

Internet gaming disorder in children and adolescents diagnosed with attention deficit hyperactivity disorder: The role of autistic traits and ADHD symptom severity

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ABSTRACT

Objective: Internet gaming disorder is increasingly recognized as a clinically significant behavioral problem among children and adolescents diagnosed with attention deficit hyperactivity disorder. This study aimed to determine the prevalence of internet gaming disorder in individuals with attention deficit hyperactivity disorder and to examine its associations with autistic traits, attention deficit hyperactivity disorder symptom severity, anxiety, and depressive symptoms in children and adolescents diagnosed with attention deficit hyperactivity disorder.

Materials and Methods: We established ADHD diagnoses based on DSM-5 criteria. Moreover, every participant had a diagnostic evaluation by a child and adolescent psychiatrist using the Kiddie Schedule for Affective Disorders and Schizophrenia (K-SADS-PL). This cross-sectional study included 101 children and adolescents aged 10–17 years who were diagnosed with attention deficit hyperactivity disorder. Autism spectrum disorder was excluded through clinical assessment. Autistic traits, attention deficit hyperactivity disorder symptom severity, anxiety and depressive symptoms, and internet gaming disorder symptoms were assessed using validated rating scales. Participants were divided into low and high autistic trait groups according to the Social Responsiveness Scale cut off score.

Results: There was no statistically significant difference between the groups in terms of internet gaming disorder total scores ($p=0.136$). Internet gaming disorder severity was positively correlated with several anxiety and depressive symptom ($r=0.465$, $p<0.001$) domains and with hyperactivity symptoms ($r=0.225$, $p=0.024$). In the regression model, depressive symptoms were positively associated with internet gaming disorder severity ($\beta=0.316$, $p=0.025$), whereas generalized anxiety symptoms were negatively associated with internet gaming disorder severity ($\beta=-0.380$, $p=0.014$).

Conclusion: Although autistic traits were not independently associated with internet gaming disorder severity, depressive symptoms and hyperactivity appeared to be more closely related to problematic gaming behavior. These findings suggest that emotional symptoms and core attention deficit hyperactivity disorder features should be considered together when evaluating internet gaming disorder risk in this population.

Keywords: Anxiety, autism, attention deficit hyperactivity disorder, depression, internet gaming disorder

Introduction

Internet gaming disorder (IGD) was included by the American Psychiatric Association (APA) in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) as an emerging condition requiring further research evidence (1). IGD has been defined as a condition characterized by the “persistent and recurrent” use of the internet for gaming, leading to clinically significant impairment or distress across various areas of functioning (1). A recent meta-analysis reported that the prevalence of IGD in the general population is approximately 6.7% (2).

Attention deficit hyperactivity disorder (ADHD) is characterized by a persistent pattern of inattention and/or hyperactivity–

impulsivity that negatively affects functioning or development (1). In the literature, ADHD has been reported to be associated with both substance use disorders and behavioral addictions (3,4). The association between ADHD and IGD has been demonstrated in pharmacological studies investigating the efficacy of ADHD medications, such as methylphenidate and atomoxetine, in reducing IGD symptoms (5). In this context, IGD may develop as a secondary problem related to ADHD, or it may interact bidirectionally with ADHD; in other words, each condition may trigger and maintain the other (6). Emotional disorders and autism spectrum disorder (ASD) are among the potential mediators of the relationship between ADHD and IGD (7,8). The association between ASD and IGD has been reported in several studies (9,10). The core features of ASD—including difficulties in social communication, a tendency toward social isolation,

restricted and intense interests, and cognitive rigidity—may make digital games more appealing to individuals with ASD. Online environments may be perceived as less stressful by individuals with ASD, as they provide a communication context that is more predictable and controllable, with fewer social cues compared with face-to-face interactions (7,10–12). Autistic traits are defined as subthreshold social deficits, communication difficulties, and repetitive behaviors that are observed in the general population but do not meet the diagnostic threshold for ASD (13). In a recent study conducted in an adult sample from the general population, autistic traits and ADHD symptom severity were reported to be positively associated with IGD severity in adults (7). Individuals with subthreshold autistic traits or ADHD symptoms have been reported to be at a higher risk of developing psychiatric disorders compared with the general population (14,15). Moreover, anxiety and depressive symptoms have been shown to be associated with IGD, along with neurodevelopmental disorders such as ADHD and ASD (16,17). In a study involving 566 young adults, higher levels of online gaming use were reported to be positively associated with depression, anxiety, and psychotic symptom levels (18). In line with the aforementioned literature, the present study will examine the roles of autistic traits, anxiety, and depression in the relationship between ADHD symptoms and IGD.

