Research / Araştırma

Investigation of the Relationship between Risk of Internet Addiction, Food Addiction, and Self-Esteem in High School Students

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ABSTRACT

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Objective: Increasing Internet addiction and food addiction in the 21st century have become a focal point for researchers. There is strong evidence that low self-esteem is a risk factor for behavioral and chemical addictions. Our aim in this study is to examine the relationship between risk of Internet addiction, food addiction, and self-esteem in students at a high school.

Method: Participants were 378 high school students, who completed a package of psychological instruments, including the Internet Addiction Test (IAT), Yale Food Addiction Scale (YFAS), and Coopersmith Self-Esteem Inventory (CSEI). Study data were evaluated using linear regression analysis to examine the risk factors that were significant in univariate analyses.

Results: Participants with high risk of Internet addiction had a significantly higher food addiction score (t=5.81; p<0.001) and lower self-esteem scores (t=-5.89; p<0.001) than participants who do not meet Internet addiction criteria according to the IAT. Also, the lineer regression model demonstrated that food addiction (ß=1.43; p<0.001) and low self-esteem (ß=-0.21; p<0.001) significantly contributed to Internet addiction risk.

Conclusion: Our study revealed the relationship between risk of Internet addiction and food addiction, and low self-esteem is a risk factor according to the concept of overlapping addiction.

Keywords: Food addiction, Internet, self esteem

ÖZ

Lise öğrencilerinde İnternet bağımlılığı riski, yeme bağımlılığı ve benlik saygısı arasındaki ilişkinin incelenmesi

Amaç: Yirmi birinci yüzyılda İnternet bağımlılığı ve yeme bağımlılığının artması onları bilim insanlarının odak noktası haline getirmiştir. Düşük benlik saygısının davranışsal ve kimyasal bağımlılıklar için bir risk faktörü olduğuna dair güçlü kanıtlar vardır. Bu çalışmada amacımız lise öğrencilerinde İnternet bağımlılığı riski, yeme bağımlılığı ve benlik saygısı arasındaki ilişkiyi incelemektir.

Yöntem: Katılımcı olarak 378 lise öğrencisi İnternet Bağımlılığı Testi (İBT), Yale Yeme Bağımlılığı Ölçeği (YYBÖ) ve Coopersmith Benlik Saygısı Envanteri de (CBSE) dahil olmak üzere psikolojik araçlardan oluşan bir form doldurdular. Çalışma verileri değerlendirildiğinde, tek değişkenli analizlerde anlamlı olan risk faktörlerini incelemek için Doğrusal Regresyon Analizi kullanılmıştır.

Bulgular: İBT'e göre internet bağımlılığı riski yüksek olan katılımcılarda YYBÖ puanı yüksekti, İnternet bağımlılığı kriterlerini karşılamayan katılımcılara göre yeme bağımlılığı ölçek skoru daha yüksek (t=5.81; p<0.001) ve benlik saygısı ölçek puanları (t=-5.89; p<0.001) daha düşüktü. Ayrıca doğrusal regresyon modelinde, YYBÖ puanları (ß=1.43; p<0.001) ve düşük benlik saygısı puanları (ß=-0.21; p<0.001), İnternet bağımlılığı için önemli risk faktörleriydi.

Sonuç: Çalışmamız, İnternet bağımlılığı ve yeme bağımlılığı riski arasındaki ilişkiyi ve düşük benlik saygısının üst üste binen bağımlılık (overlapping addiction) kavramı için bir risk faktörü olduğunu ortaya koymuştur.

Anahtar kelimeler: Yeme bağımlılığı, İnternet, benlik saygısı

INTRODUCTION

The Internet has become an important part of modern life, providing quick and easy communication between people all over the world (1). Since the beginning of the 21st century, with the spread of mobile devices as well as computers the use of the Internet has increased among children and adolescents (2). This is also true in Turkey; according to data from the Turkish Statistical Institute, the rate of computer and Internet use was 32.2% and 26.6% respectively in the age range of 16 to 24 years in 2004, however this rate increased to 68% and 82.2%, respectively for same age range in 2017 (3). Although the Internet has facilitated human life in ways previously not believed to be possible, its convenience presents a risk of addiction, as can be seen through the emergence of definitions such as Internet addiction or problematic Internet use or uncontrolled use of the Internet, negative emotions and impairment of functionality (4).

