

# Validity and Reliability Study of Online Gambling Addiction Scale (OGAS)

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## Main Points

- This is the first scale developed to study the subject of gambling addiction in the online environment.
- The study has a high reliability (0.920) result, and is a valid scale with 21 items and 3 factors.
- This study was analyzed according to diagnostic parameters by the ROC curve, and the cut-off value was calculated as 27 points. Scores greater than 27 indicate internet gambling addiction.
- The rate of online gambling/betting by the participants in any period of their lives was found as 32.8%.

## Abstract

This study was aimed at developing a scale to determine the level of addiction to online gambling. For the study, a draft scale with 57 items related to online gambling addiction was prepared, and ten experts evaluated it for content validity. A candidate scale consisting of 28 items with a content validity index (CVI) of 0.893 was obtained. The study was completed with 650 participants in total. Cronbach's alpha value was calculated as 0.920 for the reliability analysis. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were used for the validity analysis. The three-factor and 26-item structure obtained with EFA was confirmed by CFA. With a few minor modifications, the final structure consisting of 3 factors and 21 items was obtained. In conclusion, the Online Gambling Addiction Scale (OGAS) is a valid and reliable scale consisting of 21 items and 3 sub-dimensions.

**Keywords:** Gambling, gambling addiction, online gambling addiction, addiction, validity, reliability

## Introduction

Addiction is defined as the inability of a person to quit a substance or behavior (Egger & Rauterberg, 1996), while gambling is a behavior that aims to obtain more value than the invested amount, and is common all over the world (Arcan & Karancı, 2014). Gambling addiction is included in the subtitle of "Non-Substance-Related Disorder" under the title of "Substance-Related and Addictive Disorders" in the DSM-5 diagnostic manual (American Psychiatric Association, 2013). The reasons for gambling primarily include factors such as socializing, having fun, avoiding problems, seeking excitement,

and making money (Lee, Chae, Lee, & Kim, 2007; Arcan & Karancı, 2014; Çelik, 2016).

Gambling has many negative effects on the individual, family, and society. A gambler may be tempted to borrow money to gamble, from banks and from the people he knows, and then might face difficulty repaying the debt. Conflicts occur with the family and family unity suffers due to domestic violence and divorces. Gambling addiction can be a cause for smoking, alcohol, and drug addiction, and the individual may even attempt suicide due to depression and emotional breakdown (Yaşar, 2010; Köksoy Vayısoğlu, Öncü, & Güven, 2019).

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**Received:** March 3, 2021  
**Revision:** April 26, 2021  
**Accepted:** May 14, 2021

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**Cite this article as:** Karaibrahimoğlu, A., Kişioğlu, A. N., Çoban, B., Yıldırım, A., & Yılmaz, S. D. (2021). Validity and reliability study of online gambling addiction scale (OGAS). *Addicta: The Turkish Journal on Addictions*, 8(3), 186-193.

The internet offers many different options to make use of our leisure time, communicate with our loved ones, or to conduct business online. There is a gradual increase in the number of options available (Mihçı & Kiliç Çakmak, 2017). However, the widespread use of the internet in recent times has changed people's behavior, and excessive usage leads to more problematic issues (Ilgaz, 2015). One of these problems is frequent online gambling. The widespread popularity of online gambling can be attributed to the variety of games that can be played, easy accessibility, and advertising. Online gambling is global, easily accessible, and available 24 h a day (Griffiths, 2001).

Studies examining online gambling addiction, which has become a significant problem today, are available in the literature. However, the lack of a scale developed to determine the online gambling addiction level of individuals is a significant deficiency. Therefore, there is a need for a valid and reliable scale that can measure the online gambling addiction level. This study was aimed to develop a measurement tool to determine the level of online gambling addiction in university students.

## Methods

### Design of Research

This study was designed in a cross-sectional manner and has been methodologically prepared to develop an Online Gambling Addiction Scale (OGAS). A survey was created to carry out the validity and reliability analyses of the study. The design of the study was not determined as case & control groups; online gambling/betting rates were determined according to the participants' response. During the application of the questionnaire, participants were reminded about the definition of gambling, and they were asked whether they gambled/bet online at any time in their lives.

