International Journal of Contemporary Educational Research

Volume 13, Number 3, September 2026, Page 222-237 Article Type: Research Article

Measuring Digital Game Addiction in Adolescents: Development and Psychometric Evaluation of a Theory-Based Scale

Özgün Zincirli [1] | | ozincirli@firat.edu.tr
Fırat University, School of Health Services, Department of Child Development, Elazığ, Türkiye

Ayşe Dilek Öğretir Özçelik | | dilekogretir@gmail.com
Gazi University, Faculty of Education, Department of Child Development, Ankara, Türkiye

Abstract
This study developed and psychometrically evaluated a theory-based Digital Game Addiction Scale (DGAS) for adolescents aged 14–18. The scale development process was based on Griffiths' (2005) model of addiction components, the ICD-11 Gaming Disorder framework, and the developmental characteristics of adolescence. The study was conducted with a total of 898 adolescents across five independent samples. Following item development, expert review, and a pilot study, the structural validity of the resulting 23-item draft questionnaire was examined using exploratory and confirmatory factor analyses. Principal Axis Factoring and parallel analysis supported a two-factor structure consisting of 16 items. Confirmatory factor analysis conducted on an independent sample revealed that the two-factor model with interrelated factors demonstrated a better fit than the one-factor model and that the model possessed acceptable fit indices ($\chi^2/df = 2.740$, RMSEA = .078, SRMR = .051, CFI = .95). The findings regarding convergent and discriminant validity were supported by AVE, CR, and HTMT values; in criterion-related validity analyses, it was determined that scale scores were weakly negatively correlated with self-esteem and strongly positively correlated with smartphone addiction. McDonald's omega coefficients for the subscales were calculated as .86 and .88, and composite reliability coefficients as .88 and .89; in a three-week test-retest administration, an ICC of .87 was found. The findings provide evidence supporting the validity and reliability of DGAS scores among adolescents aged 14–18.

Keywords: Digital game addiction, Gaming disorder, Adolescents, Scale development, Psychometric evaluation

Citation
Zincirli, Ö., & Öğretir Özçelik, A. D. (2026). Measuring digital game addiction in adolescents: Development and psychometric evaluation of a theory-based scale. *International Journal of Contemporary Educational Research, 13*(3), 222-237. https://doi.org/10.67942/ijcer.2026.13.3.1117

Received	02.05.2026
Accepted	16.09.2026
Publication	22.09.2026
Peer-Review	Double anonymized - Double Blind
Plagiarism Checks	Yes - iThenticate
Conflicts of Interest	The author(s) has no conflict of interest to declare.
Complaints	editor@ijcer.net
Grant Support	The author(s) acknowledge that they received no external funding in support of this research.
AI Disclosure	The authors confirm that any artificial intelligence (AI) tools used during the preparation of the manuscript were used only in an ethical and transparent manner. The authors further confirm that all references, citations, and bibliographic information were checked and verified by the authors, and that no fabricated or non-existent sources were generated using AI tools.
Copyright & License	Authors publishing with the journal retain the copyright to their work licensed under the **CC BY-NC 4.0**.

[1] Corresponding Author

Introduction

Rapid advances in digital technologies have profoundly transformed the ways in which individuals interact socially, learn, and spend their free time. One of the most notable outcomes of this transformation is the widespread and intensive use of digital games, particularly among adolescents. The rise of online multiplayer games, the increasing accessibility of mobile gaming platforms, and the global growth of the gaming industry have transformed gaming from a mere recreational activity into a central part of individuals' daily routines (King et al., 2017; Kuss & Griffiths, 2012). The experiences of competition, social interaction, and achievement offered by digital games align with adolescents' developmental needs, making gaming behavior highly appealing to this age group (Steinberg, 2005, 2008). Accordingly, digital games are considered a significant environmental factor in adolescents' psychosocial development processes, presenting both opportunities and risks. Adolescence is a critical stage in terms of neurobiological and psychosocial development. Neurodevelopmental research shows that the development of the prefrontal cortex continues throughout adolescence and that this leads to relative vulnerability in executive functions such as impulse control, planning, and evaluating long-term consequences (Casey et al., 2008). In contrast, reward sensitivity and risk-taking tendencies are at high levels during this period (Steinberg, 2008). The rapid feedback, variable-ratio reward cycles, and social reinforcers offered by digital games activate the dopaminergic reward system, thereby increasing adolescents' inclination toward gaming behavior. These characteristics can reinforce adolescents' tendency to sustain and intensify their gaming behavior and, in cases of uncontrolled use, may pave the way for the development of addiction-like behavioral patterns (Paulus et al., 2018; King et al., 2017). Therefore, digital game addiction should be viewed as a complex form of behavioral addiction that arises through an interaction with the developmental characteristics of adolescence. Within the literature on behavioral addictions, digital game addiction is defined as a condition in which an individual experiences a loss of control over their gaming behavior, devotes excessive time to gaming, and experiences impairments in academic, social, and psychological functioning as a result of this behavior (Griffiths, 2005). The American Psychiatric Association classified "Internet Gaming Disorder" as an experimental diagnosis in the DSM-5 and proposed diagnostic criteria (American Psychiatric Association [APA], 2013). The World Health Organization, on the other hand, has recognized "Gaming Disorder" as an official clinical disorder in the ICD-11 classification, thereby positioning digital game addiction among global mental health issues (World Health Organization [WHO], 2019). The ICD-11 framework defines digital game addiction as a disorder requiring clinical and epidemiological monitoring, emphasizing key criteria such as loss of control, prioritizing gaming behavior, and continued engagement despite adverse consequences (Jo et al., 2019). From a theoretical perspective, Griffiths's (2005) model of addiction components provides an important framework for explaining the underlying mechanisms of digital game addiction. According to this model, addiction consists of the components of salience, mood modification, tolerance, withdrawal symptoms, conflict, and relapse (Griffiths, 2005). In the context of digital game addiction, salience refers to the individual's constant mental preoccupation with the game; tolerance refers to the need to play for longer periods over time to achieve the same level of satisfaction; withdrawal refers to symptoms such as restlessness and irritability when away from the game; and conflict, which can be observed as problems in academic, social, and family domains resulting from gaming behavior (Kuss & Griffiths, 2012). The overlap between the diagnostic criteria of the ICD-11 and the components of Griffiths's model demonstrates that digital game addiction exhibits a theoretically and clinically consistent structure (WHO, 2019; Jo et al., 2019). Findings regarding the prevalence of digital game addiction among adolescents reveal that this behavior is a significant public health issue on a global scale. A meta-analysis conducted by Stevens et al. (2021) shows that gaming disorder has a significant prevalence worldwide, with higher rates observed particularly among young populations. This finding supports the notion that digital game addiction is a risk area that requires epidemiological monitoring. Furthermore, studies conducted on clinical samples reveal that individuals with digital game addiction experience significant impairments in psychosocial functioning (Jo et al., 2019). Empirical findings on the psychosocial consequences of digital game addiction in adolescents indicate that this behavior has multidimensional effects. Various studies have reported that problematic gaming behavior is associated with a decline in academic performance, a reduction in study time, and attention problems (Gentile et al., 2011; Müller et al., 2015). In addition, health-related issues such as sleep disturbances, reduced levels of physical activity, and disruptions to daily routines are also linked to digital game addiction (Kuss & Lopez-Fernandez, 2016). In terms of psychological adjustment, comorbid risk factors such as depressive symptoms, anxiety, and problematic internet use have been reported (Paulus et al., 2018; King et al., 2017). In the realm of social relationships, negative outcomes such as withdrawal from peer relationships, a decrease in face-to-face communication, and family conflicts have been reported (Steinberg, 2005). These findings suggest that digital game addiction may negatively affect adolescents' ability to fulfill their developmental tasks. The use of valid and reliable measurement tools is of great importance for the assessment of digital game addiction and the planning of preventive interventions. Assessment tools play a fundamental role in identifying at-risk groups, conducting epidemiological studies, and monitoring the effectiveness of clinical interventions (King et al., 2017).

