

# Gaming Disorder Scale for Parents: Reliability and Validity Study of the Turkish Form



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## ABSTRACT

**Objective:** This study aimed to conduct the validity and reliability study of the Turkish version of the Gaming Disorder Scale for Parents (GADIS-P).

**Methods:** In this methodological study, the study sample consisted of 345 parents who had children within the age range of 10-17 years who played digital games. The study data were collected through the Gaming Disorder Scale for Parents, the Scale for Determining Parents' Perceptions of Computer Game Addiction, and the Digital Parenting Attitude Scale. The Cronbach's alpha analysis for reliability, item total correlation analysis, confirmatory and exploratory factor analysis for construct validity, and clustering analysis for identifying gaming disorder according to the scale scores were used.

**Results:** It was determined that the content validity index of the scale was 0.97, that item loads varied between 0.617 and 0.863 according to exploratory factor analysis, and that the scale had good fit indices in the confirmatory factor analysis. The Cronbach's reliability coefficient of the scale was found to be  $\alpha=0.907$ , and the item total correlations were determined to be adequate. The criterion validity analysis found a positive and strong correlation with the Scale for Identifying Parents' Perceptions Regarding Digital Game Addiction ( $r=0.717$   $p<0.001$ ). As a result of the clustering analysis, it was determined that the cut-off value was found as  $>9$  points for "Cognitive Behavioral Symptoms" subscale and as  $>6$  points for "Negative Consequences" subscale.

**Conclusion:** The results obtained show that the Turkish version of the Gaming Disorder Scale for Parents is a valid and reliable measurement tool.

**Keywords:** Addiction disorder, adolescents, validity, reliability, parents

## INTRODUCTION

As internet and electronic devices are becoming more widespread, digital video games become a familiar and fun past-time activity for children and adolescents (Kim et al. 2022). Increases in isolation and the necessity of staying home due to the COVID-19 pandemic with which the whole world has been struggling since 2020 have increased the digital entertainment consumption, especially with online games and related activities such as streaming (Li and Guo 2022). The fact that children and adolescents want to receive emotional support and be in social connection with their peers throughout the period in which they start to form their own identities independently from their parents

has led to an increase in the duration of their stay in online games, especially during the pandemic (Han et al. 2022, King et al. 2020).

Although 'Gaming Disorder' was given a provisional status in the Diagnostic and Statistical Manual of Mental Disorders (5th edition; DSM-5), it was officially recognized as a diagnosis in the 11th edition of the International Classification of Diseases (ICD) at the World Health Assembly in May 2019. Accordingly, in order for an individual to be diagnosed with gaming disorder, the following three symptoms should be observed for at least one year; impaired impulse control related to gaming, increased priority given to gaming, and

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continuing gaming despite negative consequences (Stevens et al. 2020, World Health Organization 2019).

Some studies mention that appropriate games played in short intervals provide a good use of leisure time by providing relaxation and avoiding loneliness by making friends (Mustafaoğlu and Yasacı 2018), and providing children with the ability to overcome complex and difficult tasks; and have positive effects on visual short-term memory (improvements in perceptual, attention and cognitive abilities) (Wilms et al. 2013, Eichenbaum et al. 2014). Along with these positive effects, in studies examining the interpersonal relationships, academic success and social life of gamers, digital gaming has been associated with low academic success and career attainment, truancy, decreased social skills and integration, and alienation in real life relationships (Rehbein et al. 2015, Kim et al. 2022). On the other hand, when digital gamers are assessed in terms of their personality traits and moods; a relationship with higher impulsivity, aggression and lower self esteem has been found (Jeong et al. 2020). In conclusion, gaming disorder may be a precursor to a variety of mental problems and may cause serious mental problems in the long term. Due to such reasons, an early diagnosis of gaming disorder via screenings conducted on risk groups is of vital importance for the mental health of society.

In clinical practice, self-report scales or questionnaires can be used for screening and diagnostic purposes, as well as forms to assess children based on parental observations. On children and adolescents with behavioral problems, parental observation assessments can provide important information along with self-report tools (Aebi et al. 2017). Although there are scales in international literature prepared in line with DSM-V diagnostic criteria where gaming disorder is evaluated by parents, there is a need for a measurement tool that can be used as a screening tool in the national literature (Vadlin et al. 2015, Wartberg et al. 2019). In view of this need, this study aims to adapt the Gaming Disorder Scale for Parents (GADIS-P), a reliable and sensitive scale prepared according to ICD-11 diagnostic criteria, into Turkish language and culture.

## METHOD

### Sample

Methodologically compiled study data was acquired from patients and their relatives who had applied to Çanakkale Onsekiz Mart University Faculty of Medicine Hospital outpatient clinics for any reason during November 2022. In scale adaptation studies, the sample size must be at least 5-10 times higher than the number of scale items (Petscher and Schatschneider 2013). This study included 354 people. 9 participant surveys were excluded due to

lack of information and analyses were conducted on data belonging to 345 participants. In line with the article of the original scale, parents with children aged between 10-17 who reported that their child played digital games at least once a week were included in the study. The objective of research and principles of volunteering were explained to the participants and their consent was obtained. The questionnaire was applied to the parents through face-to-face interviews (by reading the questions to the participant and recording the answers) and one questionnaire form took 15 minutes on average.

