Behavioural Addiction and Associated Risk Factors Among High School Students

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Abstract

Objective: Investigating the relationship between behavioral addictions and mental health is essential due to their impact on well-being and the significant barriers they create to achieving lasting recovery. The aim of the study was to examine the prevalence of food addiction, problematic internet use, and internet gaming disorder among 866 high school students (grades 9–12) in Turkey, Bingöl and their associated with impulsivity, emotional regulation, depression, anxiety, and stress.

Methods: The sample was selected using a convenience sampling approach. Data were collected via online questionnaires using validated scales and analysed with SPSS package programme.

Results: The prevalence of food addiction was 6.9%, problematic internet use 14.3%, and internet gaming disorder 0.9%. Problematic internet use relatively high prevalence likely reflects adolescents' increased exposure to digital devices. Mental health factors were found to be significantly related to behavioral addictions: depression, anxiety, and stress predicted food addiction; depression and stress predicted problematic internet use, and anxiety was linked to internet gaming disorder.

Conclusions: This study contributes to the literature by examining multiple behavioural addictions and their common risk factors simultaneously and provides a comprehensive perspective. It is also one of the rare studies examining food addiction with other behavioural addictions. More research is needed to develop better intervention programmes and policies in the issue.

Keywords: Adolescent, anxiety, behavioural addiction, depression, emotional regulation, impulsivity.

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Introduction

Behavioral addictions (BAs), characterized by compulsive, repetitive behaviors leading to significant harm or distress and impaired functioning, are increasingly recognized as a major concern, particularly among adolescents (Kardefelt-Winther et al., 2017). Although traditional addictions pose a major public health problem among adolescents, the prevalence and impact of non-substance-related addictive behaviors have gained increasing attention in recent years, leading to a growing interest in the literature (Estévez et al., 2017; Griffiths, 2017). While behavioral addictions related to the internet, digital media, and technology have been more extensively studied, research on non-internet-related addictions remains relatively limited, with even fewer studies examining the relationship between technological and non-technological BAs (Huang et al., 2023; Kucuk & Alemdar, 2023; Park et al., 2022). Adolescence, a critical developmental period, presents a heightened vulnerability to developing these unhealthy behaviors (French et al., 2001; Schiestl et al., 2021).

Food addiction (FA) is a non-digital behavioral addiction characterized by compulsive seeking and consumption of food, development of tolerance and withdrawal symptoms, and activation of reward pathways in the brain, mirroring the neurobiological mechanisms observed in substance addictions (Rossi et al., 2023). The prevalence of FA among adolescents varies widely, ranging from 2.6% to 49.9%, highlighting the need for further research in this area (Skinner et al., 2021). This variability may be partly attributed to the unique challenges adolescents face in establishing healthy dietary habits, including increased consumption of fast food, processed foods, and irregular eating patterns, all of which can contribute to FA and subsequent health issues like obesity (French et al., 2001; Schiestl et al., 2021). Importantly, FA shares common risk factors with other BAs, suggesting potential overlapping vulnerabilities (Alavi et al., 2012).

The digital age has witnessed a dramatic increase in internet usage across all age groups, with adolescents and young adults at the forefront (Terres-Trindade & Mosmann, 2016). This increased exposure has led to a rise in PIU, with global prevalence rates ranging from 0.7% to 35.5%, and in Turkiye, from 1.3% to 16.1% (Bhandari et al., 2017; Goel et al., 2013; Kilic et al., 2016; Sayili et al., 2023). Similarly, IGD, another prevalent BA, has reported global prevalence rates between 1.6% and 29.3%, with Turkish studies reporting rates of 4.32% to 28.8% (Alfaifi et al., 2022; Irmak & Erdoğan, 2019; Müller et al., 2015).

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PIU and IGD are associated with a range of negative psychological, physical, and social consequences (Yen et al., 2010; Zeyrek & Fatih Tabara, 2024). These include loneliness, low self-esteem, anxiety, depression, poor coping skills, impulsivity, emotional regulation difficulties, and sleep disturbances. Individuals struggling with these addictions often prioritize online activities over essential needs such as sleep, nutrition, and social relationships, leading to health problems like back pain, eye fatigue, and even eating disorders (Lee et al., 2017). Furthermore, these addictions can have devastating psychosocial impacts, including school or work dropout, relationship breakdowns, and strained family dynamics (Bargeron & Hormes, 2017).

