyber forgery, CVB: cyber verbal bullying, IGD: internet gaming disorder

Table 5. Regression analyses of the total scores of scales affecting Piers-Harris Self-Esteem Scale in obese adolescents

	Unstandardized coefficients	Standardized coefficients		95% confidence interval for B	
	B	Beta	p	Lower bound	Upper bound
CB total	-0.589	-0.289	0.017	-1.063	-0.115
CV total	-0.069	-0.059	0.642	-0.359	0.221
PIUS total	-0.122	-0.188	0.270	-0.338	0.094
IGDS total	-0.066	-0.079	0.493	-0.254	0.122

$F = 2.927$, $df = 16$, $p < 0.001$, adjusted $R^2 = 0.630$.
CV: cyber victim, CF: cyber forgery, PIUS: Problematic Internet Use Scale, IGDS: Internet Gaming Disorder Scale

Discussion

The present study showed that adolescents diagnosed with obesity exhibited lower self-esteem compared to healthy controls, while problematic internet use was higher among obese individuals relative to healthy controls. However, no differences were found between groups regarding IGD and cyberbullying/victimization levels. To the best of our knowledge, this study is the first to examine the relationship between problematic internet use, IGD, and cyberbullying/victimization with self-esteem in obese adolescents. Significant findings were identified that both confirm and extend existing research in this area. In obese individuals, CF and verbal cyberbullying victimization, IGD withdrawal subscales, and total scores on the cyberbullying scale were found to be factors negatively affecting self-esteem.

Self-esteem refers to a person's self-evaluation or attitude towards themselves and is a fundamental aspect of mental health (8,38). In a study of 2,813 Australian children (average age: 11.3 years), obese children showed significantly lower athletic competence, physical appearance, and overall self-esteem compared to their normal-weight peers (39). A review of the literature reveals that self-esteem is impaired in obese adolescents in nearly all studies (40). In the present study, similar to the existing literature, it was found that obese adolescents had significantly lower scores in physical appearance, behavior, popularity, anxiety, happiness satisfaction sub-scales, and overall self-esteem compared to the control group. Overweight/obese children tend to encounter more social pressure and negative events, such as peer aggression, teasing, and bullying outside of their homes (41,42). These experiences can often lead to the development of low self-esteem in children with obesity.

IGD prevalence rates vary between 0.6% to 50% across studies conducted in different countries (43,44). Başdaş and Özbey (45) found that adolescents diagnosed with obesity have higher digital game addiction scores compared to a control group. These authors suggested that adolescents who allocate more time to digital games sit for longer periods and thus are less physically active. Being male has been shown to be a risk factor for IGD in various studies. In a study conducted with 1,556 students in Korea, it was shown that males play online games three times more than females (46). In the present study, no significant difference was found between adolescents diagnosed with obesity and the control group in terms of IGD. In the obese group 15% of the adolescents and 14% in the control group showed symptoms of risky internet gaming, with IGD being identified in 0.4% of the adolescents in the obesity group. In the present study, the prevalence of IGD was found to be lower than in other studies in the literature. This may have been because more than 2/3 of the sample group in our study was composed of girls, and that IGD was more commonly seen in boys, may have resulted in no significant difference being found between the groups in our study and the apparently low prevalence of IGD. We found that withdrawal symptoms of IGD were found to be a negative predictor of self-esteem in obese adolescents. Withdrawal symptoms are the negative emotions and/or physical effects that arise when gaming is suddenly stopped or reduced (47). It has also been found that low self-esteem triggers pathological gaming behavior (22). Excessive gamers are attracted to games because gaming stimulates the experience of power and autonomy, and strengthens self-esteem (22). Considering the relationship between IGD and self-esteem, monitoring internet gaming in adolescents could be a protective approach for self-esteem.