From the perspective of adolescent development theories, research on digital game addiction must take the developmental context into account. During adolescence, the importance of identity development, the acquisition of autonomy, and peer approval increases, while the tendency toward short-term rewards becomes stronger (Steinberg, 2005, 2008). Digital games can provide an environment that meets developmental needs such as a sense of achievement, social status, and belonging. However, excessive and uncontrolled use of this environment can lead to consequences such as the neglect of academic responsibilities, conflict with family rules, and social isolation (Kuss & Lopez-Fernandez, 2016; Müller et al., 2015). For this reason, the assessment of digital game addiction in adolescents requires a multidimensional measurement approach that encompasses both core addiction processes and the functional consequences of these processes (Griffiths, 2005; WHO, 2019). Various measurement tools have been developed in the national and international literature for the assessment of digital game addiction. The *Game Addiction Scale*, developed for adolescents by Lemmens et al. (2009), consists of a 21-item version based on seven addiction components—salience, tolerance, mood changes, relapse, withdrawal, conflict, and problems—as well as a seven-item short form. The IGD-20 Test, developed following the definition of Internet Gaming Disorder in the DSM-5, is a 20-item assessment tool that integrates the DSM-5 diagnostic criteria with Griffiths' model of addiction components (Pontes et al., 2014). The IGDS9-SF, a shorter screening tool, assesses the nine criteria for gaming disorder defined in the DSM-5 using nine items (Pontes & Griffiths, 2015). Compared with these established measures, the DGAS organizes digital game addiction into two broader but closely related dimensions: Core Addiction Symptoms and Conflict. Whereas the GAS represents addiction through seven component-based dimensions and the IGD-20 and IGDS9-SF are closely aligned with the DSM-5 framework, the DGAS distinguishes core addictive symptoms from the conflicts and functional difficulties associated with gaming in adolescents' daily lives. This two-dimensional structure is particularly relevant to the developmental context of adolescents aged 14–18, as it allows core addiction-related symptoms to be considered alongside difficulties manifested in academic, family, and social functioning. Thus, the DGAS is intended to complement, rather than replace, established measures by providing a developmentally focused assessment of these two closely related aspects of digital game addiction.

In Turkey as well, specific assessment tools have been developed for different age groups. The Computer Game Addiction Scale for Children, developed by Horzum, Ayas, and Çakır Balta (2008) for elementary school students, consists of 21 items and has a four-factor structure. The Digital Game Addiction Scale for Children, developed by Hazar and Hazar (2017), is another national assessment tool designed to evaluate the levels of digital game addiction among children. While these studies provide important measurement tools for assessing digital game addiction, it is evident that the scales differ in terms of their target age groups, theoretical foundations, development periods, and the dimensions of addiction they measure.

The rationale for developing a new assessment tool in this study stems not so much from a lack of existing assessment tools, but rather from the need for an assessment approach that takes into account the developmental characteristics of high school-aged adolescents (ages 14–18) and evaluates the core cognitive and behavioral symptoms of digital game addiction, as well as the negative consequences of gaming behavior on academic, social, and family functioning, within a comprehensive theoretical framework. The acquisition of autonomy during adolescence, the increasing importance of peer relationships, and developmental characteristics such as heightened reward sensitivity and still-developing impulse control create an age-specific context for the emergence and maintenance of gaming behavior (Steinberg, 2005, 2008). Therefore, during the scale development process, Griffiths' (2005) model of addiction components, the ICD-11 Gaming Disorder framework, and the developmental characteristics of adolescence were all taken into consideration. In this regard, the aim is to assess digital game addiction not only based on the intensity of gaming behavior but also by considering core addiction indicators—such as loss of control and excessive preoccupation with gaming—along with the negative consequences that arise in academic, social, and family functioning. In this respect, the DGAS is intended to complement rather than replace established instruments such as the GAS, IGD-20, and IGDS9-SF. Its distinctive contribution lies in its development specifically for adolescents aged 14–18 and in organizing digital game addiction into two closely related dimensions: Core Addiction Symptoms and Conflict. This structure allows the assessment of both core addictive symptoms and the conflicts or functional difficulties associated with gaming in adolescents' academic, social, and family lives.

The purpose of this study is to develop a theory-based scale to measure digital game addiction in high school adolescents aged 14–18 and to examine the scale's psychometric properties. To this end, the construct validity, criterion-related validity, and reliability of the scale were tested on different samples. The study aims to contribute to the literature by providing a measurement tool that is developmentally sensitive, tailored to the Turkish context,

and has been comprehensively evaluated for its psychometric properties for assessing digital game addiction in adolescents.

Method

This section provides information on the study's sample, data collection tools, the steps followed in the scale development process, the data collection process, and the statistical analyses used. The validity and reliability properties of the Digital Game Addiction Scale (DGAS), developed in this study, were examined in detail.

Participants and Samples

The research aimed at developing the DGAS was conducted over a period of approximately four months during the fall semester of the 2025–2026 academic year (September–December) on five independent samples. The pilot, EFA, CFA, and test-retest samples were formed from volunteer adolescents attending accessible schools in Elazığ. In contrast, participants in the criterion-related validity sample were selected using random sampling. In the first phase, a preliminary pilot study was conducted with 50 high school-aged adolescents enrolled in schools in Elazığ to pre-evaluate the scale's items. Subsequently, Exploratory Factor Analysis (EFA) was performed using data from 245 high school-aged adolescents enrolled in schools in Elazığ to determine the scale's factor structure. Subsequently, to validate the identified structure, Confirmatory Factor Analysis (CFA) was applied to 205 high school-aged adolescents selected from a different group of schools in Elazığ.

Data were collected from 274 high school-aged adolescents selected using a random sampling method to examine the criterion-related validity of the scale. Additionally, to assess the scale's stability over time, two administrations were conducted three weeks apart on a separate sample of 124 high school-aged adolescents—selected independently from the previous samples—and test-retest reliability was calculated. The study was conducted on five independent samples and a total of 898 unique participants. When all these stages are considered together, the study was carried out using data obtained from a total of 898 high school-aged adolescents enrolled in Elazığ during the fall semester of the 2025–2026 academic year. Detailed demographic information regarding the Study Samples is presented in Table 1.

Table 1. Demographic Information on the Study Samples

Variable		Pilot Sample		EFA Sample		CFA Sample		Criterion Validity Sample		Test-Retest Sample	
		N	%	N	%	N	%	N	%	N	%
Gender	Female	25	50.0	112	45.7	96	46.8	132	48.2	52	41.9
	Male	25	50.0	133	54.3	109	53.2	142	51.8	72	58.1
	Total	50	100	245	100	205	100	274	100	124	100
Age	14	8	16.0	36	14.7	32	15.6	40	14.6	20	16.1
	15	8	16.0	71	29.0	58	28.3	62	22.6	37	29.8
	16	20	40.0	63	25.7	67	32.7	85	31.0	26	20.9
	17	11	22.0	43	17.6	30	14.6	56	20.4	21	16.9
	18	3	6.0	32	13.0	18	8.8	31	11.4	20	16.3
	Total	50	100	245	100	205	100	274	100	124	100
Grade	9th Grade	22	44.0	84	34.3	75	36.6	89	32.5	37	29.8
	10th Grade	12	24.0	68	27.8	46	22.4	87	31.8	41	33.0
	11th Grade	7	14.0	54	22.0	45	22	57	20.8	31	25.0
	12th Grade	9	18.0	39	15.9	39	19	41	14.9	15	12.2
	Total	50	100	245	100	205	100	274	100	124	100
School Type	Anatolian High School	18	36.0	92	37.6	60	29.2	88	32.2	30	24.1
	Science High School	3	6.0	18	7.3	9	4.4	42	15.3	28	22.5
	Sports High School	2	4.0	7	2.9	11	5.4	17	6.20	8	6.4
	Imam Hatip High School	7	14.0	29	11.8	24	11.7	45	16.4	25	20.3
	Anadolu Imam Hatip High School	20	40.0	99	40.4	101	49.3	82	29.9	33	26.7
	Total	50	100	245	100	205	100	274	100	124	100

EFA: Exploratory Factor Analysis, CFA: Confirmatory Factor Analysis

Data Collection Instruments

In this study, data were collected using the Digital Game Addiction Scale (DGAS), the Rosenberg Self-Esteem Scale (RSS), the Smartphone Addiction Scale (SAS), and a Personal Information Form.