Epidemiological studies have investigated PIU, IGD and FA separately, however research examining the relationship between FA and other digital addictions remains limited (Skinner et al., 2021; Szerman et al., 2023). Despite shared underlying mechanisms and potentially overlapping risk factors, the complex interplay between these behaviors is not fully understood (Alavi et al., 2012). Several studies have begun to explore these relationships but more research is crucial (Huang et al., 2023; Kucuk & Alemdar, 2023; Park et al., 2022). This study addresses this gap by taking a holistic approach, examining the prevalence of these co-occurring behavioral addictions among adolescents and investigating shared risk factors. Identifying these common risk factors will be crucial for developing comprehensive and effective intervention programs aimed at preventing and addressing these interconnected challenges.

Methods

Design and Setting

The study is cross-sectional, targeting high school students in grades 9, 10, 11 and 12 in 33 schools in Bingöl province. The students participating in this study were selected by convenience sampling, which involves selecting individuals who are easily accessible or willing to respond. 866 students participated in the study in this way. In order to conduct the study, permission was obtained from the Directorate of National Education. The study link was shared with all accessible students in 33 schools. Participation was voluntary, and students could proceed with the online survey only after selecting the "I voluntarily agree to participate in this study" option at the beginning of the questionnaire. Parents and subjects agreed to participate and signed informed consent. It was made clear that participant identities would remain anonymous. The online questionnaire was designed to be completed

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at home to provide a quieter and more comfortable environment for students. Teachers were trained on the study to ensure that they could support the process effectively. Students reached out to their teachers if they had any questions about the study or the survey items so that they could receive guidance and clarification when they needed it.

Data was collected between September 2023 and November 2023. The questionnaire was created and data was collected using Google Forms. It consists of eight sections. The scales used in sections three to eight are also included. The first section provides a brief introduction to the study and an option to approve participation. The second section assesses the demographic characteristics of the participants, including age, gender, class, income, academic achievement, daily screen and sleep time, and leisure time activity.

Demographic variables such as income, screen time and academic achievement provide insight into the risk factors associated with behavioural addictions. These factors exert an influence on behaviours including internet use, gaming habits and emotional regulation (W. Zhang et al., 2022). For instance, income affects technology access, screen time is linked to internet use and academic achievement may indicate underlying psychological challenges. The analysis of these variables facilitates an exploration of the ways in which different aspects of students' lives contribute to the risk of addiction.

Ethical Approval

The ethics committee of Bingol University approved this study (Approval number: 33117789/044/135265). The procedures followed during the present study were completely in accordance with the Helsinki Declaration of 1975, as revised in 2013.

Measures

In the study, six internationally validated and reliable scales were employed, each utilizing Turkish versions that have undergone validation and reliability testing (Arıcak et al., 2018; Durmuş et al., 2022; Kutlu et al., 2016; Tetik & Cenkseven Önder, 2021; Tok et al., 2023; Yılmaz et al., 2017). These included the Modified Yale Food Addiction Scale Version 2.0 (mYFAS 2.0), Young's Internet Addiction Test-Short Version (IAT-SV), Internet Gaming Disorder Scale 9-Short Form (IGDS9-SF), Barratt Impulsiveness Scale-Brief (BIS-Brief), Depression Anxiety Stress Scale 21 (DASS-21) and Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA) (Gullone & Taffe, 2012; Lovibond & Lovibond, 1996; Pawlikowski et al., 2013; Pontes & Griffiths, 2015; Schulte & Gearhardt, 2017; Steinberg et