### Population of Research

The target participants of the study were undergraduate students studying at the Süleyman Demirel University. According to the information obtained from the Registrar's Office, approximately 25 000 students are studying in different faculties. The female/male student ratio was determined as 50%.

### Sample of Research

The power analysis of the study was performed by GPower 9.1.2. First, we tried to determine the total sample size by the simple random sampling method. The minimum required sample size was calculated as 246, as a result of one-sided analysis with an effect size of 0.2, 95% power, and 5% type I error. The online gambling addiction rate was considered as 20%. Then, a stratified sampling method was used by considering the gender and faculty ratios. Based on the information that the gender ratio was 50%, only the weight of the number of students belonging to the faculties was determined as a stratum, and students from all faculties of the university were included in the study (Yazıcıoğlu & Erdoğan, 2004; Sümbüloğlu & Sümbüloğlu, 2005). However, a total of 672 students were reached during the planned study period, and 22 were excluded from the study as their data were incomplete. Thus, the study continued with the dataset of 650 students in total.

There are various opinions on sample size for exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) in scale development studies. It is reported that there should be more participants for CFA than for EFA, or a sample size of 5:1 per item is sufficient (Floyd & Widaman, 1995; Çokluk, Şekercioğlu, & Büyüköztürk, 2012). The sample size in this study was 9:1 for EFA and 25:1 for CFA.

### Ethical Approval of Research

The issue of combating addiction was published in the Official Gazette (February 14, 2019; No:30686) with the circular numbered 2019/2. A permission was obtained from the Süleyman Demirel University Rectorate for the study, and the ethical approval was given by Süleyman Demirel University, School of Medicine Non-Pharmaceutical Research Ethics Committee (February 13, 2020; No: 39). Participants were informed that the study was for scientific purposes only and no personal information would be required, and the information obtained would not be shared with third parties. All forms were completed with face-to-face interviews.

### Preparation of the Scale

The pool of scale items was created by the authors after the literature review. Scales of addiction in related subjects were investigated. It is advocated that there should be a broad pool of scale items, and that the number of items should be approximately thrice the number of items remaining on the scale to be applied (Slavec & Drnovsek, 2012). Therefore, it was suggested to start with 50 or more items in order to have a high variance, explanatory power, and reliability of the scale (Nunnally, 1978; Aguinis, Henle, & Ostroff, 2009). In this study, the authors created a pool of 57 items, according to the literature review. No sub-dimensions were considered while listing the items, and the focus was on creating an item list for online gambling addiction. The items were prepared on a 5-point Likert-type scale. The item response categories were coded as 1: I never agree, 2: I do not agree, 3: Neither agree nor disagree, 4: I agree, and 5: I completely agree. There was no item that needed to be reverse coded in the expressions.

The item pool was evaluated by ten experts from different departments on the subject to determine the content validity of the scale. Experts from sociology, public health, family medicine, psychiatry, and finance rated the scale items as "1: not suitable, should not be on the scale," "2: must be in the scale, but should be revised," and "3: appropriate, must be found in the scale." A candidate scale form was created by evaluating the draft scale by this method of scoring, and then calculating the content validity ratios (CVR) and the content validity index (CVI). This method is called the Lawshe technique (Lawshe, 1975). The criterion for CVR values varies according to the number of experts. When the number of experts is 10, the minimum CVR value should be 0.62. Therefore, the calculated CVR values of the items evaluated by experts should be greater than 0.62. By removing 29 items from the 57-item draft scale prepared in the study, a 28-item candidate scale was obtained (Tezbaşaran, 1996). Besides, CVI is calculated to determine whether a scale is statistically significant. Under the assumption of normality, the CVI value of a scale must be greater than 0.691. In this study, the CVI value for the candidate scale

items was calculated as 0.893, and the candidate scale was found to be statistically significant (Aksayan & Gözüm, 2003; Polit & Beck, 2006).