Rosenberg Self-Esteem Scale (RSS): The Rosenberg Self-Esteem Scale was developed by Rosenberg (1965) and adapted into Turkish by Çuhadaroğlu (1986). The scale consists of 10 items designed to assess individuals' levels of self-esteem and was used in this study to assess criterion-related validity. The scale is organized in a 4-point Likert-type rating format, with response options ranging from 1 = "Strongly Disagree" to 4 = "Strongly Agree." The internal consistency coefficient for the Turkish version of the scale was reported as .75 by Çuhadaroğlu (1986) and was found to be .86 in a more recent study by Gökdemir and Ekşi (2023). In this study, the Cronbach's alpha coefficient for the scale's internal consistency was found to be .85.

Smartphone Addiction Scale (SAS): The Smartphone Addiction Scale was developed by Kwon, Kim, Cho, and Yang (2013) and adapted into a 10-item, unidimensional short form based on the Smartphone Addiction Scale previously developed by Kwon et al. (2013). The scale was developed to determine individuals' levels of addiction related to smartphone use. A 6-point Likert-type scale was used for responding to the items, with response options ranging from 1 = Strongly Disagree to 6 = Strongly Agree. The Turkish adaptation of the scale was conducted by Şata and Karip (2018), and the internal consistency coefficient was reported as .90. In this study, however, the Cronbach's alpha coefficient for the scale's internal consistency was found to be .86.

Digital Game Addiction Scale (DGAS)*:* The Digital Game Addiction Scale, which constitutes the primary objective of this study, was developed by the researcher to assess the levels of digital game addiction among adolescents. The scale's construct validity, criterion-related validity, reliability, and item discriminant properties were examined in detail within the scope of this study. Psychometric findings regarding the scale are presented in detail in the Findings section of the study. The DGAS is a measurement tool consisting of 16 items and using a 5-point Likert-type scale. Items are scored as follows: 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, and 5 = Always. There are no reverse-scored items on the scale. Total scores range from 16 to 80, with higher scores indicating a higher level of digital game addiction.

Procedure

Preliminary Work

In the first phase of the scale development process, the literature on digital game addiction was reviewed, along with Griffiths' model of addiction components and the ICD-11 Gaming Disorder framework, which form the theoretical basis of this study. Based on this review, core cognitive and behavioral symptoms of digital game addiction were identified, along with behavioral indicators that could represent the negative consequences of gaming behavior on academic, social, and family functioning. During the item development process, care was taken to ensure that the statements directly represented the trait to be measured, used clear and understandable language, and were appropriate for the developmental characteristics of the target age group. As a result of this process, an initial item pool consisting of 30 items was created.

The resulting pool of 30 items was submitted for expert review. For this purpose, an expert evaluation form was prepared, in which each scale item was listed separately, allowing experts to write their critiques, suggestions, and corrections regarding the relevant item. The form was sent to a total of five experts: one faculty member specializing in measurement and evaluation, two faculty members specializing in educational sciences, and two faculty members specializing in child development. The item-specific qualitative feedback received from the experts was evaluated by the researchers; based on these evaluations, 14 items were revised in terms of wording and content, 5 items were removed from the item pool, and the draft form was reduced to 25 items.

The draft form was then reviewed by a language expert for linguistic clarity and comprehensibility, and the necessary wording adjustments were made. Subsequently, a pilot sample was conducted with a group of 50 adolescents representing the target population. Participants were asked to read the items carefully and identify any phrasing they found difficult to understand. The feedback received from the participants was evaluated, and two items identified as problematic in terms of comprehensibility were removed from the form. Thus, a 23-item draft form was obtained prior to the administration of the psychometric analyses.

Data Collection

The data collection process for the study was conducted in a school setting. Prior to data collection, informed assent was obtained from participating adolescents, and written informed consent was obtained from their parents. Prior to the administration, the adolescents were provided with the necessary explanations regarding the purpose of the study, the method of administration, confidentiality principles, and the fact that participation was voluntary. Accordingly, data collection instruments—including a personal information form, the Digital Game Addiction Scale (DGAS), the Rosenberg Self-Esteem Scale (RSS), and the Smartphone Addiction Scale (SAS)—were distributed to adolescents who agreed to participate in the study. Some of the forms were collected on the same day, while others were collected a few days after the study by researchers who returned to the schools; the adolescents were thanked for their participation.

Ethical approval was obtained from the Gazi University Ethics Commission prior to the study (Meeting Decision No. 06 dated April 15, 2025; Research Code No.: 2025-635). In addition, the necessary research implementation permit was obtained to conduct the study in schools affiliated with the Ministry of National Education (MEB Application No.: MEB.TT.2025.037640.02; approval date: November 26, 2025). Prior to the data collection process, participants were informed about the purpose of the study, their right to voluntary participation, and their right to withdraw from the study at any time; informed consent was obtained from the students and their parents. The research process was conducted in accordance with the principles of voluntariness, confidentiality, and the protection of personal data.

Statistical Analysis

To determine the psychometric properties of the DGAS, construct validity analyses were first conducted. In this context, the scale's factor structure was identified using EFA, and the validity of this structure was then tested using CFA. Data obtained from independent samples were used in the EFA and CFA analyses. The suitability of the data for factor analysis was assessed using the Kaiser-Meyer-Olkin (KMO) coefficient and Bartlett's sphericity test; the values obtained from both tests indicated that the data were adequate for factor analysis. In the EFA, Principal Axis Factoring (PAF) was used as the factor extraction method, and oblique rotation was preferred, taking into account that the factors might be interrelated; in the CFA process, model fit was evaluated using fit indices commonly used in the literature, such as χ^2/df, RMSEA, SRMR, GFI, CFI, IFI, and TLI.

The criterion-related validity of the scale was examined using the Rosenberg Self-Esteem Scale (RSS) and the Smartphone Addiction Scale (SAS). The reliability of the DGAS was assessed using Cronbach's α internal consistency coefficient separately for each sample; additionally, McDonald's Omega (ω) and Composite Reliability (CR) coefficients were calculated for the final factor structure. The scale's test-retest reliability was examined using a test-retest analysis conducted three weeks apart. For item validity, corrected item-total correlations and t-tests for differences in mean item scores between the lower and upper 27% groups were calculated. Acceptable values for fit indices are presented in Table 2.