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al., 2013). The ERQ-CA contains 10 items that assess the emotion regulation strategies of cognitive reappraisal (6 items) and expressive suppression (4 items). The scale scoring criteria and category cut-off points provided by the respective author of each scale were not altered. The diagnosis of FA (mild = 2-3 symptoms and impairment, moderate = 4-5 symptoms and impairment, severe = 6 or more symptoms and impairment) was accepted (Gearhardt et al., 2016). The cutoff value for the IAT-SV was set at 36 based on literature values (Meerkerk, 2007; Tran et al., 2017; M. W. B. Zhang et al., 2017). The cut-off score for IGDS9-SF was also set as 36. To assess specific domains of behavioural addictions, three scales (mYFAS 2.0, IAT-SV, IGDS9-SF) were used. Impulsivity was measured using the BIS-Brief, emotion regulation was assessed using the ERQ-CA, and depression, anxiety, and stress were evaluated using the DASS-21.

Data Analysis

The study employed an online questionnaire where all questions were set as mandatory fields, reducing the likelihood of incomplete responses. As a result, there were no missing data in the final dataset used for analysis. In instances where participants did not complete the survey in its entirety (e.g., exiting before submission), their responses were not saved, as required fields ensure completeness. This approach ensured a clean dataset for analysis. The Statistical Package for Social Sciences (SPSS) version 22.0 was used to analyse the data (SPSS Inc., Chicago, IL). Whether the data showed normal distribution was evaluated by Shapiro-Wilk test. Categorical variables were compared with Chi-square test. Scale scores of those with and without food addiction and those with and without PIU were compared using the Student's t-test. The Mann-Whitney U test was used to compare scale scores between participants with and without Internet gaming disorder. Effect size values (Cohen's d for Student's t-test and Eta squared for Mann-Whitney U test) are given in the text together with p values. Correlations related to FA and IA were evaluated with Pearson's correlation test, while correlations related to IGD were evaluated with Spearman's correlation test. The variables predicting addictions were analysed in a multiple linear regression model. Variables for inclusion in the multiple linear regression models were selected based on their statistical significance ($p < 0.05$) in the bivariate analyses. Variables showing a significant association with the behavioral addiction scores (mYFAS, IAT-SV, IGDS9-SF) were included in the respective regression models. Variance Inflation Factor (VIF) values were calculated to assess multicollinearity. All VIF values were below 5, indicating no significant multicollinearity among the predictors. Residual plots were visually inspected to ensure that

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the variance of residuals was consistent across the range of predicted values. The normality of residuals was assessed using the Shapiro-Wilk test and Q-Q plots. The residuals were found to approximate a normal distribution for all models. The adjusted R^2 values and p-values for each regression model were reported in Table 3, demonstrating the model fit and statistical significance. The adjusted R^2 values and p-values for each regression model were reported in the regression table (Table 3), demonstrating the model fit and statistical significance. Factors that were found to be significantly associated with the scores of all behavioral addiction scales according to bivariate analyses were included in the linear regression model. In all evaluations, $p<0.05$ was accepted as the level of statistical significance.

Results

The study included 866 participants. The mean age of the participants was 15.19±1.31 years. 71.9% (n=623) of the participants were female and 28.1% (n=243) were male. The sociodemographic characteristics of the participants are summarised in Table 1.

Food Addiction

The prevalence of food addiction (FA) was found to be 6.9% (n=60) (mild FA 3.2%, moderate FA 1.5%, severe FA 2.2%). No significant difference was found between the FA group and the non-FA group in terms of gender, class, family economic status, and academic achievement level variables ($p>0.05$). When evaluated in terms of average daily screen exposure time, it was found that the FA group was significantly more exposed to the screen than the non-FA group (X^2=11.901, p=0.008). Mean sleep duration was similar in the FA and non-FA groups. In terms of leisure activities, it was found that the FA group spent more time on social media and participated less in sports activities (X2=15.147, p=0.034). In the FA group, 11 (18.3%) participants had a psychiatric diagnosis, while 43 (5.3%) participants in the non-FA group had a psychiatric diagnosis (X^2=16.137, $p<0.001$). In addition, 10% (n=6) of the FA group were taking psychiatric medication, compared with 2% of the non-FA group (X^2=14.489, $p<0.001$). The co-occurrence of behavioural addictions is shown in Figure 1.