Although studies conducted in individuals diagnosed with ADHD and ASD have provided important insights into their associations with IGD, research specifically examining the relationship between autistic traits and IGD remains limited. To address this research gap, we aimed to test the hypothesis that autistic traits, anxiety, depressive symptoms, and ADHD symptom severity may be associated with IGD in children and adolescents diagnosed with ADHD. Accordingly, the primary aim of the present study was to determine the prevalence of IGD among children and adolescents diagnosed with ADHD. The secondary aim was to examine the associations of autistic traits, anxiety, and depression with IGD in children and adolescents with ADHD.

Materials and Methods

Participants and procedure

Participants were recruited from patients attending the Child and Adolescent Psychiatry outpatient clinic at Sincan Training and Research Hospital between April and June 2025. The study sample included 101 children and adolescents (22 females and 79 males), aged 10–17 years. Eligibility criteria comprised: (1) age between 10 and 17 years; (2) Having normal cognitive functioning according to mental status examination; (3) no evidence of autism spectrum disorder (ASD) on clinical assessment; (4) a diagnosis of attention deficit hyperactivity disorder (ADHD) established according to DSM-5 criteria and confirmed using the Schedule for Affective Disorders and Schizophrenia for School-Age Children—Present and Lifetime Version (K-SADS-PL); and (5) absence of comorbid psychiatric disorders (e.g., mood or psychotic disorders). Individuals not meeting these criteria were not included.

All participants underwent a semi-structured diagnostic interview (K-SADS-PL) conducted by board-certified child psychiatrists. The absence of ASD was determined through

a comprehensive evaluation integrating developmental and clinical history, psychiatric examination, and direct clinical observation, supplemented by a DSM-5–based mental status assessment. Following the clinical evaluation, parents completed the Social Responsiveness Scale (SRS) to quantify autistic traits and the Conners Parent Rating Scale–Revised: Short Form (CPRS-R-S) to assess ADHD symptom severity. Children and adolescents self-administered the Internet Gaming Disorder Scale–Short Form (IGDS-SF) and Revised Child Anxiety and Depression Scale–Child Version (RCADS-CV).

The Social Responsiveness Scale (SRS)

SRS introduced by Constantino in 2000, is a widely used measure with strong evidence supporting its psychometric properties. Previous research has shown that SRS scores are significantly associated with ASD diagnoses established using the Autism Diagnostic Interview–Revised (ADI-R), indicating that the instrument is appropriate for quantifying autism-related symptom domains (19). Higher total scores reflect greater severity of social impairment. In clinical interpretation, a cutoff of 60 or above is commonly used to indicate subthreshold or clinically meaningful levels of social difficulties (19). Although a formal Turkish validity and reliability study has not been published, the scale has been applied in Türkiye, including a large school-age sample reported by Ünal et al. (20). In that study, the SRS demonstrated good internal consistency (Cronbach's $\alpha=0.86$), and factor-analytic findings supported a unidimensional structure. Moreover, the Turkish version showed acceptable temporal stability, with a six-month test–retest assessment yielding a Pearson correlation of $r=0.53$ ($p=0.001$) (20).

Conners' Parent Rating Scale–Revised: Short Form (CPRS-R-S)

CPRS-R-S is one of the most widely used and practical rating instruments for assessing core ADHD symptom domains. The short form was revised by Conners and colleagues (21). It consists of 27 items and was translated and culturally adapted for Turkish children by Kaner et al. (22). The Turkish version has been shown to be valid and reliable, supporting its use in both clinical settings and research. The scale comprises four subscales: oppositional behavior, cognitive problems/inattention, hyperactivity (each with 6 items), and an ADHD Index. Internal consistency is acceptable to good, with Cronbach's alpha values ranging from 0.73 to 0.86, and test–retest reliability coefficients reported between 0.56 and 0.72.

