NÖRO PSİKİYATRİ ARŞİVİ
ARCHIVES OF NEUROPSYCHIATRY

RESEARCH ARTICLE

Arch Neuropsychiatry 2018;55:225–232
https://doi.org/10.5152/npa.2017.17017

Motives and Consequences of Online Game Addiction: A Scale Development Study

Gülşah BAŞOL[1], Abdullah Bedir KAYA[2]

[1]Department of Educational Measurement and Evaluation, Gaziosmanpaşa University School of Education, Tokat, Turkey
[2]Department of Computer Technologies, Hitit University, Çorum, Turkey

ABSTRACT

Introduction: We aimed to develop the Online Game Addiction Scale (OGAS) and examine its properties.

Methods: Three hundred and twenty-seven secondary school students (92% males and 8% females) participated in this study. A draft scale that included 69 items was used for assessing its validity and reliability. The exploratory factor analysis was used for assessing construct validity, and Cronbach's alpha coefficient, Spearman–Brown split-half reliability, and test–retest reliability were used for assessing reliability.

Results: After performing the exploratory analyses, a three-factor structure comprising 21 items was obtained, which explained the 59% of variance. The factor loads of the items ranged from 0.606 to 0.876. Reliability analyses revealed that Cronbach's alpha coefficients ranged from 0.83 to 0.91, coefficients of the Spearman–Brown split-half reliability ranged from 0.88 to 0.94, and outcomes of the test–retest reliability ranged from 0.71 to 0.94.

Conclusion: Our results revealed that OGAS is a valid and reliable tool that has adequate psychometric properties.

Keywords: Digital games, online games, online game addiction, scale development

Cite this article as: Başol G, Kaya AB. Motives and Consequences of Online Game Addiction: A Scale Development Study. Arch Neuropsychiatry 2018;55:225-232. https://doi.org/10.5152/npa.2017.17017

INTRODUCTION

Considering how intensely our lives involves technology at all ages, it is not difficult to understand that technology use turned into a habit for different uses, from gambling to shopping, downloading music to watching TV series or movies, or socializing behind a computer screen to sharing tips or recipes. We spend several hours in front of a screen for different purposes that are defined by our interests, needs, or motives.

Before technology, there were toys and playgrounds. In city life, the outdoor activities of children have become limited because of huge shopping malls and small, restricted playgrounds. With the developments in the digital gaming industry, children have started excessively using technology as pastime. A few decades ago, no such thing as virtual games or characters existed; most of the problems that we are dealing right now regarding the children and adolescents have been associated with the excessive computers use or Internet.

The literature reveals adolescents to be heavy Internet users (1, 2) and many studies have discussed the consequences of excessive Internet use by adolescents (3). According to a study, 95% of all teenagers aged from 12 to 17 years are online (4). In another study (5), the amount of time spent by children in playing digital games has dramatically increased. In addition, the preferences of children have changed; although individually played games were previously common, a recent study revealed that almost half of the most frequent players preferred social games (6).

Digital games have been around since 1990s and have gained popularity in all age groups. It is even claimed that the 21st century will be the age of digital gaming (7). Compulsive Internet use for playing digital games has become an issue for people of different ages. Online gaming is increasing at such as a pace that the Entertainment and Software Association reported the average age of game players was 35 years and that 155 million Americans regularly play video games (6).

Technology and Addiction

In recent years, the rapidly increasing number of web-based online games has been forcing people to stay connected to the Internet, it is impossible to progress in these games for a player with no Internet access to connect to the game. Therefore, players need to be connected to these online gaming environments to progress in the game. Such situations can be regarded as causes of game addiction.

In clinical practice, the two concepts that are used as bases for defining addiction are behavioral addiction and physical dependence (8). The Diagnostic and Statistical Manual of Mental Disorders (DSM) by the American Psychiatric Association includes a diagnostic system for the diagnosis of game addiction under mental disorders (9). DSM IV defines Internet addiction, as non-chemical, apparent behavioral addictions such as habits that are considered as impulsivdisorders (10). Technological non-chemical addiction dependencies can be defined as behavior-based, and it occurs in the form of the interaction between the

Correspondence Address: Gülşah Başol, Gaziosmanpaşa Üniversitesi Eğitim Fakültesi, Eğitim Bilimleri Anabilim Dalı, Tokat, Turkey • **E-mail:** gulsahbasol@gop.edu.tr
Received: 15.03.2016, **Accepted:** 17.08.2016, **Available Online Date:** 25.04.2018
©Copyright 2016 by Turkish Association of Neuropsychiatry - Available online at www.noropskiyatriarsivi.com

man and the machine. In this type of dependency, the person can be either active (such as while playing computer games) or passive (while watching TV) (11). Behavior-based dependencies; usually explained as eating, gambling, sex, etc. includes technological dependencies involving human-machine interaction (10).