Participants were compared on the Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA) and its subscales. There was no difference between the groups in terms of total score and cognitive reappraisal subscale scores. However, the expressive suppression subscale score of the FA group was significantly higher than that of the non-FA group (Cohen's *d*=0.44; p=0.001). The groups were compared on the DASS-21 and its subscales. Stress, anxiety and depression subscale scores were significantly higher in the FA

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group (respectively Cohen's *d* values=1.07, 1.10 and 1.09; p<0.001 for all). While the PIU score was significantly higher in the FA group (Cohen's *d*=1.07, p<0.001), no significant difference was observed between the groups in terms of internet gaming disorder score (p=0.093). Impulsivity scores of the FA group and the non-FA group were similar (p=0.376).

To summarise the FA group exhibited longer daily screen exposure, spent more time on social media, and engaged less in sports. Psychiatric diagnoses were more common in the FA group, as was psychiatric medication use. The FA group showed higher expressive suppression scores on the ERQ-CA and significantly elevated stress, anxiety, and depression scores on the DASS-21. PIU was higher in the FA group, but no differences were found in internet gaming disorder or impulsivity.

Problematic Internet Use

14.3% (n=124) of the participants were found to be addicted to the internet and the mean score was 26.54±9.26. No significant difference was found between the PIU group and the non-PIU group in terms of gender, class, family economic status, and academic achievement level variables (p>0.05). When evaluated in terms of average daily screen exposure, it was observed that those with more screen exposure had a significantly higher frequency of PIU (X^2=55.315, p<0.001). Mean sleep duration was similar between the groups. The frequency of PIU was found to be significantly higher among those who spent their leisure time playing digital games and surfing social media (X^2=15.171, p=0.034). The frequency of psychiatric diagnoses and psychiatric medication use was similar in the group with and without PIU.

While ERQ-CA total score and expressive suppression subscale scores were significantly higher in those with PIU (respectively Cohen's *d* values=0.35 and 0.45; p<0.001 for both), cognitive reappraisal subscale scores were similar (p=0.062). Both the total DASS-21 score and the subscale scores were statistically significantly higher in the group with PIU (respectively Cohen's *d* values=1.22, 1.09, 1.32 and 1.33; p<0.001). IGDS9-SF scores were significantly higher in participants with PIU (Cohen's *d*=0.84, p<0.001).

In a nutshell, PIU was significantly associated with increased screen time and spending leisure time on gaming and social media. Those with PIU showed higher scores on expressive suppression in emotional regulation and reported elevated stress, anxiety, and depression levels. Internet gaming disorder scores were also significantly higher among participants with PIU.

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Internet Gaming Disorder

The frequency of internet gaming disorder (IGD) was 0.9% (n=8). The mean score for the IGD was 13.20±6.10. It was found that the prevalence of IGD did not vary according to socio-demographic variables such as gender, class, family income, academic performance in the previous year, sleep duration, presence of a psychiatric diagnosis and use of psychiatric medication (p>0.05). IGD was more common in those with higher average screen exposure (p=0.020). No significant difference was found when comparing participants with and without IGD on the ERQ-CA and its subscales (p>0.05). Stress, anxiety and depression scores of those with IGD were higher than those without IGD (respectively: Eta squared (η2)=0.007, 0.007 and 0.011; p=0.002, p=0.017, p=0.013).

In summary, the study found that IGD was significantly associated with higher screen exposure. Participants with IGD also reported higher levels of stress, anxiety and depression compared to those without IGD.

Correlation and regression analyses of addictions

A significant correlation was found between DASS-21 and its subscales and mYFAS, IAT-SV and IGDS9-SF scales. No significant correlation was found between BIS-Brief scores and mYFAS, IAT-SV and IGDS9-SF scales. A significant correlation was found between ERQ-CA and its expressive suppression subscale and mYFAS, IAT-SV and IGDS9-SF scales. Correlations between scale scores are presented in Table 2.