### Data Collection Tools

Data for the study is collected through demographical information form prepared by the researchers, Gaming Disorder Scale for Parents (GADIS-P), Digital Parenting Attitude Scale and Determination of Internet and Determining the Perceptions of Parents Towards Computer Game Addiction Scale.

### Demographical Information Form

The information form prepared by researchers through a literature review includes age, sex, several attributes of their parents (education, occupation, income), the child's living situation with the parents, and the child's ownership of digital technological devices (computer, tablet, cell phone) for playing games.

### Gaming Disorder Scale for Parents (GADIS-P)

The scale developed by Paschke et al. (2021) is based on ICD-11 criteria for gaming addiction and consists of 9 symptom items and 1 timing question. Scale items are shown in Table 1.

The scale consists of a two-factor structure: 'Cognitive Behavioral Symptoms' and 'Negative Consequences'. The score obtained from the scale is positively correlated with gaming addiction risk. The confirmatory factor analysis results of the original scale were CFI=0.995, TLI=0.993, SRMR=0.056, RMSEA=0.096 and the factor loads of the items ranged between 0.83-0.90. Cronbach's alpha value for the whole scale is 0.92 and McDonald's  $\omega$  is 0.95, reflecting excellent internal consistency. The correlation of the scale with the Gaming Disorder Scale for Adolescents (GADIS-A) was positive 0.76 and the correlation with the Parental Internet Gaming Disorder Scale (PIGDS) was positive 0.71 ( $p<0.05$ ) (Paschke et al. 2020, Wartberg et al. 2019). Scoring of the scale items are as follows; 'Strongly disagree=0', 'Disagree=1', 'Partially agree', 'Partially disagree=2', 'Agree=3', 'Strongly agree=4'. There are no scale items with reverse scoring. The maximum score of the 'Cognitive Behavioral Symptoms' (Item numbers: 1,2,4,5)

**Table 1.** Scale Items Corresponding To ICD-11 and DSM-5 Criteria

ICD-11 Criteria (Corresponding DSM-5 criteria)	Scale Items Thinking of the last 12 months, how strongly do you agree with the following statements?
A) Impaired control over gaming (e.g., onset, frequency, intensity, duration, termination, context)  (Unsuccessful attempts to reduce or stop gaming.)	1. My child often plays games more frequently and longer than he/she planned to or agreed upon with me or my partner.a  2. My child often cannot stop gaming even though it would be sensible to do so or for example I have told him/her to stop.a
B) Increasing priority given to gaming to the extent that gaming takes precedence over other life interests and daily activities  (Giving up other activities.)	3. My child often does not pursue interests outside the digital world (e.g., meeting friends or partner in real life, attending sports clubs/ societies, reading books, making music) because he/she prefers gaming.a  4. My child neglects daily duties (e.g., grocery shopping, cleaning, tidying up after himself/herself, tidying his/her room, obligations for school/apprenticeship/ job) because he/she prefers gaming.a
C) Continuation or escalation of gaming despite the occurrence of negative consequences.  (Continuation of gaming despite problems.)	5. My child usually continues gaming even though it causes him/her stress with others (e.g., with me or my partner, siblings, friends, partner, teachers).a  6. My child continues gaming although it harms his/her performance at school/ apprenticeship/job (e.g., by being late, not participating in class, neglecting homework, worse grades).a
D) The behavior pattern is of sufficient severity to result in significant impairment in personal, family, social, educational, occupational or other important areas of functioning.  (Risking or losing relationships or career opportunities due to excessive gaming.)	7. Due to gaming, my child neglects his/her appearance, personal hygiene, and/or health (e.g., sleep, nutrition, exercise).a  8. Due to gaming, my child risks losing important contacts (friends, family, partner) or have lost them already.a  9. Due to gaming, my child has disadvantages at school/ apprenticeship/job (e.g., bad [final] grades, inability to continue to the next grade/no graduation, no apprenticeship or university spot, poor reference, warning/ dismissal).a
E) The pattern of gaming behavior may be continuous or episodic and recurrent and normally evident over a period of at least 12 months.	10. How often did your child experience such problems, conflicts, or difficulties due to gaming during the past year? Did this only occur on single days, during longer periods of several days to weeks, or was it almost daily?

<sup>a</sup>Response options: 5-point Likert-Scale: “strongly disagree” – “strongly agree”.

<sup>b</sup>Response options: “not at all”, “only on single days”, “during longer periods”, “almost daily”.

sub-dimension of the scale is 16, the minimum score is 0 and the cut-off point value of this sub-dimension is >9 points. The maximum score of the ‘Negative Consequences’ (Item numbers: 3,6,7,8,9) sub-dimension of the scale is 20, the minimum score is 0 and the cut-off point value of this sub-dimension is >5 points. If the timing criterion (10th item) of the scale is answered ‘During longer periods’ and ‘Almost daily’, this criterion is considered to be met. This item does not affect the scoring.

