Original Research

Investigation of the Relationship Between Internet Addiction, Food Addiction and Impulsivity in Adolescents Presenting at the Child Psychiatry Outpatient Clinic

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ABSTRACT

Objective: The purpose of this study was to investigate the relationship between Internet addiction, food addiction, and impulsivity in children and adolescents aged 12-18 years who presented at the child psychiatry outpatient clinic of a university hospital.

Methods: This study included 207 patients aged 12-18 years who presented at the child and adolescent psychiatry clinic. All the study participants completed the Internet Addiction Test (IAT), the Barratt Impulsivity Scale (BIS-11), and the Yale Food Addiction Scale for Children 2.0 (YFAS-C 2.0).

Results: The individuals who scored above the IAT total score cut-off point had substantially higher scores on the YFAS-C 2.0, BIS-11 total scores, and BIS-11 cognitive impulsivity and non-planning subscale than the participants who scored below the IAT total score cut-off point. According to the results of logistic regression analysis, the YFAS-C 2.0 and BIS-11 total scores were found to be related to Internet addiction.

Conclusion: The study's findings indicate that impulsivity and food addiction might be significant risk factors for Internet addiction.

Keywords: Adolescents, Internet Addiction Disorder, Food Addiction, Impulsive Behavior.

INTRODUCTION

Problematic Internet use, which has been named Internet addiction, has become extremely common in recent years [1]. Internet addiction is defined as excessive and unlimited Internet use that can cause functionality disorders and significant problems in daily life, and this has now become an important public health problem with the continuously increasing use of the Internet [1,2]. Adolescence constitutes a risk for Internet addiction, and studies have shown a prevalence of 20%-26.5%

for Internet addiction in adolescents [1,3]. There are studies in literature that have shown that Internet addiction could be associated with some psychiatric disorders, depression, attention deficit hyperactivity disorder (ADHD), substance addiction, and eating disorders [4-6].

Impulsivity can be defined as decisions taken rapidly by a person even if they result in negative outcomes and a tendency to translate these decisions into behaviours [7]. It has been

suggested that there could be a relationship between weak impulse control of an individual and Internet addiction, which is defined as uncontrolled Internet use [7,8,9].

A person with a food addiction loses control over how much food they eat and has an overwhelming craving for it. This is characterised by extreme difficulty in stopping the desire to eat and the amount of food consumed, despite knowing that over-consumption will have negative outcomes [10]. It is thought that adolescents may be more predisposed to food addiction as they are more sensitive to rewards, more impulsive, and take more risks than adults. However, studies of the extent of food addiction have been conducted more on adults, and there is a very limited number of studies related to adolescence [11]. In 2021, a study revealed that there might be a connection between food addiction and impulsivity [10]. Additionally, a recent study revealed the possibility of a connection between Internet addiction and food addiction [12].

As stated above, impulsivity, Internet addiction, and food addiction are inter-related. However, as far as we are aware, there aren't many research comparing food addiction and Internet addiction, and there is no study in the literature that has evaluated the relationships of Internet addiction in adolescents, food addiction, and impulsivity together. The purpose of this research was to investigate the connection between impulsivity, food addiction, and Internet addiction in adolescents who visited the psychiatry polyclinic.

The research questions were: (a) is there a significant difference between adolescents with and without Internet addiction in respect of food addiction and impulsivity? and (b) is there

Main Points;
- Internet addiction is defined as excessive and unrestricted internet use that can cause significant distress and functional impairment in daily life.
- Adolescence is a time when Internet addiction is risky.
- There are studies showing that there may be a connection between impulsivity, internet addiction and food addiction.
- The results of the study suggest that food addiction and impulsivity could be important risk factors for Internet addiction.

a significant corrrelation between Internet addiction, food addiction, and impulsivity?

MATERIALS AND METHOD
Sample and Research Design
This single-centre, cross-sectional study included adolescents aged 12-18 years who presented at the Child and Adolescent Psychiatry Polyclinic of Afyonkarahisar Health Sciences University Medical Faculty Hospital between August 2023 and February 2024.