The relationship between the variables predicting each behavioural addiction was examined using a multiple linear regression model. Regression model showed statistical significance for food addiction, PIU and internet gaming disorder (respectively R2=0,145, p <0.001; R2=0,317, p <0.001; R2=0,089, p <0.001). Stress, anxiety and depression subscale scores were statistically significant in predicting food addiction. Stress and depression subscale scores were statistically significant in predicting PIU. Finally, only anxiety subscale scores were statistically significant in predicting internet gaming disorder. The regression models for all three behavioural addiction models are presented in Table 3.

Discussion

This study examined the prevalence of behavioural addictions such as food addiction, problematic internet use and internet gaming disorder among adolescents and the relationship between these addictions and impulsivity, emotion regulation, depression, anxiety and stress.

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Obesity is a significant public health concern, particularly among adolescents. Therefore, it is crucial to implement measures to address food addiction and reduce obesity rates. Research into food addiction among adolescents is a developing area that has received less attention than that given to younger children or adults. A systematic review and meta-analysis was conducted to examine the prevalence of food addiction in children and adolescents. The study found that the prevalence of FA was 15% (Yekaninejad et al., 2021). For the Turkish population, this rate was 12.4 % (Dayılar Candan & Küçük, 2019). In our study it was 6.9%, of which 2.2% were severe food addicts. In this study, the prevalence of food addiction was found to be lower, which may be due to regional cultural differences and metadological differences. The study's findings indicate that young people may be susceptible to developing food addiction (Ahmed et al., 2016).

Given that behavioural addictions stem from the same underlying mechanisms, their coexistence has been the focus of research studies. Although problematic internet use and eating disorders and attitudes have been investigated in previous studies, the association of FA and PIU has not been sufficiently studied. One of these studies has shown that problematic internet use increases the risk of behavioural addictions such as overeating and pathological gambling (D. J. Kuss & Griffiths, 2011). Tang and Koh's study demonstrated that addiction to social networks can lead to other behavioural addictions, such as those related to food and shopping (Tang & Koh, 2017). Our findings show that PIU is more common in those with FA. It was found that 46.6 per cent of those with FA also had a PIU. There is no information on the frequency of coexistence of FA and PIU in the literature to the best of our knowledge.

Screen exposure is rewarding, so adolescents who are prone to addictive eating may also have higher levels of screen exposure (Domoff et al., 2021). Findings have shown a relationship between daily screen time and FA. Long screen time may be a natural consequence of PIU and IGD. However, it is important to note that PIU is also common in cases of FA, so long screen time in FA may be best explained by this. However, as the current study was cross-sectional, it can solely showed a relationship between food addiction and screen time. The results cannot be used to establish causality. Further prospective studies on this topic are needed.

Adolescents are thought to be more vulnerable to PIU (Cerutti et al., 2016). Previous studies have reported varying prevalence rates of problematic internet use, ranging from 0.8%

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to 26.7 (D. Kuss et al., 2014). In a systematic review and meta-analysis examining the epidemiology of problematic internet use, PIU was found to be 7.02% (Pan et al., 2020). Studies among Turkish adolescents have found PIU rates between 10.1% and 15.1% (Alpaslan et al., 2015; Şaşmaz et al., 2014). Consistently, 14.3% of the participants were found to be addicted to the internet. Previous studies have shown that the prevalence of IGD ranges from 0.6% to 5.4% worldwide depending on geographical region (Király et al., 2015; Pan et al., 2020; Rehbein et al., 2015). Among the Turkish population, 0.96% were found to have an IGD (Evren et al., 2018). In this study, the prevalence of IGD was 0.9%. Although the sample consisted of university students, the rate of IGD was found to be similar to our study in the study by Evren et al (Evren et al., 2018).