Internet Gaming Disorder Scale–Short Form (IGDS9-SF)

IGD symptom severity was assessed with the IGDS9-SF, a brief 9-item self-report instrument developed by Pontes and Griffiths in accordance with DSM-5 diagnostic criteria (23). Higher total scores represent greater IGD severity. The total score is calculated by summing the item-level response scores. Total scores range from 9 to 45, and a cut-off score of 36 is used to indicate gaming disorder. The Turkish validity and reliability of the scale was established by Arıcak et al. (24), who reported adequate psychometric performance. In the present sample, internal consistency was high, with McDonald's Omega (ω) calculated as 0.88.

Revised Child Anxiety and Depression Scale – Child Version (RCADS-CV)

The Revised Child Anxiety and Depression Scale-Child Version (RCADS-CV) was developed to screen for DSM-IV symptoms of anxiety disorders and depression in children and adolescents (25). It is a three-point Likert scale that consists of six subdivisions and forty-seven items assessing symptoms of generalized anxiety disorder, separation anxiety disorder, panic disorder, obsessive compulsive disorder, social phobia, and major depressive disorder. Validity and reliability study of the Turkish version of the scale was done in 2017 giving a Cronbach's alpha coefficient value of 0.95 (26).

Schedule for Affective Disorders and Schizophrenia for School-Aged Children, Present and Lifetime Version (K-SADS-PL)

This semi-structured interview form, originally developed by Kaufmann et al. (27), is designed to identify psychopathological conditions in children and adolescents based on DSM-IV-TR diagnostic criteria. The Turkish adaptation's validity and reliability were established by Gökler et al. (28) in 2004. In the present study, this instrument constituted a key component of the diagnostic assessment process.

Statistical analysis

Statistical analyses were performed using IBM SPSS Statistics version 25.0 (IBM Corp., Armonk, NY, USA). The distribution of continuous variables was assessed using the Shapiro-Wilk test and visual inspection of histograms and Q-Q plots. Continuous variables with normal distribution were presented as mean and standard deviation (SD), whereas categorical variables were expressed as numbers and percentages.

Participants were divided into two groups according to autistic-like trait (ALT) levels based on the Social Responsiveness Scale cutoff score. Comparisons between the low ALT and high ALT groups were performed using the independent samples t-test for normally distributed continuous variables and the chi-square test for categorical variables. The prevalence of internet gaming disorder was calculated according to the established cutoff score of the IGDS9-SF.

Spearman's correlation analysis was used to examine the relationships among IGDS total scores, SRS total scores, RCADS-CV subscale scores, CPRS-R-S subscale scores, and age. To control for type I error inflation due to multiple correlation tests, p-values were adjusted using the Benjamini-Hochberg false discovery rate (FDR) procedure, applied separately to the correlations of the IGDS total score and the SRS total score. Both unadjusted and FDR-adjusted p-values are reported, and FDR-adjusted $p < 0.050$ was considered statistically significant.

A multiple linear regression analysis was conducted to identify clinical variables independently associated with IGDS total scores. The IGDS total score was entered as the dependent variable. Predictors were selected a priori on the basis of the study hypotheses and previous literature rather than on univariate significance: RCADS-CV subscales (anxiety and depressive symptoms), CPRS-R-S subscales (ADHD symptom severity), and the SRS total score (autistic traits) were entered simultaneously using the enter method.

Multicollinearity among the predictors was examined using tolerance and variance inflation factor (VIF) values; tolerance values < 0.20 and VIF values > 5 were considered indicative of problematic multicollinearity. Model assumptions were checked by visual inspection of standardized residual plots and the Durbin-Watson statistic. Regression results were reported as unstandardized coefficients (B), standardized coefficients (β), 95% confidence intervals (CI), and p-values. Model fit was evaluated using the F statistic and adjusted R^2 . A two-tailed p-value of < 0.050 was considered statistically significant.

Results

A total of 101 children and adolescents diagnosed with ADHD were included in the study. The study group consisted of 79 males (78.2%) and 22 females (21.7%). Participants were divided into two groups according to autistic-like traits (ALT). According to the Social Responsiveness Scale, participants with scores of 60 or above were classified into the high ALT group, whereas those with scores below 60 were classified into the low ALT group. There were no significant differences between the two groups in terms of age or sex (Table I).