### Collection of Data

Once the 28-item candidate scale was evaluated for validity and reliability for the study, we began to implement it. The aim was to reach 250 participants and apply the candidate scale, and this was carried out from January 6, 2020 to January 17, 2020. It was decided to apply the test – retest method for the “invariance” validity study of the scale. For this purpose, 100 participants were randomly selected from the participant group, and the second application was carried out with a total of 82 participants for the test – retest phase, from January 20, 2020 to January 22, 2020, due to end of the fall semester. Participants in a total of 15 faculties were reached between February 17, 2020 and March 4, 2020 for the final scale application.

### Statistical Analysis

The statistical analysis of the study was performed with Statistical Package for Social Sciences (SPSS) version 20.0 (IBM SPSS Corp.; Armonk, NY, USA) and the open-source JASP program Version 0.13.1.0. The descriptive statistics were presented as the mean and standard deviation for ratio scale data, and as frequency and percentage ratio for nominal or ordinal data. For the reliability analysis, Cronbach’s alpha values of the scale and its sub-dimensions, and the reliability coefficients of the half-split method were calculated. For validity analysis, EFA analysis was performed and the Kaiser – Mayer – Olkin (KMO) sampling adequacy and Bartlett’s sphericity test values were calculated. Factorizations (sub-dimensions) were performed using the oblimin rotation method with Kaiser normalization, and a scree plot was created. The Pearson product – moment correlation coefficient was calculated for the test – retest method, for internal consistency. CFA analysis was performed using the open-source JASP 0.13.1.0 program and the goodness of fit values of the model were calculated. In the analyses,  $p$  values of less than 05 ( $p < .05$ ) were considered statistically significant, considering the type I error rate as 5%.

## Results

### EFA

The two most important aspects of a scale are its reliability and validity. The ability of a scale to measure the property that is to be measured, accurately and without mixing in other features, is called validity (Tezbaşaran, 1996; Westen & Rosenthal, 2003; Çokluk et al., 2012). Although there are more subtypes with greater detail, it is generally divided into the three areas of content validity, criterion validity, and construct validity (Yurduğül, 2006; Yeşilyurt & Cross, 2018).

In the EFA, the KMO sampling adequacy value was found to be high (KMO = 0.810). In addition, Bartlett’s sphericity test result was obtained as a highly significant chi-square value ( $\chi^2 = 3910.04$ ;  $p < .001$ ) with 378 *df*. When the common variance (communality =  $h^2$ ) of the items were examined, it was seen that the communality of all items was generally higher than 0.583. Only the communality of the 11th item was found to be 0.122. Common variance values should be greater than 0.35 (Geçkil &

Tikici, 2015). Therefore, item 11 should have been excluded from the scale. EFA was performed primarily without applying any rotation method. Secondly, it was carried out by the “oblimin” and the “varimax” rotation methods. The “structure matrix” and “pattern matrix” formed in all three methods were examined and the values of “component transformation matrix” were examined to compare the methods. The relationship values between dimensions indicate which rotation method should be chosen. In general, the transformation matrix with interdimensional component values below 0.30 is determined as the most suitable method. It was decided that the results of the analysis made with the oblimin rotation were more appropriate of all the methods. A three-dimensional structure was obtained. It was seen that item 13 had an overlapping factor in both of the second and third factors. Therefore, it was excluded from the scale. A total of three dimensions were obtained with the cumulative variance rate of 65.44%. Thus, a structure consisting of 26 items and 3 dimensions was obtained. The first dimension consists of ten items and this dimension is called “Motivation.” The second and third factors consist of eight items. The second factor was named “Addiction,” and the third factor was named “Negative psychology” (Table 1).