The research was explained to the teenagers who consented to take part in the study and all of the participants, along with their parents, gave their informed consent in writing and verbally. The study group was formed of 207 patients with no active psychotic symptoms, no common developmental disorder, and who had the mental capacity of a level to be able to respond to the questions on the questionnaires to be used.

The sociodemographic form was administered to all the study participants by a clinician, then the adolescents completed the Internet Addiction Test (IAT), the Barratt Impulsivity Scale (BIS-11), and the Yale Food Addiction Scale for Children 2.0 (YFAS-C 2.0).

Data Collection Tools
Sociodemographic data form: The researchers developed this form to capture the sociodemographic information of the study participants, including their age and gender.

Internet Addiction Test (IAT): This scale was developed by Young to determine Internet use habits and level of addiction. The scale consists of 20 items with 5-point Likert-type responses. Higher points indicate an increased severity of Internet addiction [13]. The total points are evaluated as 0-30 points indicating a normal level, 31-49 a mild level, 50-79 as a moderate level, and 80-100 as a severe level of addiction [14]. In the Turkish version of the IAT, a total score of >50 points has been defined as pathological Internet use [15]. Similar to other studies on this subject, the participants in this study were separated into two groups as the Internet addiction group with total IAT points ≥50 and the Internet non-addiction group with total IAT points ≤49 [16-18]. The scale was adapted to Turkish, and in a study by Bayraktar (2001) the Cronbach alpha coefficient was found to be 0.91, and the Spearman-Brown value was 0.87 [19].

The Yale Food Addiction Scale for Children 2.0 (YFAS-C 2.0): This scale is used to evaluate symptoms of food addiction in children and adolescents [20]. Validity and reliability studies of the scale in Turkish have been performed [21]. The scale consists of 16 items with 5-point Likert-type responses. High points indicate a higher level of food addiction [20]. The internal consistency reliability coefficent of the Turkish version of the YFAS-C 2.0 has been found to be 0.90 [21].

Barratt Impulsivity Scale 11 (BIS-11): This scale, developed by Patton et al., is used in the evaluation of impulsivity [22]. It is formed of 30 items with 4-point Likert -type responses scored from 1-4 points, in 3 subscales of non-planning, motor impulsivity, and cognitive impulsivity. High points indicate a high level of impulsivity. Validity and reliability studies of the Turkish version of the scale have been conducted [23].

Statistical Analysis

SPSS version 26.0 was used to do a statistical analysis on the study's data. Descriptive statistics were used to examine the sample's demographic features. In the comparisons of the groups with total IAT points above and below the cutoff value, the Student's t-test or Mann Whitney U-test were used depending on the normality of distribution of the data. To determine correlations between variables, Spearman correlation analysis was applied. Potential factors found in the earlier analyses were used in logistic regression analyses to evaluate independent predictors of Internet addiction in the multivariate study. The results were evaluated as statistically significant at Type 1 error level <5%.

RESULTS

Evaluation was made of a total of 207 adolescents, comprising 130 (62.8%) females and 77 (37.2%) males with a mean age of 14.6±1.7 years.

The whole study sample was separated into two groups as those with and without Internet addiction according to the cutoff value of the IAT. The group with Internet addiction (≥50 IAT points) included 52 (25.1%) adolescents and the group without Internet addiction (≤49 IAT points) included 155 (74.9%) adolescents. No significant difference was determined between the groups with and without Internet addiction in respect of gender ($x2=0.378$, p=0.776), or mean age (14.61±0.24 years vs. 14.61±0.13 years) (z=-0.022, p=0.983).

The IAT total points (p<0.001), YFAS-C 2.0 total points (p<0.001), BIS-11 total points (p<0.001), BIS-11 cognitive impulsivity subscale points (p<0.001) and the BIS-11 non-planning subscale points were determined to be statistically significantly higher in the Internet addiction group than in the group without Internet addiction. No significant difference was found between the groups in respect of the BIS-11 motor impulsivity subscale points (p=0.07) (Table 1).