Table 2. Acceptable Limits for Fit Indices

Fit Level	χ^2/df	RMSEA	GFI	CFI	IFI	TLI
Good/Excellent Fit	≤ 3	≤ .05	≥ .95	≥ .95	≥ .95	≥ .95
Acceptable Fit	≤ 5	≤ .08	≥ .90	≥ .90	≥ .90	≥ .90

(Hu & Bentler, 1999; Sümer, 2000; Tabachnick & Fidell, 2001; Kline, 1994; Savcı and Aysan, 2016)

Fındıngs

Construct Validity

Exploratory Factor Analysis (EFA)

To examine the construct validity of the DGAS, Exploratory Factor Analysis (EFA) was first conducted. As noted by Pohlmann (2004), the EFA process consists of three basic stages: identifying the variables, determining the number of factors, and interpreting the resulting factors. In this study, these stages were followed, and the analyses were conducted using data obtained from 245 high school-aged adolescents. Prior to the analysis, the Kaiser-Meyer-Olkin (KMO) coefficient and Bartlett's sphericity test were examined to assess the suitability of the data for EFA. The evaluation revealed that the KMO value was .95 and that Bartlett's test was significant at the χ^2=4051.108 ($p < .001$) level. A KMO value above .90 and the significance of the Bartlett test indicate that the data are highly suitable for factor analysis (Tabachnick and Fidell, 1996; Kalaycı, 2006; Çokluk, Şekercioğlu, and Büyüköztürk, 2010). Accordingly, EFA was conducted on the 23 items using Principal Axis Factoring (PAF) as the factor extraction method, and oblique rotation was applied, taking into account the possibility of correlations

among the factors. In factor analysis, the primary goal is to explain the relationships among the items in the simplest and most meaningful way. Parallel analysis was also conducted to support the determination of the number of factors. The results of the parallel analysis indicated that the true data eigenvalues for the first two factors exceeded the 95th percentile eigenvalues obtained from random data, whereas this criterion was not met for the third and subsequent factors. This result supported the scale's two-factor structure. Furthermore, when items have factor loadings of .40 or higher and the difference between the loadings for a given item is at least .10, this indicates that the item is consistently assigned to a single factor (Büyüköztürk, 2007). As a result of the examination conducted in accordance with the specified criteria, it was determined that items 4, 9, 13, 14, 15, 21, and 22 either had factor loadings below .40 or had a difference of less than .10 between their loadings across multiple factors. Therefore, these 7 items were removed from the scale, and the analysis continued with the remaining 16 items. After the items were removed, the remaining 16 items were renumbered in the final scale format. The structure obtained from the factor analyses is expected to explain approximately 40% to 60% of the scale's total variance (Çokluk et al., 2010; Tavşancıl, 2010; Savcı, Ercengiz, & Aysan, 2018). The analysis revealed that the two-factor structure explained 52% of the total variance of the scale. The two-factor structure obtained from the PAF was evaluated in conjunction with the findings of the parallel analysis and scree plot, yielding consistent evidence supporting the scale's two-factor structure. Furthermore, the presence of a distinct break after the second factor in the scree plot presented in Figure 1 also supported the two-factor structure. The PAF and oblique rotation results indicated that the items exhibited high loadings on their respective factors, while cross-loadings on the other factor remained at low levels. The factor loadings and communality values for the items are presented in Table 3. The interpretation of the factors was conducted in line with the literature in this field, and it was observed that both factors reflect fundamental dimensions associated with digital game addiction. A review of the literature on digital game addiction reveals that addictive behavior is addressed in terms of two fundamental dimensions that are interrelated yet functionally distinct. The first dimension encompasses the core components of addictive behavior, such as the individual's desire to play games, frequency of play, and difficulty controlling gaming behavior. In this regard, it focuses on the cognitive, emotional, and behavioral processes that constitute the starting point of addiction. Within this core structure of addiction, an individual's capacity to regulate gaming behavior, impulse control, reward sensitivity, and motivations for gaming are key determinants (Griffiths, 2005; Kardefelt-Winther, 2014). Within this framework, it was deemed appropriate to name the first factor identified by the EFA "Core Addiction Symptoms" because it reflects the fundamental mechanisms underlying addictive behavior. The items in this dimension cover the extent to which an individual can control their gaming behavior, their internal orientations toward gaming, and the primary determinants of addiction. The second dimension, meanwhile, encompasses the negative effects of digital game addiction on individual, social, and academic functioning. The literature emphasizes that addictive behavior is not limited solely to the desire to play games; it manifests itself through external consequences such as impaired time management, a decline in academic performance, conflicts in social relationships, and the neglect of daily responsibilities (American Psychiatric Association, 2013). Digital game addiction leads to increasing pressure, conflict, and loss of functioning in various areas of an individual's life. The results of the EFA showed that the items grouped under the second factor largely represent these types of external effects; therefore, this dimension has been named "Conflict." From a theoretical perspective, the core processes of addictive behavior and the negative effects experienced following addiction complement each other as two fundamental elements and are frequently addressed in the literature as interrelated yet distinct constructs that must be evaluated separately. In this regard, it can be said that the two-dimensional structure of the DGAS comprehensively reflects both the internal mechanisms and the external consequences of digital game addiction. The findings from the EFA support the existence of two distinct yet related dimensions that represent both the fundamental components of addiction and the negative consequences it creates for the individual.

In naming the dimensions, both the information on digital game addiction found in the literature and the opinions of experts in the field were taken into account. The scree plot for the DGAS is presented in Figure 1, and the EFA results are presented in Table 3.

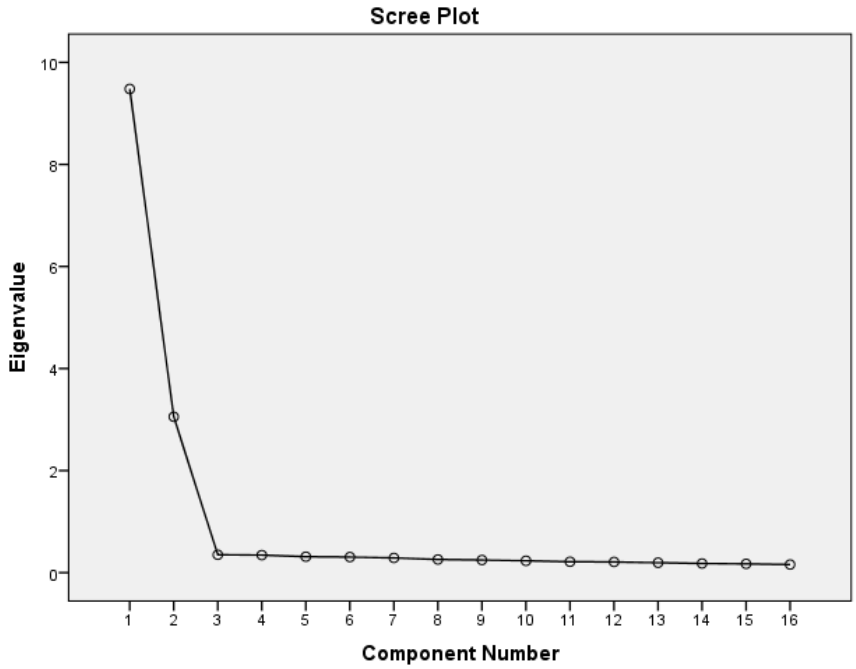


Figure 1. Scree Plot for the DGAS

Table 3. Results of the Exploratory Factor Analysis for DGAS

Item	Factor 1	Factor 2	h^2
3	**.893**	-.036	.766
8	**.889**	-.019	.773
16	**.886**	-.067	.729
2	**.856**	.055	.785
10	**.863**	-.009	.737
7	**.847**	.062	.775
6	**.839**	.030	.730
5	**.846**	-.012	.705
1	**.830**	.043	.727
20	-.071	**.908**	.763
17	-.036	**.899**	.778
23	-.023	**.891**	.773
11	.013	**.871**	.770
19	.010	**.880**	.783
18	.080	**.798**	.709
12	.111	**.798**	.739