Internet addiction is generally defined as 1) uncontrolled, more than planned, and increasing use of the Internet; 2) exposure to negative feelings such as excessive tension and nervousness when deprived; and 3) the gradual deterioration of the addicted person's work, school, and family life. Internet addiction is assessed in parallel with behavioral addiction patterns such as gambling, sex, food, and shopping addictions. Young et al. (5) have adapted diagnostic criteria for pathological gambling to pathological Internet use and published the first serious diagnostic criteria for "Internet addiction". "Internet gaming disorder" was defined in the Diagnostic and Statistical Manual of Mental Disorders (DSM) 5 supplement for the first time. While Internet gaming disorder is not an official disorder in the DSM-5, the APA is encouraging further research on the disorder for possible inclusion in future editions of the DSM (6).

On the other hand, neurobiological studies have shown that there is a common neurobiological mechanism between obesity and addiction, one of the mechanisms underlying obesity being food addiction (7). Food addiction includes the idea that certain foods (usually processed, pleasing and high-calorie foods) may have an addictive potency and that excessive intake of these foods may represent addictive behavior (8). The proliferation of highly processed foods that could create addiction in the 21st century and the continued increase of obesity as a public health problem have made the definition of food addiction a focus of research (9).

The question "Does one addiction predicate another addiction?" points to one of the main research areas of addiction studies. Addictive personality was investigated especially in healthy and young populations, and overlapping addiction was a research topic among university students (10). One of these studies has shown that the presence of Internet addiction raises the risk of other behavioral addictions such as overeating and pathological gambling (11). A study by Tang and Koh (12) also showed that social network addiction increases other behavioral addictions, such as food and shopping addiction.

In adolescence, the desire for socialization can lead people with low self-esteem and shyness towards different foci. In particular, they realize that they can feel secure in the virtual environment while they cannot perform in real life, and the probability of developing addiction is also increasing. It is also suggested that people who use social networks can see other people's flashy profile pages, which reduces the self-esteem of the viewer (13). In a cross-sectional study conducted by Pantic et al. (14) with 244 university students, a significant relationship was found between Internet addiction and low self-esteem. Another study with 1044 subjects found low self-perception associated with early-age Internet use and Internet gaming disorder (15).

When examining the literature, it is worth noting that the relationship between these two addictions is increasingly important for adolescents. In this study, we aimed to investigate the relationship between Internet addiction, food addiction, and self-esteem in high school students. As far as we know, the particular relationship between risk of Internet addiction and food addiction is an issue that has not been studied before.

METHOD

This research was carried out with 384 students between 14 and 18 years of age studying at a high school in Istanbul, Turkey. Six students for whom missing or erroneous entries in the data collection instruments were found were excluded from the study. As a result, the data of a total of 378 students were subjected to statistical analysis.

Procedures

The study was conducted in January, 2016. In the data collection process, there are no cases that are excluded from study except for cases where the form is considered to be unreliable. All participants were informed about the aims of the study and gave written informed consent. Respondents were not compensated for their participation. The volunteers completed a package of psychological instruments, including the Internet Addiction Scale (IAT), Coopersmith Self-Esteem Inventory (CSEI), and Yale Food Addiction Scale (YFAS), administered by two investigators in their classrooms. The present study protocol received approval from the Ethics Committee of the Institute of Social Sciences, Istanbul Gelisim University, with the approval number 2015-23-6.

Measures

Internet Addiction Test (IAT): The scale was designed by Hahn and Jerusalem (16) to determine individual Internet addiction levels and was adapted to Turkish by Sahin and Korkmaz (17). This scale consists of 19 items and it is a self-report measure with a 5-point Likert-type scale (1=never; 5=always). Higher score indicates higher Internet addiction level. Exploratory factor analysis for structural validity of the scale accounted for 68.09% total variance in the Turkish adaption study. Results of confirmatory factor analysis indicated that the model was well-fit, and the chi-square value (χ^2=580.17, n=486, p=0.01) that was calculated for the adaptation of the model was found to be significant. The Cronbach Alpha values of the subscales

varied between 0.89 and 0.93, and the overall Cronbach Alpha value of the scale was 0.86 (17). In this study, the general reliability of the IAT applied to individuals was found highly reliable, with α=0.93. For assessing the risk of Internet addiction, the statistical cut-off score was determined to be 35 according to the IAT.