When the cut-off point values are reached in both sub-dimensions and the timing criterion is met, children and adolescents are evaluated in terms of gaming disorder. Reaching only the cut-off point value of ‘Cognitive Behavioral Symptoms’ sub-dimension is interpreted as hazardous gaming. Reaching only the cut-off point value of ‘Negative Consequences’ sub-dimension may point to significant psychological problems that require deeper research. Reaching cut-off point values before the timing criterion is met may indicate hazardous playing behavior that may need to be observed subsequently.

### Digital Parenting Attitude Scale

Scale developed by Kaya et al. (2018) measures the digital parenting attitudes of parents. Digital parenting comprises of attitudes and behavior of parents on the digital media tool use of their children. The scale has two dimensions, ‘Approval of Effective Digital Media Use’ and ‘Protection Against Risks in Digital Media’, 12 items and 5-point Likert-type scale. The fit indices of the scale are GFI=0.92, AGFI=0.89, CFI=0.87, RMSEA=0.08 and Cronbach’s alpha internal consistency coefficient is 0.724 and 0.776 for the two dimensions. A minimum of 12 and a maximum of 60 points can be obtained in the scale. A higher score on the scale indicates that the parent is more conscious and aware of the aforementioned issue.

### Determining the Perceptions of Parents Towards Computer Game Addiction Scale

This scale is developed by Ulusoy et al. (2019) and is designed to measure the perception of parents on students’ gaming addiction. It is a one-dimensional, 5-point Likert-type scale

consisting of 18 items. The fit indices of the scale were CFI=0.96, RMSEA=0.07 and Cronbach's alpha internal consistency coefficient was 0.92. The lowest point that can be obtained from the scale is 18; the highest is 90. Score obtained from the scale is positively correlated with gaming addiction risk.

### Procedure

First, permission was obtained via e-mail from Kerstin Paschke, the author in charge and developer of the scale, to conduct the validity and reliability study in Turkish (10/05/2021). Ethical approval was then obtained from Istanbul University Social Sciences and Humanities Research Ethics Committee (Date: 12/10/2021 Number: E-539355). In order to develop the Turkish version of the scale, the scale was first translated, then back-translated and a pilot study was conducted. The translation of the scale into Turkish was undertaken by a professional translator graduated from English Language and Literature department and was then approved (C.B.). The form was then back-translated by a person whose native language is English and who are fluent in both languages (Turkish - English). The original form of the scale and the back-translated version was compared and evaluated by field experts. For the content validity index, the scale was submitted for the opinions and suggestions of experts working in the field (A.M., B.B., C.B., D.A.D., E.Ö.A., E.Ş., G.D., G.T.S., H.B., S.U.U., Z.Y.) including psychiatry specialists, psychiatric nurses and public health specialists. The Davis method was used to assess content validity. The experts were asked to rate the scale items as 'inappropriate (1)', 'should be heavily revised (2)', 'should be slightly revised (3)' and 'appropriate (4)'. Based on these scores, content validity ratio (CVR) and content validity index (CVI) were calculated. While the CVR is >0.80, CVI value is required to be >0.59 for 11 experts (Alpar 2018). In order to evaluate the clarity and comprehensibility of the scale, a pilot study was conducted on 20 participants chosen from target population and not included in the research. The scale was finalized in line with the suggestions of the experts and the participants in the pilot study.

### Statistical Analysis

Statistical analysis was conducted with SPSS 23.0 and AMOS v20 software. Number, percentage, mean ( $\bar{x}$ ), standard deviation (SD), minimum and maximum values were used to analyze descriptive characteristics. Whether the data were normally distributed was evaluated with histograms, probability graphs and analytical methods (Kolmogorov-Smirnov) and it was determined that the data were not normally distributed. Spearman correlation analysis was employed to determine the relationship between continuous variables and  $p < 0.05$  was considered statistically

significant for all analyses. Internal consistency coefficient (Cronbach's alpha) was calculated for the scale and sub-dimensions to assess scale reliability, and exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were used to determine construct validity. The suitability of the data for factor analysis was evaluated by Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity. For the convergent and discriminant validity of the scale, the Digital Parenting Attitude Scale and the Determining the Perceptions of Parents Towards Computer Game Addiction Scale were used. Split-half method is a test method used to assess scale reliability. In order to assess the reliability of the scale, the scale and its sub-dimensions were randomly divided into two sections by the data package program (SPSS). The correlation between the randomized halves was then evaluated by calculating Spearman-Brown and Guttman reliability coefficients. K-Means clustering analysis using Euclidian distance was performed to determine the status of digital gaming disorder according to the scores of the Determining the Perceptions of Parents Towards Computer Game Addiction Scale. The classification level of the clusters obtained was evaluated with the Silhouette score. Silhouette score, which has values between minus 1 and plus 1, in which values nearing 1 indicate a good quality of classification, is calculated to show the cluster validity measurements (Rousseeuw 1987).