Internet addiction was first introduced in the literature by Dr. Ivan Goldberg via an e-mail that was meant to be a joke (12). Regardless of how Internet addiction was introduced in the literature, it refers to excessive and problematic use of the Internet (13). Internet addiction, similar to pathological gambling, is defined as an impulse control disorder that is not associated with substance use (14). Researchers have used various terms such as problematic Internet use (15, 16, 17) addiction to Internet (18), pathological Internet use (19, 20), Internet addiction (14, 21), Internet overuse (22), Internet abuse (23), and excessive Internet use (24) for referring to problematic areas of Internet addiction. At a close look at the related literature, one can see that these problems are all rooted on the point of excessive and problematic Internet usage and it becomes a financial and intangible burden to the person.

Even if online games turned into a dependency objects for those who are connected to Internet, people who are not connected to Internet might be using it as a medium (25) for other addictions (e.g., online sexual behavior, online gambling, or online games). These dependencies are described as the dependence on the environment for online gaming, chat channel addiction, online gambling addiction, pornography, or cyber-sex addiction (26). Computer and Internet addiction was not under under DSM IV before, later on it was examined many and finally placed it under pathological gambling addiction identified as having the most identical specifications to dependence on the computer (13). Internet addiction criteria were defined on the basis of the model, which was adapted from the pathological gambling addiction criteria.

In addition, many studies have stated that online game addiction forms a significant portion of Internet-based addictions (27, 28, 29, 30, 31).

Role play games

Digital game types can be typically classified as action shooters, multiplayer games, sports, simulation, strategy games, educational games, and role play games (RPGs) (32). Of these game types, RPGs are the ones played through an interface in which players assume roles of characters-named avatar-in a fictional setting. An avatar is a digitally created character that is powered by digital interactions (33, 34).

Worldwide, tens of thousands of players simultaneously play RPGs interactively on their tablet/computers with an Internet connection. These games are identified as massively multiplayer online role play game (MMORPG). MMORPG is different from RPG in that thousands of players worldwide can play together online and can socialize through chat channels. MMORPG enables players to socialize with people from different beliefs, cultures, and languages.

Online game addiction

Internet addiction are of various types, e.g., online games, online chat, online gambling, online sex, online information, online shopping, or surfing the Internet for research (26, 35, 36, 37). Moreover, news published worldwide and records of digital games in the Guinness Records Book indicate that game addiction, particularly digital game addiction, has become the subject of many news. An 18-year-old Thai teenager died after playing online computer games for 40 h straight (38). A 22-year-old mother from Florida shook her 3-month-old son to death because he interrupted her Farmville game on Facebook (39). Likewise, a father who was playing the EverQuest game got annoyed with his 9-month-old son and killed the child by squeezing him to death (40). Furthermore, a father killed his 17-month-daughter for pulling out the plug of his Xbox game console (41). Ironically, a Korean couple starved their 3-month-old daughter to death because they devoted hours to playing a computer game, raising an avatar (a digital character) of a young girl (42). A teenager shot his parents in the head after they confiscated an Xbox game console (43). A desperate teenager stabbed his rival in the game Counter Strike in real life (44). In Turkey, a father hired digital assassins to attack his son's game character in hopes of preventing him from playing World of Warcraft (45).

Some records related to digital games in the Guinness Records Book are: "Most Popular Free MMORPG" record; the MMORPG named Runescape reached almost 200 million registered players from >150 countries worldwide (46). Okan Kaya broke the longest videogame marathon record by playing nonstop for 135 h, 15 min, and 10 s (47).

All these news indicate that online game addiction is a rapidly increasing issue. Although many studies have reported regarding the dangers of excessive Internet use and digital game addiction, to the best of our knowledge, no scale exists to identify the consequences of digital game playing.

There is no scale in the literature that aims to identify the consequences of online gaming. A previous study (48) identified an association between online games and maladaptive cognitions using the Online Cognitions Scale developed in another study (49).

Factors associated with online gaming addiction and motivation for playing in MMORPGs were investigated. Latent class analysis revealed the following seven classes of motivations: novelty, highly social and discovery oriented, aggressive, anti-social and non-curious, highly social, competitive, low intensity enjoyment, discovery oriented, and social classes (50). They also reported the following five classes of gaming addiction-related experiences: high risk for addiction, time-affected addiction, intermediate risk for addiction, emotional control, and low risk for addiction.