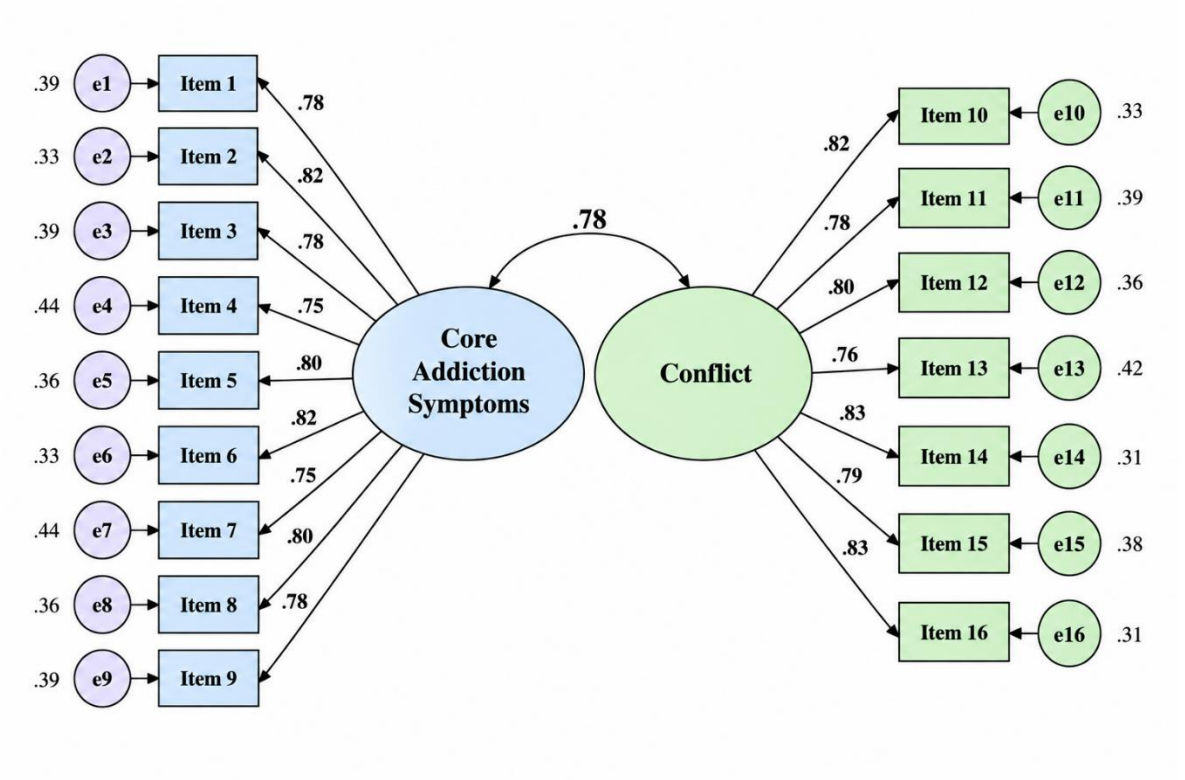
Note: Factor extraction method: Principal Axis Factoring (PAF); oblique rotation method: oblimin. h^2 = communality.

Confirmatory Factor Analysis

The two-factor structure of the Digital Game Addiction Scale (DGAS), consisting of 16 items, was tested using Confirmatory Factor Analysis (CFA). CFA was conducted using data from 205 adolescents in a different sample group to confirm the scale's structure, which had previously been identified using Exploratory Factor Analysis (EFA). To evaluate the fit of the two-factor structure identified by EFA compared to an alternative one-factor model, the one-factor model was compared with the two-related-factors model. For the one-factor model, χ^2 = 294.956, df=104, χ^2/df=2.836, CFI=.944, and TLI=.935, while for the two-factor model, the values were χ^2=282.211, df=103, χ^2/df=2.740, CFI=.947, and TLI=.939. The chi-square difference test revealed that the two-factor model with correlated factors fit the data significantly better than the one-factor model ($\Delta\chi^2$ = 12.745, Δdf = 1, $p < .001$). The standardized correlation coefficient between the two factors was determined to be .78. This finding indicates that Core Addiction Symptoms and Conflict represent distinct but closely related dimensions of the broader digital game addiction construct, with their relatively strong correlation suggesting substantial shared

variance. Furthermore, the fact that the two-factor model fits better than the one-factor model and that the HTMT value was determined to be .79 provides additional evidence for the two-dimensional structure. Accordingly, the two subscale scores can be used to assess the specific dimensions of Core Addiction Symptoms and Conflict, while the total DGAS score provides an overall indicator of the broader digital game addiction construct. The analysis revealed that the two-factor model of the DGAS possesses fit indices above an acceptable level. The fit values obtained are as follows: $\chi^2 = 282.211$, df = 103, $\chi^2/df = 2.740$, RMSEA = .078, 90% CI [.069, .083], SRMR = .051, GFI = .91, CFI = .95, IFI = .95, and TLI = .94. These findings indicate that the model demonstrated acceptable overall fit. The standardized factor loadings for the items examined within the CFA range from .75 to .83. These values indicate that the items strongly represent the dimensions to which they belong. The standardized path diagram obtained from the CFA results for the DGAS is presented in Figure 2.

Figure 2. Standardized Path Diagram of the Two-Factor CFA Model for the DGAS



Note. Standardized factor loadings and error variances are presented. Item = observed variable; e = error term. The correlation between the two factors is shown as a double-headed arrow.

To provide additional evidence of construct validity, convergent and discriminant validity were examined. For the Core Addiction Symptoms dimension, AVE = .57 and CR = .88; for the Conflict dimension, AVE = .61 and CR = .89. The fact that the AVE values for both dimensions are above .50 and the CR values are above .70 supports convergent validity. The HTMT value between the factors was determined to be .79. Since this value is below the .85 criterion, it indicates that discriminant validity between the Core Addiction Symptoms and Conflict dimensions is supported.

Criterion-Related Validity

The criterion-related validity of the DGAS was assessed through its relationships with the Rosenberg Self-Esteem Scale (RSS) and the Smartphone Addiction Scale (SAS). In this context, a Pearson correlation analysis was conducted on data from 274 adolescents in an independent sample. The analysis results revealed that the DGAS total score showed a weak negative correlation with the RSS ($r = -0.17$, $p < .01$) and a strong positive correlation with the SAS ($r = 0.75$, $p < .01$). When examining the relationships at the scale dimension level, it was observed that the "Core Addiction Symptoms" subscale exhibited a weak negative relationship with RSS ($r = -0.17$, $p < .01$) and a strong positive relationship with SAS ($r = 0.71$, $p < .01$). The "Conflict" dimension also showed a weak negative correlation with RSS ($r = -0.16$, $p < .01$) and a strong positive correlation with SAS ($r = 0.73$, $p < .01$).

These findings indicate that DGAS scores are weakly and negatively associated with self-esteem and strongly and positively associated with smartphone addiction. Given that smartphone addiction and digital game addiction represent conceptually related forms of problematic technology use, the strong association with smartphone addiction should be interpreted as evidence of theoretically expected convergence with a related construct rather than as sufficient evidence of criterion-related validity on its own. Future studies should further examine the criterion-related validity of the DGAS using established gaming-disorder measures and clinical indicators. All findings regarding the criterion-related validity analysis are presented in Table 4.