## RESULTS

### Sociodemographical Characteristics

The mean age of the 345 parents who participated in the study was 41.9 years ( $S=5.9$ ; range=29-58), the mean age of the children was 13.4 years ( $S=2.3$ ; range=10-17), and 54.5% ( $n=188$ ) were male. Participants' sociodemographical characteristics are summarized in Table 2. When the distribution of technological gaming devices available in the household were examined, it was found that 76.2% ( $n=263$ ) had smart cell phones, 59.1% ( $n=204$ ) had computers, 39.4% ( $n=136$ ) had tablets, and 12.8% ( $n=44$ ) had gaming consoles. No significant difference was found between digital parenting attitude scores in terms of sociodemographic characteristics. When the results of the scale for determining the attitudes of parents' towards gaming addiction are evaluated in view of socio-demographical data, it was concluded that only boys' scale scores ( $\bar{x}=47.6$ ;  $S=16.4$ ) were higher than girls' scores ( $\bar{x}=39.0$ ;  $S=15.7$ ) ( $p < 0.001$ ). In the evaluation of the frequency of problems related to playing games (Question 10), 34.8% ( $n=120$ ) of the parents stated that there were no problems, 30.1% ( $n=104$ ) stated that problems lasted for a few days, 26.1% ( $n=90$ ) for long periods of time and 9% ( $n=31$ ) almost every day.

**Table 2.** Distribution of the Participants By Their Sociodemographic Characteristics

Characteristics	
Parent	
Age, x±S	41.9±5.9
Education, n (%)	
Primary	53(15.4)
Middle	34(9.9)
High school	105(30.4)
University/Grad	153(44.3)
Perception of income, n(%)	
Income more than expenditure	41(11.9)
Income equals expenditure	187(54.2)
Expenditure more than income	117(33.9)
Child	
Age, x±S	13.4±2.3
Sex, n (%)	
Male	188(54.5)
Female	157(45.5)

## Validity Results

### Content Validity

According to the scores gathered from the opinions of 11 experts (psychiatrists, psychiatric nurses, public health experts), the content validity ratio (CVR) of the scale items ranged between 0.82 and 1.00, and the content validity index (CVI) of the scale was determined to be 0.97.

## Construct Validity

### Exploratory Factor Analysis

After exploratory factor analysis and varimax rotation, it was determined that the scale items loaded on 2 dimensions. It was determined that the first factor consisted of items M1, M2, M3, M4, M5 (factor loads 0.863, 0.844, 0.662, 0.617, 0.663, respectively) and the second factor consisted of items M6, M7, M8, M9 (factor loads 0.659, 0.710, 0.828, 0.816, respectively) (Table 3). According to the original scale, item 3 should have been included in the second dimension. However, it was included in the first dimension due to its higher factor load.<sup>1</sup> In the exploratory factor analysis of nine items, Kaiser-Meyer-Olkin Measure was 0.893 ( $p < 0.001$ ), Bartlett's test of sphericity was calculated as  $\chi^2 = 1717.1$  ( $df = 36$ ;  $p < 0.001$ ) and found to be statistically significant. In the exploratory factor analysis, it was shown that 68.56% of the total variance in two dimensions was explained and the scree plot graph is shown in Figure 1, and the factor loads and item-total correlations of the items are shown in Table 3.

### Confirmatory Factor Analysis

It was determined that the model fit index values obtained through the confirmatory factor analysis of the dimension and item distribution of the original scale were not within acceptable limits. Confirmatory factor analysis of the dimensions was carried out on the item distribution obtained from the exploratory factor analysis. As a result of the application of the 3 proposed modification indices, the model fit values reached acceptable limits (Table 4). The path diagram of the scale is shown in Figure 2.

**Table 3.** Gaming Disorder Scale for Parents Exploratory Factor Analysis, Rotated Factor Loadings and Item-Total Correlations

Items	F1	F2	$\bar{x} \pm S$	Item-Total Correlation	Cronbach alfa when item is removed
M1	0.863	-	2.17±1.30	0.616	0.901
M2	0.844	-	1.87±1.31	0.704	0.895
M3	0.662	0.421	1.42±1.23	0.693	0.896
M4	0.617	0.544	1.59±1.25	0.756	0.891
M5	0.663	0.470	1.40±1.25	0.733	0.893
M6	0.471	0.659	1.44±1.29	0.730	0.893
M7	0.322	0.710	1.25±1.23	0.649	0.899
M8	-	0.828	1.25±1.19	0.654	0.898
M9	-	0.816	1.19±1.19	0.610	0.901
Variance explained (%)	57.45	11.11	Total=68.56		

$\bar{x}$ : Mean, S: Standard Deviation, Factor loadings are specified as  $>0.30$