In the online world, individuals who are overweight and obese may frequently encounter aggressive messages. A systematic assessment of comments on a video-sharing website has reported that weight stigma can 'go viral' on the internet (48). In a study conducted among 4,364 children in the Netherlands, it was found that children diagnosed with obesity were more likely to be both victims and perpetrators of bullying compared to the control group (49). Sergentanis et al. (50) hypothesized that, due to the increasing prevalence of obesity, overweight/obesity has become normalized among adolescents. According to data from the Turkish Statistical Institute, the prevalence of obesity is increasing and being overweight or obese may have also become normalized in Türkiye, which could explain the lack of a

difference between the groups. Nocentini et al. (51) have reported that parental monitoring of online internet use is a protective factor against cyberbullying. In the present study, no difference was found between the groups in terms of parental monitoring of internet use. Thus, another reason for the lack of differences between the groups in terms of cyberbullying and victimization may be the similar levels of parental internet monitoring.

We found that exposure to CF and verbal cyberbullying victimization could be factors negatively affecting self-esteem in adolescents diagnosed with obesity. Adolescents diagnosed with obesity are often more affected by negative emotional experiences and generally have lower self-esteem compared to their peers (7,39,52). Therefore, cyberbullying victimization may further reduce self-esteem in obese adolescents. Self-esteem becomes increasingly important during adolescence, as this period heightens the significance of peer relationships, peer acceptance, and physical appearance, which can make adolescents more aggressive towards events that may threaten their self-esteem (53). Social relations theory posits that individuals with low self-esteem have weaker social relationships with others and that their lower conformity to social norms increases the risk of aggression (54). Individuals with low self-esteem may exhibit aggressive behavior to gain power and achieve a higher level of self-esteem (55). According to our findings, cyberbullying is another factor negatively affecting self-esteem. Obese adolescents might be exhibiting aggressive behaviors as a means of self-expression due to their low self-esteem, which could further diminish their sense of self-worth. When these findings are considered together, preventing cyberbullying/victimization in obese individuals may be a protective approach for the self-esteem of these individuals.

Study Limitations

Our study has several limitations. The most significant limitation is the cross-sectional design of our study. The cross-sectional design complicates the determination of the direction of the relationships between the variables assessed in individuals with obesity, as well as the establishment of causal relationships. Longitudinal studies are needed to provide more evidence for these relationships. Moreover, only self-report measures were used. Employing a multi-method approach (for example, integrating self-report measures with interviews) could be a strategy to overcome the limitations associated with collecting self-reported data. At the same time, we selected study samples from patients referred to pediatric endocrinology clinics, and nearly two-thirds of the adolescents in our study were girls. These factors limit the generalizability of our findings.

Conclusion

Our findings indicated that obesity was associated with low self-esteem and problematic internet use during adolescence. It was also shown that risky online behavior may be associated with self-esteem. In light of this, taking preventive measures to reduce problematic online behavior in obese adolescents may be a protective measure for self-esteem of obese adolescents. For the variables in our study to gain clarity in individuals diagnosed with obesity, longitudinal studies in a more homogeneous and larger sample are needed.

Ethics

Ethics Committee Approval: The study was approved by the Ethics Committee of Süleyman Demirel University Faculty of Medicine (protocol no: 72867572.050.01.04-216193, date: 11.02.2022).

Informed Consent: Written informed consent was obtained from the participants and their families.

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Footnotes

Authorship Contributions

Surgical and Medical Practices: Havvanur Eroğlu Doğan, Concept: Havvanur Eroğlu Doğan, Evrim Aktepe, Design: Havvanur Eroğlu Doğan, Evrim Aktepe, Ümit Işık, Mustafa Özgür Pirgon, Data Collection or Processing: Havvanur Eroğlu Doğan, Ümit Işık, Mustafa Özgür Pirgon, Analysis or Interpretation: Havvanur Eroğlu Doğan, Ümit Işık, Literature Search: Havvanur Eroğlu Doğan, Evrim Aktepe, Writing: Havvanur Eroğlu Doğan, Evrim Aktepe, Ümit Işık, Mustafa Özgür Pirgon.

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