Because online gaming addiction has been recognized as a mental disorder, predictive factors that lead to this disorder are not established (51). This study aimed to investigate factors that may influence the development of online gaming addiction (51). In a hierarchical logistic regression analysis, individual factors such as sex and age; cognitive factors such as IQ and preservative errors; psychopathological conditions such as attention-deficit hyperactivity disorder, depression, anxiety, and impulsivity; and social interaction factors such as family environment, social anxiety, and self-esteem were entered in a stepwise design. The findings indicated that all four factors were associated with online gaming addiction. Because psychological factors were the strongest risk factors for online gaming addiction, psychopathologies were the strongest factors associated with the development of online gaming addiction in individuals.

Online gaming addiction has an impact on the physical and psychological health of players. Social capital and co-playing patterns appear to have significant health implications in participants playing online games (52). Online multiplayer games create new social platforms, with their own etiquette, social rules of conduct, and ways of expression (53). The effect of online gaming on the behaviors of children has been previously investigated (54). As a rare finding on the side of online gaming, they concluded that despite the negative effect of playing violent games, violent arousal has a positive effect on children's development, particularly self-regulation and thinking aloud.

Although many studies have assessed the harms of Internet and digital game addiction, to the best of our knowledge, there is not a scale

development study that measures the consequences of playing digital games in terms of its reflection on family relationships, daily activities, and social relationships. Therefore, the current study aimed to develop a scale that helped educators identify problems that occurred because of playing online games and the motives behind this addiction.

METHODS

This scale development study was conducted among adolescents who played MMORPGs in Turkey. The participants were from Corum and Sivas Province, which is located in Central Anatolia, during the 2012-2013 academic year. The study included 465 students who were selected through purposive sampling. The previously set criteria need to be defined in the criterion sampling (55). In the current study, the participants included were those who played one of the MMORPGs. Out of 465 scales, 327 scales were valid. The scales with too many missing answers, repetitive answers, or contradictory responses were excluded from the final data set. The study was performed in accordance with the ethical considerations of the Helsinki Declarations. Participation was voluntary, there were no incentives for participation and no personal questions were asked.

To gather prospective items for the Online Gaming Addiction Scale (OGAS), a focus group study with adolescents who played MMORPG was conducted; the positive and negative aspects of gaming were discussed and probable expressions were gathered. In addition, a comprehensive literature regarding online gaming helped in identifying problems and motives that were associated with online gaming behavior (13, 17, 23, 30, 56, 57, 58). During the item pool development stage, the following studies (13, 17, 23, 30, 56, 57, 58). were considered. The construct validity of the resulting 142 Likert scale items was confirmed using an expert evaluation form, and the readability and suitability of the scale for adolescents were scored by two Turkish teachers. Later, the expert opinions of two academicians whose research focused on online gaming were requested. According to their suggestions, 34 items were excluded, similar items were reconsidered (either eliminated or adjusted), and the ones with same meanings were combined. Consequently, the number of items in the final draft was reduced to 69 items. Items that were regarded highly by the majority of the applicants (completely agreed or completely disagreed) were also excluded. Before applying, the final form of the scale was reviewed by a Turkish teacher one last time. A pilot study indicated that the scale took approximately 30 min to complete and required intermediate level language skills.

Study Sample

According to the descriptive analysis, the number of boys and girls in the study sample were 302 (92%) and 25 (8%), respectively. Of all the participants, 156 (48%) were 9th graders, 46 (14%) were 10th graders, 70 (21%) were 11th graders, and 55 (17%) were 12th graders. Approximately 58% of the participants answered the question "How many hours a day do you spend playing games?" as >2 h. Forty-six percent of the participants answered that the longest nonstop playing time for them was ≥6 h, whereas 61% responded as ≥4 h. These results suggest that most of the participants were highly engaged in online digital games.

Data Analysis

Statistical analysis was performed using a SPSS 15 developed by IBM in New York. The normality check at item level were achieved through skewness and kurtosis check and yielded no problems. The construct validity was assessed using the principal component analysis. Before the analysis, sampling adequacy and factorability of a correlation matrix were evaluated. Kaiser–Mayer–Olkin (KMO) test indicated that the sample size was adequate with a value of 0.92 (59), and Bartlett test was significant beyond 0.001, indicating the suitability of the correlation matrix to draw factors (60). In the light of the literature, certain rules such as removal of the factors with <5% explanation rate or the ones having less than three items were used to decide the factors to be retained (61). To retain a factor, the eigenvalues needed to be >1 (62). Furthermore, items with an item load less then .45 on their respective factor, the ones cross loaded on multiple factors, or the ones reduce the alpha coefficient were eliminated. Finally, the ones with <0.10 discrepancy between loadings (59) were removed. Cattell's scree test was also performed to visually consider the number of factors. Common variation levels of the items (Communalities) were investigated to exclude the items with an inadequate common variation. Researchers used factor rotation methods to provide "independent and significant factors" (62). Because factors were determined to be independent from each other, the Varimax method was used. Moreover, item-total correlations and dependent *t* test comparisons were performed to confirm the unidimensionality of the scale and its subscales. Higher item-total correlations were assumed to indicate that altogether the items measured the same construct. In contrast, significant differences identified through dependent sample *t* tests indicated the uniqueness of each subscale.