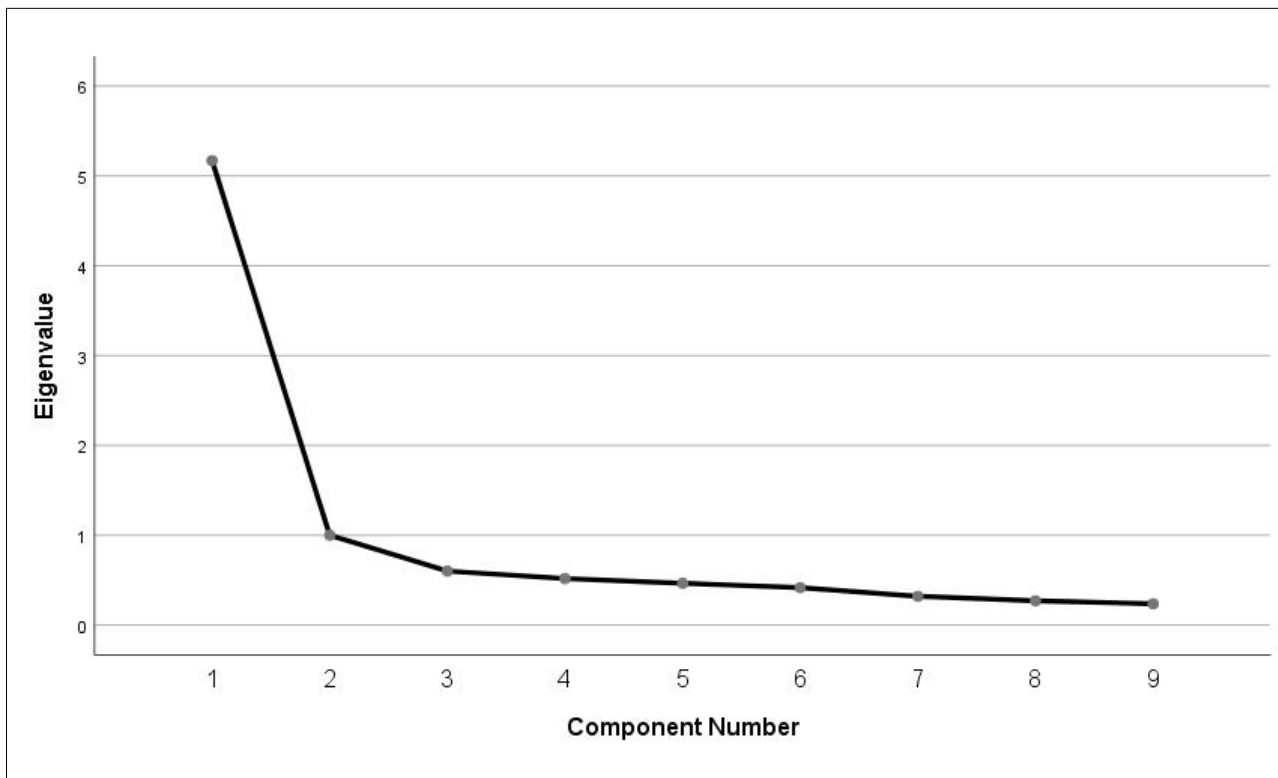


Figure 1. Gaming Disorder Scale for Parents Scree Plot

As a result of exploratory factor analysis and confirmatory factor analysis, a scale consisting of 9 items and 2 sub-dimensions was obtained, categorizing the 3rd item under the 'Cognitive Behavioral Symptoms' sub-dimension, which was under the 'Negative Consequences' sub-dimension in the original scale (Gaming Disorder Scale for Parents, GADIS-P). The 'Cognitive Behavioral Symptoms' sub-dimension includes 5 items and is scored between 0-20, while the 'Negative Consequences' sub-dimension includes 4 items and is scored between 0-16. Scale total score ranges between 0 and 36. All the results obtained show that the scale has a high validity in Turkish language and culture.

#### Discriminant Validity of the Scale and Determining Construct Validity with Alternative Scales

When the scale total scores and socio-demographic characteristics were compared, it was found that the mean