### Reliability

The reliability level of the study was analyzed by two different methods. First of all, the reliability level for the overall scale was found to be quite high, and it was calculated as Cronbach’s alpha = 0.920; the lowest reliability level was 0.901. Therefore, no item was removed from the scale. Item – total correlation values varied between 0.288 and 0.803. It was understood that the relationship values were not at a level that would require removing items from the scale. The first dimension of the scale had a reliability value similar to that of the scale (Cronbach’s alpha = 0.912). The second and third dimensions of the scale were lower but had an acceptable level of reliability (Cronbach’s alpha values were 0.701 and 0.721, respectively). When the items of the scale were divided into 13+13, the reliability level was calculated as 0.899 and 0.799 for the first and second part of the scale by the half-split method. The Spearman – Brown internal consistency correlation coefficient between the forms was found to be 0.775, and the findings show that the reliability level of the scale is quite high (Table 1).

### CFA

CFA, one of the types of structural equation modeling, is applied to test whether the scale created is a suitable model for the sample being studied, and whether the desired structure will emerge if it is used for a different sample. While EFA usually helps to create a model based on a hypothesis, CFA reveals the structure of the model established and the relationships between the factors determined in the model (Çapık, 2014). There are several model fit indices in CFA, and they give information about whether the factors are sufficient to explain the model. In addition, a more valid structure can be obtained with various modifications suggested by CFA in the factor structures created with EFA, to obtain more accurate indices (Erkorkmaz, Etikan, Demir, Özdamar, & Sanisoğlu, 2013).

In the CFA model, fit values for the one-dimensional structure were first obtained. However, the fit of the model was not considered acceptable because the  $\chi^2$  value was quite large and

Table 1.  
Factor Structure and Reliability Values of the Online Gambling Addiction Scale

Items	Communality (h <sup>2</sup> )	Factor Loads	Item – Total Correlation	$\bar{X}$	SD	Cronbach's Alpha
Motivation sub-dimension						0.912
M1	0.569	0.638	0.564	1.236	0.637	
M2	0.802	0.845	0.787	1.432	0.834	
M3	0.784	0.803	0.728	1.526	0.940	
M4	0.516	0.612	0.552	1.196	0.572	
M5	0.594	0.692	0.627	1.324	0.818	
M6	0.764	0.830	0.767	1.364	0.816	
M7	0.743	0.679	0.594	1.410	0.869	
M8	0.636	0.711	0.637	1.448	0.990	
M9	0.559	0.588	0.537	1.416	0.818	
M12	0.602	0.442	0.388	1.372	0.941	
Addiction sub-dimension						0.701
B10	0.639	0.432	0.440	1.424	1.043	
B16	0.757	0.632	0.565	1.208	0.625	
B17	0.601	0.634	0.587	1.104	0.445	
B18	0.534	0.478	0.413	1.090	0.285	
B19	0.536	0.539	0.451	1.248	0.788	
B22	0.755	0.616	0.540	1.076	0.409	
B27	0.701	0.669	0.592	1.096	0.464	
B28	0.657	0.601	0.545	1.080	0.432	
Negative psychology sub-dimension						0.712
P14	0.547	0.402	0.376	1.136	0.572	
P15	0.633	0.539	0.506	1.100	0.441	
P20	0.677	0.535	0.451	1.080	0.361	
P21	0.684	0.512	0.331	1.200	0.728	
P23	0.630	0.456	0.429	1.108	0.499	
P24	0.774	0.612	0.577	1.100	0.476	
P25	0.741	0.585	0.307	1.364	1.002	
P26	0.755	0.524	0.351	1.164	0.671	
Total scale				1.281	0.761	0.920
Scale score				29.479	13.511	

$\bar{X}$ , Mean; SD, standard deviation.

the  $df$  value was small. In addition, residual fit values such as RMSEA and SRMR and fit indices such as AGI, NFI, GFI, and CFI were not found at the desired acceptance level. The fit values found in the analysis for the three-factor model were close to acceptable, however the fit was poor. The values of  $\chi^2/df = 1475.50/187 = 7.89$  and  $RMSEA = 0.101$  were calculated and the model fit was not at the desired level. When the  $R^2$  values were examined, it was seen that the values of some items were below 0.300. Therefore, it was decided that modification was required. Various modifications were made and the model was recreated by exchanging some items. The fit values of the model established for a structure consisting of ten items for the "Motivation" factor, six items for the "Addiction" factor, and five items for the