Several types of addictions, including behavioural addictions (FA, PIU, IGD), have been associated with depression, stress and anxiety, and previous studies have shown that anxiety and depression can lead to addictive behaviours in humans (Ahmed et al., 2016; Hakami et al., 2021; Parylak et al., 2011; Saikia et al., 2019; Y et al., 2023). In this study, correlational results showed that behavioural addiction was associated with stress, anxiety and depression, which is consistent with previous studies showing that people with high BAs have psychological distress. The cause and effect relationship between behavioural dependence and depression, stress and anxiety could not be fully established due to the cross-sectional design of the study. Nevertheless, in this study, it was revealed that depression, anxiety, and stress predicted food addiction. Additionally, depression and stress were identified as predictors for problematic internet use, with anxiety being the sole predictor for internet gaming disorder. Importantly, it was demonstrated that expressive suppression did not predict any form of behavioral addiction. Adolescents may be more prone to overeating when faced with emotional difficulties, and in order to cope with these emotional challenges, they may choose to spend additional time on the internet and engage in extended gaming sessions. This indicates the significance of emotional problems for behavioral addictions.

The internet, which is a behavioural addiction, is used by addicts as a means of avoiding and coping with underlying psychological problems (Rey & Martin, 2006). One study found that participants with higher problematic internet use scores were more likely to report greater difficulties with affective regulation (Mo et al., 2018). The prefrontal-limbic circuit, the insula, the dorsal anterior cingulate cortex and the prefrontal areas are involved in the cognitive regulation of emotions and enhance the coupling of limbic and prefrontal areas. When activated, it increases the release of dopamine as well as opiates and other

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neurochemicals. Chronic use can affect the associated receptors, leading to tolerance or the need for increased stimulation of the reward centre to produce a 'high' and the subsequent characteristic behaviour required to avoid withdrawal symptoms (Herpertz et al., 2018). In the study by Estevez et al., emotion regulation was shown to be a predictive factor for all of the addictive behaviours assessed (Estévez et al., 2017). Expressive suppression is an emotion regulation strategy involving the conscious, top-down control of reflexive behavioral expressions of emotion (Gross & John, 2003). Research has shown that people with difficulties in emotion regulation are more likely to engage in addictive behaviours or have difficulty stopping such behaviours (Sayette & Griffin, 2004). However, this study found significant correlation between expression suppression and behavioural addiction in the correlation analysis, but it did not predict behavioural addiction in the regression analysis. In the study by Estevez et al. attachment and emotion regulation risk factors in behavioural addiction were studied, while in this current study impulsivity, emotion regulation, depression, anxiety and stress were examined . Estevez et al. conducted a study with a sample of high school and vocational education centre students aged 13-21 years (Estévez et al., 2017). In contrast, this study only included high school students aged 13-18 years. Therefore, prospective studies on this topic are needed.

Similar to our study, anxiety was found to be important in predicting IGD in the study conducted by Fumero et al (Fumero et al., 2020). Although the measurement tools used for IGD and anxiety in the study of Fumero et al. differed, the sample size and target population were similar to our study. Three hypothetical theoretical models have been proposed to explain the factors involved in IGD (Cheng et al., 2018). One of these is the comorbidity hypothesis, which relates to the presence of other individual psychological problems or symptoms. The comorbidity hypothesis suggests shared neurobiological and psychological mechanisms between IGD and other substance or behavioral addictions (Gomis-Vicent et al., 2019).

Adolescents should be evaluated for symptoms of behavioral addiction, and special attention should be paid to the manifestation of the following signs: excessive food consumption and prolonged use of the Internet and gaming, despite awareness of the negative consequences. Additionally, factors such as tolerance, withdrawal symptoms, and a reduction in important social or occupational activities should be considered. Given that these symptoms overlap with psychiatric comorbidities in this study, conducting a psychiatric evaluation becomes even more crucial.

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Limitations

Our study has several limitations that must be acknowledged. Firstly, it is important to note that our research design is cross-sectional, which means that we cannot establish causality between behavioural addictions and impulsivity, emotion regulation, depression, anxiety, and stress. The sensitivity of behavioural addictions across many cultures may contribute to the low response rate in the study. Additionally, our study sample only consisted of high school students in one province, which may limit the generalisability of our findings to a broader population. In addition, it is important to note that the scales used in our study rely on self-report measures, which may introduce subjective biases.