Yale Food Addiction Scale (YFAS): The YFAS measures clinical symptoms of food addiction according to the substance-dependence criteria in DSM-IV-TR as well as assessing clinical impairment or distress (18). The YFAS is a 25-item measure, which assesses addictive eating behavior such as reduced involvement in social, occupational, and recreational pursuits due to addictive eating and food tolerance. Responses are used to calculate a symptom count of food addiction symptoms ranging from 0 to 7. A diagnosis of food addiction can be made if an individual endorses 3 or more symptoms and indicates clinically significant impairment (19). The validity and reliability of the Turkish YFAS among bariatric surgery patients was performed by Sevincer et al. (20). Internal consistency was found to be 0.82, as analyzed by the KR-20 formula (20). In this study, the general reliability of the YFAS applied to individuals was found highly reliable, with α=0.861.

Coopersmith Self-Esteem Inventory (CSEI): The CSEI was developed by Coopersmith to measure the self-esteem of students (21). There is a long form of this scale consisting of 58 items and a short form composed of 25 items. The short form was used in this study. The validity and reliability study of the CSEI was carried out by Piskin (22). The validity and reliability study of the CSEI was carried out by Piskin (22). The reliability of the inventory calculated by Kuder Richardson (KR-20) formula is 0.76 (22). In the present study, the general reliability of the CSEI applied to individuals was found reliable, with α=0.78.

Statistical Analysis

All data were evaluated using the SPSS-24 statistical package. Firstly, descriptive statistics were computed. In addition to descriptive statistical methods (frequency,

percentage, mean, standard deviation), Pearson's chi-square test and Fisher exact test, Pearson correlation analysis and independent variables t-test were used. Linear regression analysis was used to examine the risk factors that were significant in univariate analysis. The risk values were calculated within the 95% confidence interval. Significance threshold was set at p<0.05.

RESULTS

Descriptive Analyses

The mean age of the participants was 16.01 years (SD±1.2), ranging between 14 and 18 years. Of the sample, 84.9% were male (n=321); 20.4% reported smoking, 16.1% met the criteria for food addiction according to the YFAS, and 37.8% met the criteria for risk of Internet addiction according to the IAT. Demographic characteristics, means and standard deviations of the IAT, YFAS and CSEI scores are presented in Table 1.

Differences of Participant Characteristics and Scores According to the Presence of Risk of Internet Addiction

Participant characteristics were compared by chi-square test according to the presence of risk of Internet addiction. There was no difference between participants according to their sex, age, BMI percentile, and smoking status (Table 2).

Individual differences in scores were compared according to risk of Internet addiction by independent t-test. The subscales of IAT, YFAS, and CSEI scores of the participants were significantly different according to risk of Internet addiction. Participants with risk of Internet addiction had a significantly higher food addiction score (t=5.81; p<0.001) and lower self-esteem scores (t=-5.89; p<0.001) than participants who did not meet risk of Internet addiction criteria according to the IAT (Table 3).

Table 1: Participant characteristics, means and standard deviations for psychometric instruments

Participant characteristics (n=378)	n	%	Mean	SD	Range
Gender					
Female	57	15.1			
Male	321	84.9			
Age			16.01	1.19	14-18 years
14-15 years	145	38.4			
16-17 years	185	48.9			
18 years	48	12.7			
Smoking					
Smoking	77	20.4			
Not smoking	301	79.6			
Daily internet use			4.23	3.32	0-16 hours
Less than 3 hours	208	55.0			
4 to 7 hours	77	20.4			
More than 7 hours	93	24.6			
Having own personal computer					
Yes	220	58.2			
No	158	41.8			
Body mass index percentile			50.89	30.26	0-99.6
Very underweight	23	6.1			<5
Underweight	40	10.6			5-14.9
Healthy weight	258	68.3			15-84.9
Overweight	37	9.8			85-94.9
Obese	20	5.3			>95
IAT symptoms			35.03	14.73	19-95
Met criteria	143	37.8			
Did not meet criteria	235	62.2			
YFAS symptoms			5.16	3.06	0-19
Met criteria	61	16.1			
Did not meet criteria	317	83.9			
CSEI symptoms			64.41	18.11	8-96