"Negative Psychology" factor were found to have very good values. Since  $\chi^2/sd = 4.25$  was found, it was concluded that it was acceptable. The RMSEA value was calculated as 0.041. Fit index values were generally found within acceptable ranges. The residual fit index RMSEA and the ECVI fit index were within the ranges of "good fit". It was found that index values of CFI, TLI, NNFI, PNFI, RFI, IFI, and RNI were within "acceptable" compliance ranges (Yaşar, 2014) (Table 2). The correlation value between the "Motivation" and the "Addiction" dimensions was 0.89, and the correlation value between the "Negative Psychology" and "Addiction" dimensions was 0.86. The correlation level between the factors of "Motivation" and "Negative Psychology" was lower and it was calculated as 0.65 (Figure 1).

Table 2.  
Confirmatory Factor Analysis Fit Indices

Fit Measures	Measurement Value	Good Fit Values	Acceptable Fit Values	Result
Goodness of Fit test				
$\chi^2$	876			
<i>df</i>	206			
$\chi^2/df$	876/206 = 4.25	$0 \leq \chi^2/sd \leq 3$	$3 \leq \chi^2/sd \leq 5$	Acceptable
Goodness of Fit Indices				
Comparative Fit Index (CFI)	0.958	$\geq 0.97$	$\geq 0.95$	Acceptable
Tucker – Lewis Index (TLI)	0.961	$\geq 0.95$	0.94 – 0.90	Acceptable
Bentler – Bonett Non-normed Fit Index (NNFI)	0.961	$\geq 0.95$	0.94 – 0.90	Acceptable
Bentler – Bonett Normed Fit Index (NFI)	0.963	$\geq 0.95$	0.94 – 0.90	Acceptable
Parsimony Normed Fit Index (PNFI)	0.865	$\geq 0.90$	0.89 – 0.70	Acceptable
Bollen’s Relative Fit Index (RFI)	0.840	$\geq 0.90$	0.89 – 0.70	Acceptable
Bollen’s Incremental Fit Index (IFI)	0.955	$\geq 0.95$	0.94 – 0.90	Acceptable
Relative Noncentrality Index (RNI)	0.875	$\geq 0.90$	0.89 – 0.70	Acceptable
Absolute Fit Indices				
Goodness of fit index (GFI)	0.897	$\geq 0.90$	0.89 – 0.85	Acceptable
McDonald fit index (MFI)	0.751	$\geq 0.90$	0.89 – 0.85	Acceptable
Expected cross validation index (ECVI)	2.663	$\leq 3.0$	3.0 – 5.0	Good fit
Residual Compliance				
Root mean square error of approximation (RMSEA)	0.041	$\leq 0.05$	0.06 – 0.08	Good fit
Standardized root mean square residual (SRMR)	0.064	$\leq 0.05$	0.06 – 0.08	Acceptable
Information Criteria				
Log-likelihood	-13,328,858			
Akaike Information Criteria (AIC)	26,795,716			
Bayesian Information Criteria (BIC)	27,099,791			

*df*, degrees of freedom;  $\chi^2$ , chi-square.

**Demographic Characteristics**

The pilot study was completed with a total of 250 participants. After the validity and reliability analyses, a questionnaire was applied again in different faculties to reach new participants. Four hundred participants were reached during the implementation phase, and the study was completed with 650 participants in total. Almost half of the participants were male (45.2%). While some lived alone, some lived with their friends, and the proportion was almost equal (36.6%). The remaining participants were living with their families (26.7%). Most of the participants (71.9%) had graduated from public schools, 18.6% of the students were graduates of private schools, and 9.4% of them were graduates of vocational high schools. While the mothers of the participants were mostly high school graduates (32.5%), their fathers were university graduates (43.1%). While 41.1% of the participants smoked, 12.4% of them had stopped the practice. The rate of alcohol use among the participants was frequently 13.4% and rarely 49%; 4.1% of the participants stated that they used drugs, and 4.5% stated that they

had stopped using drugs. The mean age of the participants was calculated as  $21.85 \pm 2.78$  years (18 – 46) and the median age was 22 years. The average of the answers given for the time spent on the internet was  $4.51 \pm 2.65$  h (1 – 20) and the median value was 4 h. While the rate of gambling/betting on the internet in any period of their lives was 32.8%, the participants declared that the reason they gambled was to earn money at the highest rate (43.2%), while entertainment followed close behind (41.1%). A passion for adventure was another reason stated, although at a lower rate (15.2%).