Table 1. The IAT total points, YFAS-C 2.0 points, and BIS-11 subscale points of the groups with and without Internet addiction

	With Internet Addiction (n:52)		Without Internet Addiction (n:155)		z	p
	Mean	SD	Mean	SD		
IAT total points	62.88	1.32	27.57	1.00	-10.785	**<0.001**
YFAS-C 2.0	30.82	2.01	15.82	1.14	-5.83	**<0.001**
BIS-11 total points	71.40	1.12	61.67	0.86	-5.789	**<0.001**
BIS-11 cognitive impulsivity subscale points	22.019	0.56	18.12	0.36	-5.184	**<0.001**
BIS-11 Motor impulsivity subscale points	16.78	0.57	15.71	0.31	-1.814	0.070
BIS-11 non-planning subscale points	32.59	0.47	27.83	0.41	-6.042	**<0.001**

SD: standard deviation - Mann Whitney U-test

YFAS-C 2.0: Yale Food Addiction Scale for Children 2.0, BIS-11: Barratt Impulsivity Scale- 11, IAT: Internet Addiciton Test

Table 2. Correlations between the IAT total points and the BIS-11 subscale points and the YFAS-C 2.0 (n=207)

	BIS-11 Total points		BIS-11 Cognitive Impulsivity subscale points		BIS-11Motor Impulsivity subscale points		BIS-11 Non-planning subscale points		YFAS-C 2.0	
	r	p	r	p	r	p	r	p	r	p
IAT total points	0.529	**<0.001**	0.474	**<0.001**	0.271	**<0.001**	0.479	**<0.001**	0.479	**<0.001**
YFAS-C 2.0	0.470	**<0.001**	0.503	**<0.001**	0.317	**<0.001**	0.336	**<0.001**		-

Spearman correlation

YFAS-C 2.0: Yale Food Addiction Scale for Children 2.0,   BIS-11: Barratt Impulsivity Scale-11, IAT: Internet Addiction Test

Table 3. Results of the Logistic Regression Analyses of the YFAS-C 2.0 and the BIS-11 subscale points to determine the factors related to Internet addiction

	Standard error	p-value	Cox & Snell R2
			0.221
Gender	0.393	0.106	
Age	0.109	0.689	
YFAS-C 2.0	0.013	**<0.001**	
BIS-11 total points	0.020	**0.001**	

YFAS-C 2.0: Yale Food Addiction Scale for Children 2.0,   BIS-11: Barratt Impulsivity Scale- 11

The Spearman correlation analysis's findings indicate that a significant positive correlation was determined between the IAT total points and the BIS-11 cognitive impulsivity subscale points (p<0.001), the BIS-11 total points (p<0.001), BIS-11 non-planning subscale points (p<0.001) at a moderate level, between the IAT total points and the BIS-11 motor impulsivity subscale points (p<0.001) at a weak level, between the IAT total points and the YFAS-C 2.0 total points (p<0.001) at a moderate level, between the YFAS-C 2.0 total points and the BIS-11 total points (p<0.001) and the BIS-11 cognitive impulsivity subscale points (p<0.001) at a moderate level, and between the YFAS-C 2.0 total points and the BIS-11 motor impulsivity subscale points (p<0.001) and BIS-11 non-planning subscale points (p<0.001) at a weak level. The results of the correlation analyses are shown in Table 2.

Logistic regression analyses were used to determine relationships of age, gender, YFAS-C 2.0 total points, and BIS-11 total points with Internet addiction (Table 3). The analysis results showed a significant correlation of YFAS-C 2.0 total points (p<0.001) and BIS-11 total points (p=0.001) with Internet addiction.

DISCUSSION

According to our study results, a significant relationship was found between food addiction, impulsivity and Internet addiction. Food addiction scores were higher in adolescents with internet addiction. Despite the fact that several research have been conducted and published in the literature demonstrating a connection between food and Internet addiction [6,24], to the best of our knowledge, there are very few studies that have examined the relationship between Internet addiction and food addiction in the adolescent age group. A study conducted in 2023 of 180 obese and non-obese children aged 8-18 years reported that there could be a relationship between Internet addiction and food addiction [12]. 'Some studies have shown that Internet addiction is associated with eating disorders [25,26]. In another study of eating behaviours in adolescents with Internet addiction, it was seen that high Internet usage could have an impact on negative eating behaviours such as skipping meals, and snacking [24]. It has been reported that increased frequency of Internet use can lead to a decrease in physical activity and the development of irregular eating habits [12]. When it is considered that there is an extremely limited number of studies related to Internet addiction and food addiction in the adolescent age group, the current

study suggests that there is a need for more comprehensive studies related to the correlation between Internet addiction and food addiction in adolescents and the potential mechanisms of this relationship. The results of this study also show that food addiction could be a risk factor for Internet addiction.