IAT: Internet Addiction Test; YFAS: Yale Food Addiction Scale; CSEI: Coopersmith Self-Esteem Inventory

Table 2: Comparison of participant characteristics according to the presence of risk of Internet addiction

| | Risk of Internet Addiction | | | | | |
| | Yes | | No | | | |
Participant characteristics	n	%	n	%	χ^2	p
Sex						
Female	19	13.3	38	16.2	0.58	0.27
Male	124	86.7	197	83.8		
Age						
14-15 years	49	34.3	96	40.9	1.68	0.43
16-17 years	74	51.7	111	47.2		
18 years	20	14.0	28	11.9		
BMI percentile						
Severely underweight	10	7.0	13	5.5	1.09	0.90
Underweight	14	9.8	26	11.1		
Healthy weight	98	68.5	160	68.1		
Overweight	15	10.5	22	9.4		
Obese	6	4.2	14	6.0		
Smoking						
Yes	32	22.4	45	19.1	0.57	0.27
No	111	77.6	190	80.9		

Table 3: Comparison of scores according to the presence of risk of Internet addiction

| | Risk of Internet Addiction | | | | | |
| | Yes (n= 143) | | No (n=235) | | | |
Measures	Mean	SD	Mean	SD	t	p
Loss of control*	19.92	6.03	10.29	2.81	17.976	<0.001
Want to stay more online*	11.92	3.81	5.42	1.69	19.29	<0.001
Negativity social interaction*	18.74	6.40	9.86	2.37	15.95	<0.001
Coopersmith Self-Esteem Inventory	57.68	18.26	68.51	16.78	-5.89	<0.001
Yale Food Addiction Scale	6.43	3.84	4.39	2.14	5.81	<0.001

*Subscales of Internet Addiction Test

Table 4: Pearson product-moments correlation coefficients

	1	2	3	4
1. Internet Addiction Test	1.00			
2. Yale Food Addiction Scale	0.36**	1.00		
3. Coopersmith Self-Esteem Inventory	-0.31**	-0.19**	1.00	
4. Body mass index percentile	-0.001	0.007	-0.054	1.00

*p<0.05, **p<0.01

Pearson correlation coefficients were calculated to examine the associations between the Body mass index (BMI) and IAT, YFAS, and CSEI scores. There was a strong correlation between all scale and subscale scores. There was no correlation between BMI and other variables such as the IAT, the YFAS, and the CSEI scores. Pearson correlations are presented in Table 4.

Linear Risk Analyses for Risk of Internet Addiction

We performed linear regression analyses to examine risk factors for risk of Internet addiction. In the linear model, we regressed sex, economic situation, tobacco use, BMI, CSEI and YFAS as independent variables for risk of Internet addiction. As can be seen in Table 5, the

Table 5: Linear risk analyses for risk of Internet addiction

Independent variable	B	T	P	F	Model (p)	R^2
Sex	-2.63	-1.32	0.19	13.94	<0.001	0.19
Economic status	0.92	0.64	0.52			
Smoking	1.23	0.67	0.50			
Disciplinary punishment in school	-4.17	-1.97	0.05			
Body mass index percentile	-0.01	-0.53	0.60			
Coopersmith Self-Esteem Inventory	-0.21	-5.45	<0.001			
Yale Food Addiction Scale	1.43	6.12	<0.001			
Constant	48.07	6.56	<0.001			

linear model demonstrated that food addiction (ß=1.43; p<0.001) and low self-esteem (ß=-0.21; p<0.001) significantly contributed to risk of Internet addiction.