Table 4. Correlations Regarding the Criterion-Related Validity of the DGAS

	Rosenberg Self-Esteem	Smartphone Addiction
Digital Game Addiction (Total)	-0.174**	0.755**
Core Addiction Symptoms	-0.176**	0.711**
Conflict	-0.167**	0.732**

**p < 0.01

Reliability

The reliability of the DGAS was examined using both the internal consistency coefficient and the test-retest method to assess its stability over time. The scale's internal consistency was calculated separately for three different samples. Cronbach's α was found to be .84 in the sample from which the EFA data were obtained, .85 in the CFA sample, and .82 in the sample used for criterion-related validity analysis. These values indicate that the scale exhibits a high level of internal consistency in all three samples. To strengthen the evidence of internal consistency, McDonald's Omega (ω) and Composite Reliability (CR) coefficients were also calculated. For the Core Addiction Symptoms dimension, ω = .86 and CR = .88; for the Conflict dimension, ω = .88 and CR = .89. The coefficients obtained support the internal consistency of the scale's subscales. Additionally, a test-retest analysis was conducted to determine the scale's test-retest reliability. In this context, the DGAS was administered twice, three weeks apart, to a test-retest sample consisting of 124 adolescents independent of the other study groups. The Pearson correlation coefficient between the two administrations was determined to be .83. The scale's test-retest reliability was also examined using the intraclass correlation coefficient [ICC(2,1)], based on a two-way random effects, absolute agreement, and single-measurement approach, and was calculated as ICC = .87, 95% CI [.82, .92]. These findings support that DGAS scores demonstrate a good level of stability over a three-week time interval.

Item Analysis

Item analysis is a crucial step in determining the extent to which each item on the scale reflects the intended construct and in assessing the discriminant validity of the items. According to Tezbaşaran (1997), in the item analysis process, the item-total correlation should be calculated for each item, and the difference between the mean item scores of the lower and upper 27% groups—formed based on total scores—should be examined using a t-test. As noted by Şencan (2005) and Büyüköztürk (2007), an item-total correlation of .30 or higher indicates that the item demonstrates adequate discrimination. Item analysis for the DGAS was conducted separately on data obtained from the EFA, CFA, and criterion-related validity samples. The analyses examined both the corrected item-total correlation coefficients and the significance of the t-values between the bottom 27% and top 27% groups. In the first sample (EFA), it was determined that the corrected item-total correlations ranged from .66 to .79; the t-values for the differences between the lower and upper groups were significant for all items ($p < .001$) and ranged from 14.67 to 7.32. In the second sample (CFA), item-total correlation coefficients ranged from .73 to .89; t-values were again significant for all items ($p < .001$) and ranged from 16.64 to 7.56. In the third sample (criterion-related validity), it was found that the corrected item-total correlations ranged from .68 to .90; all t-values between the lower and upper groups were significant ($p < .001$) and ranged from 17.65 to 8.23. These results indicate that the DGAS items demonstrate strong item discrimination. Detailed findings regarding the item analysis are presented in Table 5.

Table 5. Findings Regarding the DGAS Item Analysis

	EFA Sample			CFA Sample			Criterion-Related Validity Sample		
	Item	*rjx*	*t*	Item	*rjx*	*t*	Item	*rjx*	*t*
Digital Game Addiction Scale	1	.761	10.318***	1	.896	9.725***	1	.683	9.943***
	2	.794	11.902***	2	.739	10.188***	2	.877	13.537***
	3	.748	10.621***	3	.827	16.648***	3	.867	13.965***
	5	.728	11.539***	5	.730	14.742***	5	.820	14.804***
	6	.757	8.026***	6	.813	13.152***	6	.897	12.549***
	7	.793	7.324***	7	.845	14.365***	7	.908	17.622***
	8	.759	13.332***	8	.850	12.704***	8	.869	14.275***
	10	.746	14.64***	10	.829	14.859***	10	.887	17.303***
	11	.710	14.369***	11	.841	14.279***	11	.830	9.22***
	12	.741	14.285***	12	.846	13.105***	12	.897	17.65***
	16	.716	9.311***	16	.840	11.509***	16	.853	12.005***
	17	.686	13.023***	17	.823	8.502***	17	.880	11.406***
	18	.714	14.67***	18	.783	7.567***	18	.828	14.596***
	19	.713	10.288***	19	.798	8.725***	19	.888	8.23***
	20	.659	11.492***	20	.870	10.188***	20	.869	10.139***
	23	.691	9.358***	23	.832	9.648***	23	.828	9.685***

***p < 0.001 **Note**: The item numbers in the table correspond to the original item numbers in the 23-item draft form used for psychometric analyses. In the final 16-item scale form, the items have been renumbered sequentially from 1 to 16.

Results, Discussion, and Recommendations

The aim of this study was to develop the Digital Game Addiction Scale (DGAS) for adolescents and to examine its psychometric properties. The findings indicate that the scale exhibits a two-factor structure and that this structure is consistent with both theoretical expectations and existing measurement tools in the literature. In particular, when considering Griffiths' model of addiction components and the ICD-11 Gaming Disorder diagnostic criteria, it can be said that the "Core Addiction Symptoms" dimension reflects the cognitive and behavioral addiction processes related to the individual's gaming behavior, while the "Conflict" dimension reflects the functional consequences of this behavior on the individual's academic, social, and family life. This finding aligns with theoretical approaches suggesting that digital game addiction exhibits a multidimensional structure in terms of both core addiction processes and functional consequences. The two-factor structure of the DGAS indicates that it offers a measurement approach that does not focus solely on the frequency or persistence of the behavior but also takes into account impairments in functioning across the individual's life domains. This provides a significant advantage, particularly in assessing the combined effects of digital game use on academic achievement, family relationships, and peer interactions during adolescence. Considering that some scales developed in the literature exhibit a unidimensional structure, the multidimensional structure of the DGAS can be regarded as a significant contribution toward a more comprehensive assessment of digital game addiction in adolescents. Criterion-related validity findings revealed negative associations between digital game addiction and self-esteem, and positive associations with smartphone addiction. This result indicates that digital game addiction is associated with indicators of psychosocial adjustment during adolescence and that different forms of digital addiction behaviors may cluster together. The weak negative relationship with self-esteem suggests a limited yet significant association between digital game addiction and self-worth. The finding of a positive relationship with smartphone addiction, meanwhile, supports the idea that digital addiction behaviors may share common risk factors and that problematic technology-use behaviors can co-occur. These findings suggest that digital game addiction among adolescents should be considered as part of a broader pattern of problematic technology use. The scale's reliability findings—demonstrating that the DGAS exhibits high internal consistency coefficients and test–retest reliability across different samples—indicate that it is a reliable measurement tool for use with adolescent samples. In particular, the test–retest results are important as they demonstrate that the scale can provide stable measurements over time. Item discrimination analyses, meanwhile, showed that each item of the scale is effective in distinguishing between adolescents with low and high levels of digital game addiction. When these findings are evaluated together, it can be concluded that the DGAS is a psychometrically robust measurement tool. The findings of this study support theoretical approaches that emphasize that digital game addiction in adolescents exhibits a multidimensional structure and that addictive behavior must be addressed in terms of both individual cognitive-behavioral processes and social and academic outcomes. Furthermore, the results reveal that digital game addiction is associated with self-esteem and other types of digital addiction, indicating the need for a holistic assessment of

adolescents' digital life practices. The Digital Game Addiction Scale (DGAS), developed as part of this study, is a measurement tool with established validity and reliability designed to assess levels of digital game addiction among adolescents. The scale's two-factor structure allows for the evaluation of digital game addiction in terms of both addiction processes and functional outcomes. The findings regarding the scale's construct validity, criterion-related validity, internal consistency reliability, and test-retest reliability indicate that the DGAS is a psychometrically adequate measurement tool suitable for use with adolescent samples. The development of the DGAS makes a unique contribution to the literature by providing a theory-based and culturally appropriate measurement tool for assessing digital game addiction in adolescents. In particular, the simultaneous assessment of core addiction symptoms and conflict dimensions allows for the concurrent measurement of both the internal addiction processes and the functional consequences of adolescents' digital game use across various life domains. In this regard, the DGAS can serve as a research and non-diagnostic assessment instrument for measuring individual differences in digital game addiction symptoms among adolescents.