Conclusion

The increase in internet usage and the accessibility of video games has raised concerns regarding addiction. The results of this study indicate that high prevalence of behavioural addiction, particularly problematic internet use, and its potential association with suppression, depression, stress, and anxiety. In conclusion, it is anticipated that this issue will continue to grow over time. Further research is required to confirm the prevalence and investigate the causal or correlational relationship with emotion regulation, impulsivity, depression, stress, and anxiety. Future studies should include a larger sample size to examine the issue in the general population and across different age groups. Lastly, it is essential to assess the effect of these behavioural addictions on quality of life and functioning to inform appropriate interventions.

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Author contributions

İ.Z.: Conceptualization, Project Administration, Writing – Original Draft Preparation, Supervision, Data Curation, Investigation

M.F.T.: Validation, Resources, Investigation, Writing – Original Draft Preparation, Data Curation

M.Ç.: Data Curation, Formal Analysis, Methodology, Investigation, Writing – Review & Editing

A.K.: Validation, Formal Analysis, Methodology, Investigation, Writing – Review & Editing

Data availability statement

The data are not accessible to the general public because of ethical and privacy concerns. Upon reasonable request, the corresponding author will provide the data supporting the study's conclusions.

Additional Information

The authors declare no competing interests.

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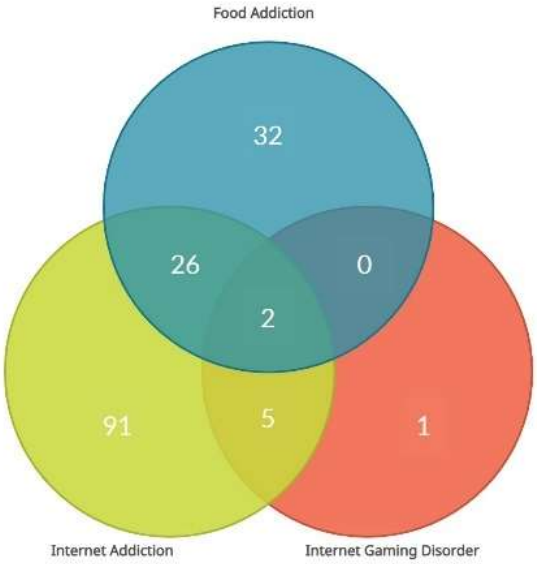


Figure 1. The Venn diagram illustrates the overlap among food addiction, problematic internet use, and internet gaming disorder. Most participants were diagnosed with only one condition, with problematic internet use being the most prevalent. Overlaps were observed, with a small group sharing all three conditions and others sharing two. Notably, food addiction and IGD did not overlap directly without the presence of problematic internet use, highlighting unique and shared features of these behavioral addictions.

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Table 1: Sociodemographic characteristics of the participants

		n (%)
Gender	Female	623 (71.9%)
	Male	243 (28.1%)
Class	9th class	276 (31.9%)
	10th class	219 (25.3%)
	11th class	144 (16.6%)
	12th class	227 (26.2%)
Family economic status	Low	140 (16.2%)
	Middle	700 (80.8%)
	High	26 (3%)
Academic achievement level in the previous year	No certificate of achievement	189 (21.8%)
	Certificate of appreciation	320 (37%)
	Certificate of academic excellence	357 (41.2%)
Daily screen exposure	<1 hour	112 (12.9%)
	1-2 hours	334 (38.6%)
	2-4 hours	312 (36%)
	>4 hours	108 (12.5%)
Daily sleep duration	<5 hours	59 (6.8%)
	5-8 hours	671 (77.5%)
	>8 hours	136 (15.7%)
Preferred way of spending leisure	Read a book	142 (16.4%)
	Surfing social media	203 (23.4%)
	Playing digital games	35 (4%)
	Watching films/series/TV	100 (11.5%)
	Listening/producing music	169 (19.5%)
	Doing sports	96 (11.1%)
	Participating in social activities	5 (0.6%)
	Other activities	116 (13.4%)
Perception of addiction	I am not an addict	609 (70.3%)
	I have a food addiction	42 (4.8%)
	I have an internet addiction	163 (18.8%)
	I have an addiction to digital games	16 (1.8%)
	I have a food addiction and an internet addiction	18 (2.1%)
	I have an internet addiction and an addiction to digital games	12 (1.4%)
	I have an addiction to food, the internet and digital games	6 (0.7%)
Psychiatric diagnosis	Yes	54 (6.2%)
	No	812 (93.8%)
Psychiatric medication use	Yes	22 (2.5%)
	No	844 (97.5%)