There was no statistically significant difference in IGD total scores between the high ALT and low ALT groups ($p = 0.136$) (Table II). The prevalence of internet gaming disorder (IGD) was 9.5% in the low ALT group and 15.3% in the high ALT group, while the overall prevalence of IGD in the ADHD sample was 12.9%.

Spearman's correlation coefficient was used to analyze the relationships among the CPRS-RS subscale scores, RCADS-CV subscale scores, SRS total score, IGD total score, and age. IGD total scores were positively correlated with RCADS-CV subscale scores for social phobia, separation anxiety disorder, obsessive-compulsive disorder, panic disorder, generalized anxiety disorder, and major depressive disorder, as well as with the hyperactivity subscale score of the CPRS-RS (Table III). In addition, the SRS total score was positively correlated with the RCADS-CV subscale scores for social phobia, separation anxiety disorder, obsessive-compulsive

Table I: Sociodemographic characteristics of the study groups

Variable	Lower ALT group	Higher ALT group	χ^2, t	p
Total number of patients	42	59		
Age, months*	153.5 $\pm$ 22.7	151.1 $\pm$ 27.3	-0.477	0.634
Sex, male/female†	33/9	46/13	1	0.942

*: mean $\pm$ SD (Independent samples t-tests), †: n(%) (Chi Square test), ALT: Autistic-like traits

Table II: Comparison of participants with low and high ALT in terms of IGD scores

Variable	Total sample	Lower ALT group	Higher ALT group	χ^2, t	p
Total number of patients	101	42	59		
IGDS total score*	23.6 $\pm$ 9.4	21.9 $\pm$ 8.4	24.8 $\pm$ 9.9	1.503	0.136
IGDS above cut-off†	13 (12.9)	4 (9.5)	9 (15.3)	0.718	0.397

*: mean $\pm$ SD (Independent samples t-tests), †: n(%) Chi Square test, ALT: Autistic-like traits, IGDS: Internet Gaming Disorder Scale

Table III: Spearman correlation coefficients between IGDS, SRS, anxiety/depression symptoms, ADHD-related symptom domains, and age.

Variable	RCADS-CV						CPRS-R-S				SRS Total	Age
	SP	SAD	OCD	PD	GAD	MDD	Oppositional	Inattention	Hyperactivity	ADHD-I		
IGDS total	0.308	0.275	0.354	0.411	0.206	0.465	0.115	0.157	0.225	0.157	0.163	-0.081
r	0.002	0.005	<0.001	<0.001	0.038	<0.001	0.253	0.116	0.024	0.116	0.104	0.419
p	0.005	0.012	0.001	<0.001	0.045	<0.001	0.291	0.141	0.039	0.141	0.140	0.419
p*												
SRS total	0.290	0.244	0.216	0.265	0.086	0.321	0.476	0.272	0.548		-	-0.104
r	0.003	0.014	0.030	0.007	0.395	0.001	<0.001	0.006	<0.001	0.382	-	0.301
p	0.008	0.025	0.046	0.014	0.413	0.003	<0.001	0.012	<0.001	0.001	-	0.329
p*												

*: Adjusted for multiple comparisons, **ADHD-I**: Index, attention deficit hyperactivity disorder index, **CPRS-R-S**: Conners' Parent Rating Scale-Revised: Short Form, **GAD**: generalized anxiety disorder, **IGDS**: Internet Gaming Disorder Scale, **MDD**: major depressive disorder, **OCD**: obsessive-compulsive disorder, **PD**: panic disorder, **RCADS-CV**: Revised Child Anxiety and Depression Scale-Child Version, **SAD**: separation anxiety disorder, **SP**: social phobia, **SRS**: Social Responsiveness Scale.

Table IV: Multiple linear regression model examining the effects of anxiety/depression symptoms, ADHD-related symptoms, and autistic-like traits on IGDS total score.