Limitations

This study has several limitations that should be considered when interpreting the findings. First, although five independent samples were used across different stages of the psychometric evaluation, all participants were adolescents aged 14–18 attending schools in Elazığ. Therefore, the generalizability of the findings to adolescents from different geographical regions and socioeconomic backgrounds requires further investigation. Second, the principal measures used in the study relied on self-report, and the findings should therefore be interpreted within the inherent limitations of self-report data. Third, criterion-related validity evidence was examined using self-esteem and smartphone addiction, rather than an established gaming-disorder measure or a clinical criterion. In addition, measurement invariance across groups such as gender, age, and school type was not examined in the present study. Finally, because no clinical reference standard was used, clinical cut-off scores, sensitivity, specificity, and diagnostic accuracy have not yet been established for the DGAS. These limitations define the current boundaries for the interpretation and generalization of the psychometric evidence and indicate areas for further validation of the scale.

Based on the findings obtained in this study, various recommendations can be made for practical application and future research. First, it is important to re-administer the DGAS in different geographic regions, with adolescent samples from different socioeconomic backgrounds, and in different types of schools to test the scale's generalizability. Additionally, using the scale in longitudinal studies could provide more detailed information about the developmental course of digital game addiction and its changes over time. From the perspective of educational and counseling practices, the DGAS can be used to assess variations in digital game addiction symptoms among adolescents and to inform preventive psycho-educational programs. School counselors and guidance services can develop awareness campaigns and intervention programs regarding digital game use based on the results obtained from the scale. Additionally, through educational programs for families, strategies can be taught to help manage adolescents' digital game use within healthy limits. Future research could more comprehensively examine the relationship between digital game addiction and variables such as academic achievement, tendency to drop out of school, social isolation, depression, anxiety, attention problems, and problematic internet use. Furthermore, adapting the scale to different cultures and conducting cross-cultural comparative studies will contribute to understanding the sociocultural determinants of digital game addiction. In addition, studies conducted on clinical samples will be important for evaluating the DGAS's potential as a clinical screening tool.

Author (s) Contribution Rate

The authors contributed equally to the study. Author 1: 50%; Author 2: 50%.

Ethical Approval

Ethical approval for this research was obtained from the Gazi University Ethics Commission (Meeting No. 06, Date: April 15, 2025; Research Code No. 2025-635).

References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). American Psychiatric Publishing.

Büyüköztürk, Ş. (2007). *Sosyal bilimler için veri analizi el kitabı* (7. baskı). Pegem Akademi Yayınları.

Casey, B. J., Jones, R. M., & Hare, T. A. (2008). The adolescent brain. *Annals of the New York Academy of Sciences, 1124*(1), 111–126. https://doi.org/10.1196/annals.1440.010

Çokluk, Ö., Şekercioğlu, G. ve Büyüköztürk, Ş. (2010). *Sosyal bilimler için çok değişkenli istatistik: SPSS ve LISREL uygulamaları.* Pegem Akademi.

Çuhadaroğlu, F. (1986). *Adolesanlarda benlik saygısı* [Uzmanlık tezi, Hacettepe Üniversitesi Tıp Fakültesi].

Gentile, D. A., Choo, H., Liau, A., Sim, T., Li, D., Fung, D., & Khoo, A. (2011). Pathological video game use among youths: A two-year longitudinal study. *Pediatrics, 127*(2), e319–e329. https://doi.org/10.1542/peds.2010-1353

Gökdemir, M. E., & Ekşi, H. (2023). Çocuklar için Rosenberg benlik saygısı ölçeğinin Türkçeye uyarlanması. T. Erdoğmuş & Ş. Karabatak (Ed.), *11. Türkiye Lisansüstü Çalışmalar Kongresi Bildiriler Kitabı – I* (ss. 267–280). İLEM.

Griffiths, M. D. (2005). A "components" model of addiction within a biopsychosocial framework. *Journal of Substance Use, 10*(4), 191–197. https://doi.org/10.1080/14659890500114359

Hazar, Z., & Hazar, M. (2017). Çocuklar için dijital oyun bağımlılığı ölçeği. *Journal of Human Sciences, 14*(1), 203–216.

Horzum, M. B., Ayas, T., & Çakır Balta, Ö. (2008). Çocuklar için bilgisayar oyun bağımlılığı ölçeği. *Türk Psikolojik Danışma ve Rehberlik Dergisi, 3*(30), 76-88.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal*, *6*(1), 1-55. https://doi.org/10.1080/10705519909540118

Jo, Y. S., Bhang, S. Y., Choi, J. S., Lee, H. K., Lee, S. Y., & Kweon, Y.-S. (2019). Clinical Characteristics of Diagnosis for Internet Gaming Disorder: Comparison of DSM-5 IGD and ICD-11 GD Diagnosis. *Journal of Clinical Medicine*, 8(7), 945. https://doi.org/10.3390/jcm8070945

Kalaycı, Ş. (2006). *SPSS Uygulamalı Çok Değişkenli İstatistik Teknikleri*. Ankara: Asil Yayın Dağıtım.

Kardefelt-Winther, D. (2014). A conceptual and methodological critique of internet addiction research: Towards a model of compensatory internet use. *Computers in Human Behavior*, 31, 351–354. https://doi.org/10.1016/j.chb.2013.10.059

King, D. L., Delfabbro, P. H., Wu, A. M. S., Doh, Y. Y., Kuss, D. J., Pallesen, S., Mentzoni, R., Carragher, N., & Sakuma, H. (2017). Treatment of Internet gaming disorder: An international systematic review and CONSORT evaluation. *Clinical Psychology Review*, 54, 123–133. https://doi.org/10.1016/j.cpr.2017.04.002

Kline, P. (1994). *An Easy Guide To Factor Analysis*, New York: Routledge.

Kuss, D. J., & Griffiths, M. D. (2012). Internet gaming addiction: A systematic review of empirical research. *International Journal of Mental Health and Addiction, 10*(2), 278–296. https://doi.org/10.1007/s11469-011-9318-5

Kuss, D. J., & Lopez-Fernandez, O. (2016). Internet addiction and problematic Internet use: A systematic review of clinical research. *World Journal of Psychiatry*, 6(1), 143–176. https://doi.org/10.5498/wjp.v6.i1.143

Kwon, M., Kim, D. J., Cho, H., & Yang, S. (2013). The smartphone addiction scale: Development and validation of a short version for adolescents. *PLOS ONE*, 8(12), e83558. https://doi.org/10.1371/journal.pone.0083558

Kwon, M., Lee, J.-Y., Won, W.-Y., Park, J.-W., Min, J.-A., Hahn, C., Gu, X., Choi, J.-H., & Kim, D.-J. (2013). Development and validation of a Smartphone Addiction Scale (SAS). *PLOS ONE, 8*(2), e56936. https://doi.org/10.1371/journal.pone.0056936

Lemmens, J. S., Valkenburg, P. M., & Peter, J. (2009). Development and validation of a Game Addiction Scale for adolescents. *Media Psychology*, 12(1), 77-95. https://doi.org/10.1080/15213260802669458

Müller, K. W., Janikian, M., Dreier, M., Wölfling, K., Beutel, M. E., Tzavara, C., Richardson, C., & Tsitsika, A. (2015). Regular gaming behavior and internet gaming disorder in European adolescents: Results from a cross-national representative survey of prevalence, predictors, and psychopathological correlates. *European Child & Adolescent Psychiatry*, 24(5), 565–574. https://doi.org/10.1007/s00787-014-0611-2

Paulus, F. W., Ohmann, S., von Gontard, A., & Popow, C. (2018). Internet gaming disorder in children and adolescents: A systematic review. *Developmental Medicine & Child Neurology*, 60(7), 645–659. https://doi.org/10.1111/dmcn.13754

Pohlmann, J. T. (2004). Use and interpretation of factor analysis in The Journal of Educational Research: 1992–2002. *The Journal of Educational Research*, 98(1), 14–23. https://doi.org/10.3200/JOER.98.1.14-23

Pontes, H. M., Király, O., Demetrovics, Z., & Griffiths, M. D. (2014). The conceptualisation and measurement of DSM-5 Internet Gaming Disorder: The development of the IGD-20 Test. *PLOS ONE, 9*(10), e110137. https://doi.org/10.1371/journal.pone.0110137

Pontes, H. M., & Griffiths, M. D. (2015). Measuring DSM-5 Internet Gaming Disorder: Development and validation of a short psychometric scale. *Computers in Human Behavior*, 45, 137–143. https://doi.org/10.1016/j.chb.2014.12.006

Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton University Press.