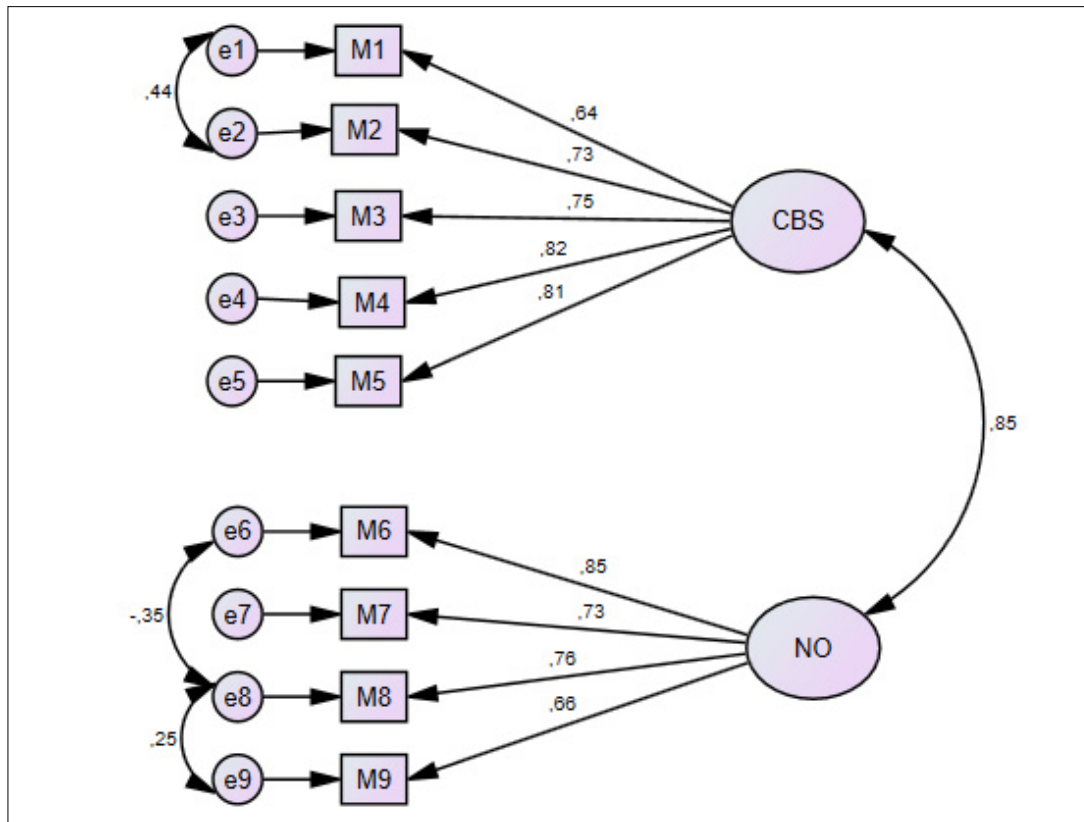
scale score of boys ( $14.8 \pm 8.5$ ) was statistically significantly higher than that of girls ( $12.2 \pm 8.3$ ) ( $p=0.004$ ). No statistically significant correlation between children's ages and scale scores were observed ( $r=0.077$ ;  $p=0.157$ ). The mean score of the children of parents with an education level of high school and below was  $13.6 \pm 7.9$ , while the mean score of the children of parents with an education level of university and above was  $13.6 \pm 9.2$  and no statistically significant difference was observed ( $p=0.993$ ). While the mean score of the children of parents whose income was less than or equal to their expenditure was  $13.7 \pm 8.3$ , the mean score of the children of parents whose income was more than their expenditure was  $13.3 \pm 9.0$ ; there was no statistically significant difference ( $p=0.661$ ). When the scale mean scores were compared with children's technological device ownership status, the mean scores of those who had a smart phone were found to be  $13.9 \pm 8.2$  and  $12.7 \pm 9.4$  ( $p=0.262$ ), those who had a computer  $14.2 \pm 8.3$  and  $12.6 \pm 8.8$ , and those who had a tablet  $13.7 \pm 8.8$  and  $13.5 \pm 8.3$  ( $p=0.824$ ), those who had a game console  $15.2 \pm 8.8$  and  $13.4 \pm 8.5$  ( $p=0.181$ ); no relationship was observed between digital device ownership status and scale score.

In addition to gaming disorder scale for parents, two other scales which may have convergent and divergent features were employed for the participants. While a strong positive correlation ( $r=0.717$ ;  $p<0.001$ ) was found between the total scale score of the Gaming Disorder Scale for Parents and the total scale score of the Determining the Perceptions of Parents

Table 4. Gaming Disorder Scale for Parents, Confirmatory Factor Analysis Model Fit Index Values (n=345)

Model Fit Index	Original Scale Structure	Adapted Scale Structure
CMIN/DF	8.065	2.772
GFI	0.882	0.961
RMR	0.095	0.045
TLI	0.850	0.962
RMSEA	0.143	0.072

Adapted scale structure: When 3rd item is placed under the cognitive behavioral symptoms sub-dimension



**Figure 2.** Gaming Disorder Scale for Parents, Confirmatory Factor Analysis Path Diagram (CBS: Cognitive Behavioral Symptoms, NO: Negative Outcomes)

**Table 5.** Score Correlation of the Gaming Disorder Scale for Parents and Its Sub-dimensions with the Determining the Perceptions of Parents Towards Computer Game Addiction Scale and the Digital Parenting Attitude Scale

		Gaming Disorder Scale for Parents	Cognitive Behavioral Symptoms Sub-dimension	Negative Outcomes Sub-dimension
Determining the Perceptions of Parents Towards Computer Game Addiction Scale	r(p)	<b>0.717(&lt;0.001)</b>	<b>0.721(&lt;0.001)</b>	<b>0.587(&lt;0.001)</b>
Digital Parenting Attitude Scale	r(p)	<b>0.140(0.009)</b>	<b>0.173(0.001)</b>	0.073(0.179)

r: Correlation coefficient

Towards Computer Game Addiction Scale, there was a very weak positive correlation ( $r=0.140$ ;  $p=0.009$ ) regarding the total score of the Digital Parenting Attitude Scale (Table 5).