Predictor	Unstandardized coefficient, B	Standardized coefficient, β	p	95% CI for B, Lower / Upper	Tolerance	VIF
RCADS-CV-SAD	0.183	0.073	0.511	-0.367 / 0.733	0.675	1.482
RCADS-CV-SP	0.141	0.099	0.534	-0.307 / 0.589	0.326	3.069
RCADS-CV-GAD	-0.845	-0.380	0.014	-1.511 / -0.178	0.358	2.795
RCADS-CV-PD	0.264	0.151	0.279	-0.218 / 0.746	0.421	2.378
RCADS-CV-OCD	0.578	0.244	0.089	-0.090 / 1.245	0.403	2.479
RCADS-CV-MDD	0.438	0.316	0.025	0.055 / 0.821	0.423	2.367
CPRS-R-S-Oppositional	-0.154	-0.073	0.551	-0.664 / 0.357	0.552	1.812
CPRS-R-S-Inattention	0.424	0.196	0.249	-0.302 / 1.149	0.286	3.497
CPRS-R-S-Hyperactivity	-0.072	-0.033	0.815	-0.685 / 0.541	0.404	2.473
CPRS-R-S-ADHD Index	0.149	0.105	0.592	-0.403 / 0.702	0.214	4.666
SRS	-0.034	-0.088	0.504	-0.137 / 0.068	0.467	2.140

ADHD: Attention deficit hyperactivity disorder, **ADHD- Index**: Attention-deficit/hyperactivity disorder index, **CI**: confidence interval, **CPRS-R-S**: Conners' Parent Rating Scale-Revised: Short Form, **GAD**: generalized anxiety disorder, **IGDS**: Internet Gaming Disorder Scale, **MDD**: major depressive disorder, **OCD**: obsessive-compulsive disorder, **PD**: panic disorder, **RCADS-CV**: Revised Child Anxiety and Depression Scale-Child Version, **SAD**: separation anxiety disorder, **SP**: social phobia, **SRS**: Social Responsiveness Scale, **VIF**: Variance inflation factor. Model statistics: $F(11, 89) = 3.073$, $p=0.002$, adjusted $R^2 = 0.186$; Durbin-Watson=1.72. Tolerance values <0.20 and VIF values >5 were considered indicative of problematic multicollinearity; none of the predictors exceeded these thresholds (tolerance = 0.21–0.68; VIF=1.48–4.67).

disorder, panic disorder, and major depressive disorder, as well as with the oppositional, inattention, hyperactivity, and ADHD index subscale scores of the CPRS-RS (Table III). The results of the Spearman correlation analyses are presented in Table III.

The linear regression model including the RCADS-CV subscales, CPRS-R-S subscales, and autistic traits significantly predicted IGDS total scores ($F = 3.073$, $p=0.002$) and explained 18.6% of the variance in IGDS total scores (adjusted $R^2 = 0.186$). Collinearity diagnostics did not indicate problematic multicollinearity among the predictors (tolerance = 0.21–0.68; VIF=1.48–4.67), and the Durbin-Watson statistic was 1.72. Among the variables reported in Table IV, the RCADS-CV-MDD score was positively associated with the IGDS total score ($\beta=0.316$, $p=0.025$; 95% confidence interval [CI]: 0.055–0.821). In contrast, the RCADS-CV-GAD score was negatively associated with the IGDS total score ($\beta=-0.380$, $p=0.014$; 95% CI: -1.511 to -0.178) (Table IV).

Discussion

In this study, we examined the prevalence of internet gaming disorder (IGD) and the clinical variables associated with IGD

in children and adolescents diagnosed with ADHD, with a particular focus on autistic traits and ADHD symptom severity. According to our findings, the prevalence of IGD in the ADHD sample was 12.9%. No significant difference was found in IGD total scores between the groups with high and low autistic traits. IGD severity was positively correlated with depressive/anxiety symptoms and hyperactivity symptoms. In the linear regression analysis, after controlling for other clinical variables included in the model, including autistic traits and ADHD symptoms, depressive symptoms were identified as a positive factor associated with IGD symptoms, whereas generalized anxiety symptoms were identified as a negative factor associated with IGD symptoms.

To the best of our knowledge, this is the first study in the literature to examine the relationship between IGD and autistic traits in a sample of individuals with ADHD. According to our findings, no statistically significant difference was observed in IGD total scores between the high and low autistic traits groups; additionally, no statistically significant correlation was found between autistic traits and IGD total scores. Autistic traits did not predict IGD in the regression model either. In a study conducted by Concerto et al. (7) in a general