Savcı M, & Aysan F. (2016). Relationship between impulsivity, social media usage and loneliness. *Educational Process: International Journal; 5*(2):106-115. https://doi:10.12973/edupij.2016.52.2

Savcı M, Ercengiz M. & Aysan F. (2018). Ergenlerde sosyal medya bozukluğu ölçeğinin türkçe uyarlaması. *Arch Neuropsychiatry, 55(3,)* 248-255. https://doi.org/10.5152/npa.2017.19285

Steinberg, L. (2005). Cognitive and affective development in adolescence. *Trends in Cognitive Sciences*, *9*(2), 69–74.https://doi.org/10.1016/j.tics.2004.12.005

Steinberg, L. (2008). A social neuroscience perspective on adolescent risk-taking. *Developmental Review, 28*(1), 78–106.https://doi.org/10.1016/j.dr.2007.08.002.

Stevens, M. W. R., Dorstyn, D., Delfabbro, P. H., & King, D. L. (2021). Global prevalence of gaming disorder: A meta-analysis. *Australian & New Zealand Journal of Psychiatry*, *55*(6), 553–568. https://doi.org/10.1177/0004867420962851

Sümer, N. (2000). Yapısal Eşitlik Modelleri: Temel Kavramlar ve Örnek Uygulamalar [Yapısal Eşitlik Modellemesi: Temel Kavramlar ve Uygulamalar]. *Türk Psikoloji Yazıları, 3* (6), 49–74.

Şata, M., & Karip, F. (2018). Akıllı Telefon Bağımlılığı Ölçeği-Kısa Versiyonunun Ergenler İçin Türk Kültürüne Uyarlanması. *Cumhuriyet Uluslararası Eğitim Dergisi*, 6(4), 426-440. https://doi.org/10.30703/cije.346614

Şencan H. (2005). *Sosyal ve Davranışsal Ölçümlerde Güvenirlik ve Geçerlik*. Ankara: Seçkin Yayıncılık.

Tabachnick, B. G., & Fidell, L. S. (1996). *Using multivariate statistics* (3rd ed.). HarperCollins College Publishers.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4th ed.). Allyn and Bacon.

Tavşancıl, E. (2010). *Tutumların ölçülmesi ve SPSS ile veri analizi* (4. baskı). Nobel Yayın Dağıtım.

Tezbaşaran, A. A. (1997). *Likert tipi ölçek geliştirme kılavuzu*. Türk Psikologlar Derneği.

World Health Organization. (2019). *International statistical classification of diseases and related health problems* (11th rev.).

Appendix A

Dijital Oyun Bağımlılığı Ölçeği							
	Lütfen aşağıdaki ifadeleri dikkatlice okuyarak, o ifadenin size ne kadar uygun olduğunu belirleyiniz. Daha sonra ifadenin sağ tarafında verilen seçeneklerden size uygun olanın üzerini (X) şeklinde işaretleyiniz. ① Hiçbir Zaman ② Nadiren ③ Bazen ④ Sık Sık ⑤ Her Zaman						
Temel Bağımlılık Belirtileri	1	Dijital oyun oynamadığım zamanlarda dijital oyun oynamak hakkında düşünürüm	①	②	③	④	⑤
	2	Zihnim, gün boyunca dijital oyunla meşguldür.	①	②	③	④	⑤
	3	Dijital oyun oynayamadığımda mutsuz olurum.	①	②	③	④	⑤
	4	Zamanla dijital oyunlara daha fazla zaman ayırmaya başladım.	①	②	③	④	⑤
	5	Önceden yeterli gelen dijital oyun süresi artık bana yeterli gelmiyor.	①	②	③	④	⑤
	6	Dijital oyunu bırakmam gereken zamanlarda kendimi durdurmakta zorlanırım.	①	②	③	④	⑤
	7	Planladığımdan daha fazla dijital oyun oynarım.	①	②	③	④	⑤
	8	Dijital oyunları eğlenme aktivitelerime tercih ederim.	①	②	③	④	⑤
	9	Gerçek hayatın stresinden kaçmak için dijital oyun oynarım.	①	②	③	④	⑤
Çatışma	10	Dijital oyun oynadığım için çevremle (Okul, aile, arkadaş vb) ilişkilerim bozulmasına rağmen oynamayı sürdürürüm.	①	②	③	④	⑤
	11	Dijital oyun oynamanın sağlığıma zarar verdiğini bilmeme rağmen oynamayı sürdürürüm.	①	②	③	④	⑤
	12	Dijital oyun oynamak akademik başarımı olumsuz etkiler.	①	②	③	④	⑤
	13	Dijital oyun oynamak uyku sorunları yaşamama sebep olur.	①	②	③	④	⑤
	14	Dijital oyunlar yüzünden ailemle tartışırım.	①	②	③	④	⑤
	15	Ailem dijital oyun oynamamı engellediğinde öfkelenirim.	①	②	③	④	⑤
	16	Ailem dijital oyunlara sınırlama getirdiğinde kendimi gergin hissederim.	①	②	③	④	⑤

Note:
* There are no items on the scale that should be scored in reverse.
** The scale may be used for research purposes with proper citation.

Appendix B

Digital Game Addiction Scale							
	Please read the following statements carefully and determine how well each statement applies to you. Then, mark the option that best applies to you with an (X) from the choices provided on the right side of each statement. ① Never ② Rarely ③ Sometimes ④ Often ⑤ Always						
Core Addiction Symptoms	1	When I'm not playing digital games, I think about playing digital games	①	②	③	④	⑤
	2	My mind is occupied with digital games throughout the day.	①	②	③	④	⑤
	3	I feel unhappy when I can't play digital games.	①	②	③	④	⑤
	4	Over time, I started spending more time playing digital games.	①	②	③	④	⑤
	5	The amount of time I used to spend playing digital games is no longer enough for me.	①	②	③	④	⑤
	6	I have a hard time stopping myself when I need to stop playing digital games.	①	②	③	④	⑤
	7	I play more digital games than I planned to.	①	②	③	④	⑤
	8	I prefer digital games to other recreational activities.	①	②	③	④	⑤
	9	I play digital games to escape the stress of real life.	①	②	③	④	⑤
Conflict	10	Even though playing digital games has caused my relationships with those around me (school, family, friends, etc.) to deteriorate, I continue to play.	①	②	③	④	⑤
	11	Even though I know that playing digital games is harmful to my health, I continue to play.	①	②	③	④	⑤
	12	Playing digital games negatively affects my academic performance.	①	②	③	④	⑤
	13	Playing digital games causes me to have trouble sleeping.	①	②	③	④	⑤
	14	I argue with my family because of digital games.	①	②	③	④	⑤
	15	I get angry when my family stops me from playing digital games.	①	②	③	④	⑤
	16	I feel tense when my family sets limits on my digital game playing.	①	②	③	④	⑤

Note:
* There are no items on the scale that should be scored in reverse.
** The scale may be used for research purposes with proper citation.
***The English version is provided for international readability only and has not been independently psychometrically validated.