### Reliability

Cronbach's alpha internal consistency coefficient was calculated for the reliability assessment of the scale. In line with this, the internal consistency coefficient calculated for the scale is found as 0.907; 0.877 for 'Cognitive Behavioral Symptoms' sub-dimension (M1, M2, M3, M4, M5), and 0.837 for 'Negative Consequences' sub-dimension (M6, M7, M8, M9). It was observed that item total correlations ranged between 0.610-0.756. According to the split-half analysis, the Spearman-Brown coefficients for the scale and its sub-dimensions were 0.827, 0.851 and 0.793, and the Guttman Split-half values were 0.810, 0.814 and 0.792, respectively (Table 6).

For the total scale, Cronbach's alpha values for the first and second halves were 0.877 and 0.837 respectively, and the correlation coefficient between the two halves was calculated as 0.703. Cronbach's alpha values for the 'Negative Consequences' sub-dimension were 0.717 and 0.722, respectively, and the correlation coefficient between the two halves was 0.720; Cronbach's alpha values for the 'Cognitive Behavioral Symptoms' sub-dimension were 0.815 and 0.756, respectively, and the correlation coefficient between the two halves was calculated as 0.759.

### Cluster Analysis

The scores of both sub-dimensions of the gaming disorder scale according to the parents were divided into two clusters with the K-Means clustering. The average Silhouette score of the clusters obtained from the sub-dimensions is 0.7

**Table 6.** Gaming Disorder Scale for Parents, Reliability Analysis (n = 345)

Scale and sub-dimensions	Cronbach alfa	Spearman-Brown	Guttman split-half	$\bar{x}$ (S)	Min-Max
Scale as a whole	0.907	0.827	0.810	13.6(8.5)	0-36
Negative outcomes sub-dimension	0.877	0.851	0.814	8.5(5.2)	0-20
Cognitive behavioral symptoms sub-dimension	0.837	0.793	0.792	5.1(4.0)	0-16

$\bar{x}$ : Mean, S: Standard Deviation, Min: Minimum, Max: Maximum

**Table 7.** K-Means Clustering Analysis Results

Sub-dimensions	Clusters	n	$\bar{x}$	S	Median	Min.	Max	AIC
Cognitive Behavioral Symptoms	>9	145	13.6	2.8	13.0	10	20	106.9
	≤9	200	4.8	2.9	5.0	0	9	
	Total	345	8.5	5.2	8	0	20	
Negative Consequences	>6	118	9.7	2.6	9.0	7	16	104.8
	≤6	227	2.8	2.1	3.0	0	6	
	Total	345	5.1	4.0	4.0	0	16	

$\bar{x}$ : Mean, S: Standard Deviation, Min: Minimum, Max: Maximum, AIC: Akaike Information Criterion

(good). With the clusters obtained, cut-off point values were determined for the sub-dimensions. The cut-off point value for the 'Cognitive Behavioral Symptoms' sub-dimension was set as >9 points and the cut-off point value for the 'Negative Consequences' sub-dimension was set as >6 points. If the cut-off point values for both sub-dimensions are reached and the timing criterion is also met, the score is then evaluated in terms of gaming disorder akin to the original scale. The clusters where the cut-off point values of the sub-dimensions were calculated are shown in Table 7.

## DISCUSSION

Based on the findings of our literature review, this is the first study to present a new Turkish screening scale based on ICD-11 that supports the diagnosis of gaming disorder in children and adolescents in view of assessments of parents. The scale includes 9 symptom items related to gaming disorder and 1 item on the frequency of symptoms according to ICD-11 timing criteria. Therefore, in addition to being psychometrically reliable, the scale is also quite affordable and applicable. Technology has already become an integral part of people of all ages. While in the past, the children were spending most of their leisure time with toys and games, enabling face to face interactions with their friends; these activities are now replaced with virtual, online and digital games as technological devices and internet have become easily accessible from our houses. Studies in literature find that some of the problems of children and adolescents are associated with computer and internet use (Başol and Kaya 2018, Nazari et al. 2022). It is observed in this study that a high number of participants owned cell phones

and computers. Studies have also found that adolescent boys have a more inclined to play games excessively in comparison to girls (Chou and Tsai 2007, Çakır et al. 2011, Han et al. 2022, Irmak and Erdoğan 2016, Ko et al. 2005, Zhu et al. 2021). In our study, it was found that the scale scores of boys were higher than those of girls, which suggests that the boys suffer from gaming disorder more. Lucas and Sherry (2004) emphasized that many video games are in parallel with the rules and structure of the types of games that boys play in the real world and that game contexts such as 'clear goals', 'direct competition', 'clear role definition' appeal more to boys. In neurobiological studies conducted by Dong et al. (2018), men were found to have more severe activations regarding gaming disorder symptoms compared to women and gender-related differences were also observed in thalamic and prefrontal cortex activation.