DISCUSSION

In our study, a significant positive correlation was found between Internet addiction scores and food addiction scores. In the regression analysis applied for Internet addiction, it was determined that food addiction is a strong predictor for risk of Internet addiction. Although there is limited information about overlapping addiction phenomena, having one kind of addiction predicts an increased risk for another (10). The relationship between Internet addiction and food addiction may be an example of overlapping addictions. To our knowledge, our study is the first to examine the relationship between risk of Internet addiction and food addiction. Previous studies have examined the relationship between Internet addiction and disordered eating attitudes (23,24). A cross-sectional study with 584 adolescents found a significant relationship between Internet addiction and disordered eating attitude scores (25). Similarly, there was a significant positive correlation between problematic Internet use and eating attitude test score in a study conducted among 314 university students (26). In studies involving young persons and adolescents compared to a control group of 54 Internet addicts, Internet addiction and eating disorder symptoms were found to be particularly important in women (27). However, in a study involving 1938 students, no significant difference was found between disordered eating attitudes and the degree of Internet addiction (28).

In our study, low self-esteem scores were associated with high Internet addiction scores. Those who meet the criteria for risk of Internet addiction according to the IAT have a significantly lower self-esteem than those who do not. A well-designed study examining the relationship between Internet addiction and self-esteem included 1044 adults and found a negative relationship between Internet addiction and self-esteem. In that study, it was found that early Internet use increased Internet addiction indirectly through self-esteem and gaming-contingent self-worth (15). In another cross-sectional study conducted in young people, a positive correlation was found between low self-esteem and Internet addiction (14). These studies show that a decrease in self-esteem increases Internet addiction.

There is limited information about the reduction in self-esteem being predisposing to chemical and behavioral addiction (10). In our study, there was a significant correlation between food addiction scores and low self-esteem as well as Internet addiction scores. When the findings are thoroughly examined, it is suggested that low self-esteem is an important risk factor for addiction behavior and overlapping addiction.

In one of the studies that investigated the relationship between Internet addiction and obesity, obese and non-obese control groups were examined in children and adolescents, and statistically significant results were obtained between Internet addiction rate and Internet addiction score and obesity (29). There was a significant relationship between Internet addiction and BMI in two cross-sectional studies conducted in adolescents (25,28).

In another study, the relationship between Internet addiction and BMI was found to be significant in males but not in females (27). In our study, there was no significant difference between BMI and risk of Internet addiction, which may be due to the sample being a non-clinical population with a relatively narrow age range. In addition, the cross-sectional nature of the study may not have demonstrated a possible relationship between BMI and risk of Internet addiction.

The first limitation of our study was the narrow age range and the application to high school students only, which might make it difficult to generalize the findings. Our study was designed as a scale study in which no psychiatric interviews were conducted with the participants. For this reason, findings should be supported by future clinical studies that could explain better the relationship between risk of Internet addiction, food addiction, and self esteem. Finally, the cross-sectional design of our study and the inability to assess attention deficit hyperactivity disorder, depression, and anxiety symptoms that can affect both the Internet and food addiction are further limitations. Longitudinal and prospective studies will provide more detailed information on possible risk factors to be investigated when researching the way to obesity.

In sum, when the findings are taken as a whole, a strong relationship is found between risk of Internet addiction and food addiction in adolescents. Low self-esteem was associated with both addictions and was a risk factor according to the concept of overlapping addiction. Our study has achieved pioneering results for addiction and obesity studies. One of the treatment goals of Internet and food addiction should be to support self-esteem. Our findings suggest that psychotherapeutic approaches to self-esteem may reduce the frequency and severity of addictions. Longitudinal studies in the clinical sample are needed to support and consolidate our findings.

Contribution Categories		Author Initials
Category 1	Concept/Design	M.S.Y., G.M.S.
	Data acquisition	M.S.Y., C.A.
	Data analysis/Interpretation	M.S.Y., G.M.S., A.K., C.A.
Category 2	Drafting manuscript	M.S.Y., G.M.S., A.K., C.A.
	Critical revision of manuscript	G.M.S., A.K.
Category 3	Final approval and accountability	M.S.Y., G.M.S., A.K., C.A.
Other	Technical or material support	M.S.Y., G.M.S., C.A.
	Supervision	G.M.S., A.K.
	Securing funding (if applicable)	M.S.Y.

Informed Consent: Written consent was obtained from the patients.

Peer-review: Externally peer-reviewed.

Conflict of Interest: Authors declared no conflict of interest.

Financial Disclosure: Authors declared no financial support.

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