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Table 2: The correlation analysis of scales scores with clinical features

	Correlation coefficient	p-value
mYFAS - BIS-Brief	0.004	0.909[a]
mYFAS - ERQ-CA	0.097	**0.004**[a]
mYFAS - Expressive Suppression	0.109	**0.001**[a]
mYFAS - Cognitive Reappraisal	0.055	0.103[a]
mYFAS - DASS-21	0.342	**<0.001**[a]
mYFAS – Subscale Stress	0.308	**<0.001**[a]
mYFAS – Subscale Anxiety	0.319	**<0.001**[a]
mYFAS – Subscale Depression	0.323	**<0.001**[a]
IAT-SV - BIS-Brief	0.020	0.565[a]
IAT-SV - ERQ-CA	0.080	**0.019**[a]
IAT-SV - Expressive Suppression	0.123	**<0.001**[a]
IAT-SV - Cognitive Reappraisal	0.023	0.523[a]
IAT-SV - DASS-21	0.558	**<0.001**[a]
IAT-SV – *Subscale Stress*	0.535	**<0.001**[a]
IAT-SV – *Subscale Anxiety*	0.486	**<0.001**[a]
IAT-SV – *Subscale Depression*	0.523	**<0.001**[a]
IGDS9-SF - BIS-Brief	0.045	**0.185**[b]
IGDS9-SF - ERQ-CA	0.114	**0.001**[b]
IGDS9-SF - Expressive Suppression	0.132	**<0.001**[b]
IGDS9-SF - Cognitive Reappraisal	0.059	0.083[b]
IGDS9-SF - DASS-21	0.245	**<0.001**[b]
IGDS9-SF – *Subscale Stress*	0.229	**<0.001**[b]
IGDS9-SF – *Subscale Anxiety*	0.225	**<0.001**[b]
IGDS9-SF – *Subscale Depression*	0.228	**<0.001**[b]

Bold data, p<0.05 (significance).

[a] Pearson's correlation test

[b] Spearman correlation test

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Table 3: Multiple linear regression analysis of clinical features predicting the scores of the behavioural addiction scales

Predictor	mYFAS Score				IAT-SV Scores				IGDS9-SF Scores			
	β	**95% CI for β**	**Standard error**	**p-value**	**β**	**95% CI for β**	**Standard error**	**p-value**	**β**	**95% CI for β**	**Standard error**	**p-value**
Expressive Suppression	0.008	-0.028, 0.044	0.018	0.648	-0.103	-0.273, 0.066	0.086	0.231	0.114	-0.015, 0.243	0.066	0.083
Stress	0.044	0.001, 0.086	0.022	**0.043**	0.586	0.385, 0.787	0.102	**<0.001**	0.130	-0.023, 0.282	0.078	0.096
Anxiety	0.049	0.009, 0.088	0.020	**0.015**	0.089	-0.098, 0.275	0.095	0.352	-0.145	0.003, 0.287	0.072	**0.046**
Depression	0.044	0.008, 0.080	0.018	**0.016**	0.416	0.246, 0.586	0.087	**<0.001**	0.76	-0.054, 0.205	0.066	0.251

Notes: R=0.381, R^2=0,145, p <0.001 for mYFAS; R=0.563, R^2=0,317, p <0.001 for IAT-SV; R=0.298, R^2=0,089, p <0.001 for IGDS9-SF

mYFAS: the Modified Yale Food Addiction Scale Version 2.0, IAT-SV: short version of Young's Internet Addiction Test, IGDS9-SF: Internet Gaming Disorder Scale - Short Form

Bold data, p<0.05 (significance).

Abbreviations: CI: Confidence Interval. Standard Error: SE.

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