### Discussion of Validity Analysis

Validity is discussed to the extent to which the measurement tool accurately and truthfully measures the situation it is designed to measure. In this study, the content and structural validity of the scale were analysed, and we aimed to determine whether these analyses were compatible with factor model study of the original scale. The content validity index value (CVI) of the scale was determined as 0.97 and this value was then considered to represent 97% of the scope of the conceptual structure aimed to be measured by the scale. Kaiser-Meyer-Olkin (KMO) test was conducted to assess whether the sample was sufficient for factor analysis before the factor analyses, and the value is found to be 0.893 ( $p < 0.001$ ). According to the criteria, the value being between 0.80 and 0.90 indicates that the sample is

sufficient for factor analysis. Exploratory factor analysis was performed to statistically define the sub-dimensions of the feature to be measured (Kartal and Bardakçı 2018). As a result of the analysis conducted in this study, the scale items were grouped into two dimensions, 'Cognitive Behavioral Symptoms' and 'Negative Consequences', akin to the original scale. The third question, which is under the sub-dimension 'Negative Consequences' in the original scale is placed under 'Cognitive Behavioral Symptoms' sub-dimension in the adapted scale. Similar to how cultural and linguistic differences in scale adaptation studies can cause alterations on how the items are understood; it is also possible to observe differences in how the participants perceive and interpret the item due to their cultural norms. The expression of emotion, thought and behavior is a dynamic structure that varies between countries. Therefore, attention must be paid to these variances and alterations must be made where necessary (Çapık et al. 2018). In order to avoid any losses of items, researchers have contacted author-in-charge of the original scale and have reached a unison on 3rd Item being placed under 'Cognitive Behavioral Symptoms' sub-dimension. It was determined that the item factor loads of the first sub-dimension ranged between 0.617-0.863 and the item factor loads of the second sub-dimension between 0.659-0.828. According to these values, the item factor loads of the study can be classified as good, very good and excellent (Dede and Yaman 2008). In the original scale by Paschke et al. (2021), factor loads are found to be higher (between 0.83-0.90) than they are in this study. In confirmatory factor analysis, the hypothesis established for the factor and variable whose relationship was previously determined is tested (Karagöz 2016). According to the results of the confirmatory factor analysis, it was concluded that the model showed a good fit with a general fit index of CMIN/DF 2.772 (reference value CMIN/DF $\leq$  3), a good fit with an absolute fit index of GFI 0.961 (reference value GFI  $\geq$ 0.90), a good fit with a comparative fit index of TLI 0.962 (reference value TLI  $\geq$ 0.95), an acceptable fit with an RMSEA value of 0.072 acceptable fit (reference values  $\leq$  0.080); and the RMR value, which is one of the residual-based fit indices, is measured as 0.045, which also shows good fit (reference values  $\leq$  0.05) (Alpar 2018, Kartal and Bardakçı 2018). The fit indices of the original scale showed good fit with CFI (0.995) and TLI (0.993), while the RMSEA value (0.096) showed poor fit (Paschke et al. 2021). Another method used to test the construct validity of the scale is to determine the equivalence with alternative scales. Accordingly, the correlation between the scale taken as reference and the scale developed is evaluated, and a positive and high level correlation, it is considered a positive indicator in favor of the scale developed (Kartal and Bardakçı 2018). In line with this information, the scale adapted showed a strong positive correlation ( $r=0.717$ ;  $p<0.001$ )

with the Determining the Perceptions of Parents Towards Computer Game Addiction Scale which was determined as a convergent scale. High scores on both scales indicate an increased risk of gaming addiction.

### Discussion of Reliability Analysis

One of the most important features of a measurement tool is its reliability. In this study, the internal consistency coefficient calculated for the scale (Cronbach's alpha value) was calculated as 0.907. This value shows that the scale is highly reliable (Alpar 2018). The internal consistency coefficient of the original scale developed by Paschke et al. (2021) was 0.92 and therefore found to have a high degree of reliability. Cronbach's alpha internal consistency coefficient in the scales developed by Başol and Kaya (2018) for gaming addiction was calculated as 0.91, 0.86 in the study by Çakıroğlu et al. (2019), 0.82 in the study by Arıcak et al. (2019), and 0.89 in the study by Nazari et al. (2022). Compared to other studies, the internal consistency coefficient of this scale is at a similar level and thus found reliable.

### Limitations and Strengths

As the study involved parents who applied to the university hospital and agreed to participate, the sample group is limited. As per the nature of scale adaptation studies, conceptual and cultural differences might differ between societies for which the scale is developed and for the target population for which the scale is adapted. Therefore, in this study, the 3rd item was placed in a different sub-dimension from the original scale, which might be considered as a limitation of the study. It is noteworthy that many scales related to gaming addiction in the literature are not based on diagnostic criteria. The fact that this scale, developed in accordance with ICD-11 criteria, can be answered in short time is hence thought to be helpful for clinicians regarding screening, evaluation and determination of risky situations. Also, as being in a state of addiction alters the individual's perception of time, it is thought that the time allocated for playing games is not evaluated in a real sense. Therefore, considering the fact that information obtained through self-report based scales do not always reflect the reality; the scale being designed for the parents who have a chance to closely observe the child-adolescent who has a gaming disorder may provide the means to more objectively evaluate the addiction.

### CONCLUSION

Study findings suggest that the Gaming Disorder Scale for Parents is a reliable and valid instrument that can be used to assess the symptoms and severity of gaming disorder on children.

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