adult population, both autistic traits and ADHD scores were found to be positively associated with IGD severity, and both were identified as independent predictors of IGD. Concerto et al. (7) suggested that individuals with autistic traits may perceive online games as a more accessible social platform due to deficits in social communication and difficulties in establishing real-life relationships, and that this “social compensation” mechanism may increase their vulnerability to addiction (7). Our findings suggest that, in a clinical sample of ADHD, the severity of gaming addiction may be more closely related to co-occurring emotional symptoms and behavioral dimensions associated with ADHD than to parent-assessed autistic characteristics. In a study conducted with individuals with IGD, although autistic traits were higher in the IGD group compared with controls, logistic regression analysis revealed that IGD was associated with executive functions rather than autistic traits (29). The authors reported that, rather than directly predicting IGD, autistic traits may be indirectly associated with IGD through executive function deficits, which are a shared feature of both ADHD and IGD (29). In our sample, executive function difficulties commonly observed in ADHD may have reduced the additional explanatory contribution of autistic features; however, this interpretation should be considered a hypothesis requiring direct empirical testing. Future studies should examine gaming motivations, reward processing, social avoidance, and executive functions using longitudinal designs and mediation analyses.

The prevalence of IGD in the overall ADHD group was found to be 12.9%. In a recent study, the prevalence of IGD was reported to be 44.4% in an untreated ADHD group (30). The authors suggested that increased reward sensitivity, rapid reward-seeking, impulsivity, and difficulties in emotion regulation in ADHD, when combined with the immediate reinforcement and high stimulation provided by games, may contribute to the development of problematic gaming behavior (30). The close association between core ADHD symptoms and IGD is further supported by pharmacological studies examining the effects of ADHD treatment on IGD symptoms (5). This discrepancy between studies may be attributed to methodological factors such as differences in referral profiles and cutoff values, as well as the presence of individuals receiving ADHD treatment in our sample, which may have contributed to a lower prevalence of IGD. From this perspective, ADHD may be considered not only a comorbid condition accompanying IGD, but also a neurodevelopmental condition that predisposes individuals to the development of IGD.

Concerto et al. (7) reported that ADHD symptom severity directly predicts IGD severity in adults and suggested that gaming may serve to satisfy the need for stimulation in these individuals. Consistent with our findings, there was a positive correlation between hyperactivity scores and IGD severity. It has been emphasized that hyperactive/impulsive individuals exhibit a constant need for stimulation and a strong desire for immediate rewards (30). The immersive experience, rapid reward mechanisms, and constantly changing stream of stimuli provided by video games align with the novelty-seeking tendencies of hyperactive individuals, thereby reinforcing gaming behavior (31,32). Hyperactivity is associated with impaired inhibitory control and deficits in behavioral regulation

at the neurocognitive level (33). In a study conducted by Turan et al. (29), the IGD group exhibited significantly greater impairments in behavioral regulation (inhibition, emotional control) and metacognitive indices compared with healthy controls. Consistent with our findings, the correlation between hyperactivity and IGD may indicate that deficits in self-regulation, potentially linked to prefrontal cortex dysfunction, play a central role in the inability to inhibit gaming-related urges.

In our study, while a positive correlation was observed between generalized anxiety disorder, depressive symptoms, and IGD total scores, linear regression analysis revealed that generalized anxiety symptoms negatively predicted IGD, whereas depressive symptoms positively predicted IGD. The apparently positive association between generalized anxiety symptoms and IGD may be attributable to their overlap with depressive symptoms and other internalizing symptoms. The literature indicates that anxiety symptoms typically increase concurrently with depression and stress, and that these three variables exhibit very strong intercorrelations ($r=0.792-0.815$) (34). In a study by De Pasquale et al. (18), although a significant association between anxiety and IGD was observed in correlation analysis, anxiety was not identified as a significant predictor of IGD in the regression model; instead, IGD was associated with depression, somatization, and sleep disturbances. Similarly, in our study, the apparent positive effect of anxiety may in fact be driven by co-occurring variables such as depressive symptoms. Although significant correlations between IGD and anxiety have been reported at rates of up to 92%, anxiety may, in some cases, act as a precursor that contributes to the development of addiction, while in others it may arise as a consequence of the negative outcomes associated with gaming (35). Therefore, the negative predictive effect observed in the regression model may reflect a tendency for anxiety-related features -such as intolerance of uncertainty or heightened threat expectancy- to lead individuals to avoid potential social or performance-related stressors associated with gaming.