Some previous studies have also shown higher impulsivity in adolescents with Internet addiction compared to those without, similar to the findings of the current study [8,9]. In the current study regression analyses, impulsivity was seen to be correlated with Internet addiction at a significant level. Using the DSM-IV criteria, some authors have suggested that Internet addiction is a condition associated with problems of impulse control [27,28]. Impulsivity is dealt with as an endophenotype of individuals at risk of developing addiction, primarily substance abuse and pathological gambling [29]. Another study also showed that the presence of impulsivity characteristics in adolescents was associated with Internet addiction [9]. Internet addiction is defined as difficulty in controlling internet use [8]. At the same time, impulsivity is the tendency to act prematurely without forethought, which is considered a lack of cognitive control. It is therefore suggested that impulsivity may play an inhibitory role in the stopping of addictive behaviors [30]. Adolescents are thought to be at greater risk of Internet addiction as in this youthful period they are more impulsive, and have weaker self-regulation capabilities for Internet use [3]. To the best of our knowledge, there is a limited number of studies that have examined the relationship between Internet addiction and impulsivity in the adolescent age group. In the light of the above-stated information, the results of this study suggest that impulsivity in adolescents could play an important role in terms of Internet addiction and impulsivity characteristics could be a significant risk factor for Internet addiction.

The current study results also demonstrated a significant positive correlation between food addiction and impulsivity. It is thought that more frequent and severe loss of control over food and eating is associated with impulsivity [31,32]. It has also been reported that characteristics such as an increase in reward-seeking and low capability of self-control can be seen in adolescence, and these can cause an increase in risk-taking behaviours [33,34]. When the neurodevelopmental characteristics of adolescence are taken into consideration, it has also been stated that the mechanism between food addiction and impulsivity has not been sufficiently understood [10]. Although the current study results support the findings in literature of a relationship between food addiction and

impulsivity, the above-mentioned information suggests that there remains a need for more comprehensive studies of the potential mechanisms of the relationship between impulsivity and food addiction.

No study could be found in the literature that has evaluated Internet addiction, food addiction, and impulsivity together at the same time in adolescents. Therefore, this can be accepted as a strong aspect of this study. The results of this study demonstrate that food addiction and impulsivity in adolescents aged 12-18 years could be a risk factor for Internet addiction. Further studies of the relationships between Internet addiction, food addiction, and impulsivity would be helpful for the better understanding of the mechanisms of these important problems in adolescence and for the development of intervention methods.

Limitations of this study were primarily the cross-sectional design and relatively small sample size, which prevent the generalisation of the results. Another limitation could be said to be that self-reported scales were used for the evaluation of food addiction, impulsivity, and Internet addiction, and that the mental capaity of the children was not evaluated with objective intelligence tests.

CONCLUSION

The results of this study demonstrated that food addiction and impulsivity were determined at higher rates in adolescents with Internet addiction compared to those without. In addition, significant positive correlations were determined between Internet addiction and impulsivity and food addiction, and between food addiction and impulsivity. In the logistic regression analysis, food addiction and impulsivity were seen to be correlated with Internet addiction at a significant level and could be significant risk factors. Nevertheless, there is a need for further studies to be able to better understand the underlying mechanisms of impulsivity, food addiction and Internet addiction which can be observed in adolescence, and the relationships between these.

Ethics Committee Approval: Study procedures were performed in accordance with the Declaration of Helsinki. The study received ethical approval from the ethics committee of Afyonkarahisar Health Sciences University Faculty of Medicine. (date: 11.08.2023, ethics committee no: 2023/330).

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