**Discussion**

Technological developments have an important effect on gambling habits, and this habit has evolved into online gambling in recent years. It is noteworthy that internet sites that allow gambling have increased in terms of number and usage in the last 10 years. In particular, young people are more exposed to and participate in online gambling (King, Delfabbro, & Griffiths,





the use of gaming, gambling, or betting sites. Although there are no data to support this idea yet and it does not seem possible to obtain data in the ongoing process, this judgment can be made as a result of individual observations. Youngsters try to find entertainment and money making opportunities online, which results in addiction to this harmful practice. For this reason, we think that the damages of online gambling/gaming/betting habits should be highlighted more frequently in public places.

Online gambling and betting opportunities have increased in recent years. Although there are many addiction-related scales for research, no study was found on online gambling addiction. Therefore, this study is the first in this field, and it covers a huge lacuna in this subject. The data obtained show that more satisfactory information can be obtained by applying the scale in different areas or in different environments. The reliability level of this study was calculated as 0.92, and the level of reliability is high. In validity studies, a three-factor structure was obtained and the values indicated a good level of reliability of the sub-dimensions. The internal consistency of the scale is above 0.80 on average, which is a very good level. The construct validity results were found at an acceptable level. The three-factor and 26-item structure obtained with EFA were confirmed by CFA. With a few minor modifications, the final structure was obtained with three dimensions and 21 items.

The scale was scored based on a Likert-type scoring of points by all participants. Since the final version of the scale consists of 21 items, score values will be between 21 and 105. High scores indicate an addiction to online gambling/betting. For the scale scores, Receiving Operating Characteristics (ROC) analysis was applied between the participants who gambled on the internet and those who did not, and the cut-off value was calculated as 27 points. According to the cut-off value, two groups of scale scores were formed, for online gambling and non-gambling. The success level of the scale was determined by cross validation of the actual responses given by the individuals with the groups obtained, by using the score. Accordingly, the sensitivity of the scale was calculated as 79.90%, specificity as 88.45%, and accuracy value as 85.64%. These rates show that the scale is a very good diagnostic tool. In conclusion, the "OGAS" is a valid and reliable scale with high diagnostic accuracy, consisting of 3 sub-dimensions and 21 items. It is suggested that it be used to measure the level of online gambling knowledge and addiction in different populations.

#### Limitations and Suggestions for Future Research

The study has some limitations, and they can be stated as follows: the study group was enrolled in a very short time period. The sample size could have been greater, although it was sufficient to meet the power analysis. Moreover, the age range of the participants was not so wide, since the survey was conducted at a university. As a further study, participants over a wider age range will be better reflect the young population.

**Ethics Committee Approval:** Ethical committee approval was received from the Non-Pharmaceutical Research Ethics Committee of Süleyman Demirel University (February 13, 2020; No: 39).

**Informed Consent:** Written informed consent was obtained from all participants who participated in this study.

**Peer Review:** Externally peer-reviewed.

**Author Contributions:** Concept - A.K., A.N.K.; Design - A.K.; Supervision - A.N.K.; Materials - A.K., B.Ç., A.Y., S.D.Y.; Data Collection and/or Processing - A.K., B.Ç., A.Y., S.D.Y.; Analysis and/or Interpretation - A.K.; Literature Review - A.K., B.Ç., A.Y., S.D.Y.; Writing - A.K., B.Ç., A.Y., S.D.Y.; Critical Review -A.N.K.

**Conflict of Interest:** The authors have no conflict of interest to declare.

**Financial Disclosure:** The authors declared that this study has received no financial support.

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