The finding that the most consistent positive association with IGD symptoms in the regression analysis was observed for depressive symptoms suggests that IGD may be closely related not only to impulsivity or reward-seeking, but also to mood-related psychopathological processes. A recent meta-analysis reported that approximately one-third of individuals with IGD experience clinical depression (36). Frequent and excessive gaming has been suggested to serve as a temporary coping strategy for individuals experiencing negative mental states (37). For these individuals, digital games may function as a coping strategy by providing short-term pleasure, diverting attention from feelings of failure and inadequacy, and offering a controllable environment (38–40). In this context, gaming behavior may initially emerge as a maladaptive avoidance strategy aimed at reducing negative affect; over time, it may become reinforced and contribute to an increase in IGD symptoms. This finding suggests that depressive symptoms may represent an important clinical risk factor for IGD.

Limitations

This study has several limitations. First, due to its cross-sectional design, causal relationships between variables cannot be established. Therefore, no definitive conclusions

can be drawn regarding whether depressive symptoms lead to IGD or whether IGD contributes to an increase in depressive symptoms. Second, the study sample was drawn from a single center and included only children and adolescents diagnosed with ADHD; this may limit the generalizability of the findings to the general population or to other clinical groups. Third, IGD, autistic traits, and ADHD symptom severity were assessed using rating scales; therefore, the possibility of bias related to self-report and parent-report measures should be considered. Fourth, the modest sample size may have limited the statistical power of the analyses, especially for the multivariable regression models. Therefore, the present findings should be interpreted with caution and need to be confirmed in larger and more heterogeneous samples to improve their reliability and generalizability. Moreover, the marked predominance of male participants in the sample (78.2%) may limit the extent to which the results can be generalized to females. This is particularly important because ADHD symptoms and autistic traits may differ by sex, and these characteristics are often less readily recognized in girls. Accordingly, future research should include samples with a more balanced sex distribution in order to better characterize sex-specific clinical presentations and obtain more representative findings. Fifth, the inclusion of a control group would have been preferable. Sixth, the present study did not use gold-standard diagnostic instruments for ASD, such as the Autism Diagnostic Observation Schedule–Second Edition (ADOS-2) or the Autism Diagnostic Interview–Revised (ADI-R), because validity and reliability studies for these tools have not been established in our country. Therefore, ASD was ruled out through clinical assessment rather than standardized structured diagnostic procedures. This may have led to insufficient detection of ASD. In ADHD populations, differentiating autistic traits from subthreshold or previously unrecognized ASD is particularly challenging. Future studies should incorporate more standardized and methodologically rigorous diagnostic procedures to improve diagnostic precision and strengthen the validity of the results. Finally, several variables that may influence IGD such as psychostimulant use, daily screen time, type of gaming, preference for online versus offline gaming, and family functioning were not examined in detail.

Nevertheless, our study also has several strengths. The diagnosis of ADHD was confirmed using a structured clinical interview, and ASD was excluded through clinical evaluation. In addition, the study provides a multidimensional evaluation of clinical factors associated with IGD by jointly examining autistic traits, ADHD symptom severity, anxiety and depressive symptoms in children and adolescents with ADHD. In this respect, our findings emphasize that problematic gaming behavior in individuals with ADHD should be evaluated not only in terms of neurodevelopmental symptoms but also in conjunction with co-occurring emotional symptoms.

Conclusion

From a clinical perspective, when assessing the risk of IGD in children and adolescents with ADHD, depressive symptoms, hyperactivity/impulsivity, and co-occurring anxiety symptoms should be considered together. The findings of this study may contribute to a better understanding of the psychopathology-related etiological mechanisms underlying

IGD and to improving the clinical management of children with ADHD. Future studies with larger samples, longitudinal designs, and mediation analyses are needed to further clarify the direction and underlying mechanisms of the relationships among ADHD, autistic traits, mood symptoms, and IGD.

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Ethics committee approval

This study was conducted in accordance with the Helsinki Declaration Principles. The study was approved by Sincan Training and Research Hospital Ethics Committee (09.04.2025, reference number: BAEK-2025-17).

Contribution of the authors

Study conception and design: HED; data collection: HED, ÜGAB; analysis and interpretation of results: HED; draft manuscript preparation: HED. All authors reviewed the results and approved the final version of the article.

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Conflict of interest

The authors declare that there is no conflict of interest.

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