RESULTS

Validity

Using factor analysis, construct validity was confirmed by assessing whether data was grouped as anticipated (63). The purpose of factor analysis was to decrease the number of factors, release the structure among the items, and classify them (59). A good factor solution should decrease the number of variables; in addition, outcome factors should be independent of each other, and new factors should be conceptually meaningful (62).

The findings indicated that KMO and Bartlett results were adequate (KMO = 0.91, X^2 = 11166, 638 p<0.001). Principal component analysis with Varimax rotation provided 16 factors, which explained the 63% of the total variation and had eigenvalues of >1 (64). Factors with an explanation level of <5% and the items that were singled out were excluded. Finally, 41 items were left. In the second analysis with the new data set, PCA explained the 58% variation and yielded four factors; twenty items that did not fit the predetermined criteria were excluded. In the third analysis, the remaining 21 items yielded three factors, explaining approximately 59% of the total variation. Cattell's scree plot (65) for the final solution is provided in Figure 1.

According to Figure 1, the scale comprised three factors. After the third factor, eigenvalue was <1. The PCA results by Varimax rotation are given in Table 1.

According to Table 1, three factors with eigenvalues of >1 explained the 58.56% of the total variation in the data. There were no reverse items. "Malfunctions" with nine items (item 15, 51, 49, 26, 4, 48, 18, 63, and 33), which reflected the problems in the adolescents' life because of online gaming, explained 24.25% of the total variation, with factor loadings between 0.63 and 0.77. Items with its original Turkish form in parentheses, factor loadings, and descriptive statistics for the items in the "Malfunctions" factor are provided in Table 2.

The second factor "Success" with eight items (item 9, 13, 19, 66, 28, 16, 64, and 69), which reflected the feeling of achievement because of online gaming behavior, explained 20.96% of the variation, with factor loadings between .61 and .79. Items with its original Turkish form in parentheses, factor loadings, and descriptive statistics for the items in the "Success" factor are provided in Table 3.

Finally, the third factor "Economic profits" with four items (item 45, 20, 57, and 47) explained 13.34% of the variation, with factor loadings between

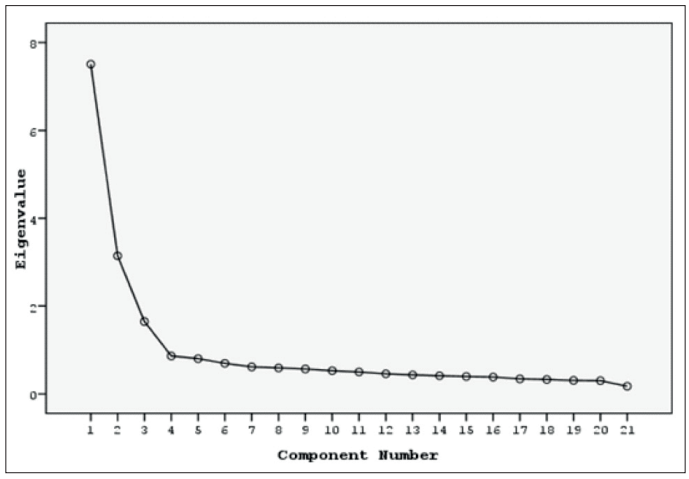

Figure 1. Screen plot.

Table 1. Varimax rotation results of OGAS items

Scale Item No		Factor-1	Factor-2	Factor-3
	Item 1	0.771	0.046	0.175
	Item 5	0.743	0.230	0.148
	Item 14	0.736	0.132	0.110
	Item 21	0.734	0.248	0.138
	Item 17	0.711	0.216	0.180
	Item 12	0.690	-0.063	0.224
	Item 9	0.673	0.180	0.120
	Item 7	0.661	0.060	0.315
	Item 3	0.627	0.216	0.153
	Item 2	0.036	0.794	-0.028
	Item 8	-0.050	0.774	0.042
	Item 16	0.097	0.755	0.127
	Item 19	0.067	0.729	-0.034
	Item 18	0.225	0.672	0.189
	Item 10	0.274	0.672	0.189
	Item 13	0.312	0.668	0.147
	Item 4	0.303	0.606	0.211
	Item 6	0.195	0.126	0.876
	Item 11	0.174	0.212	0.827
	Item 15	0.337	-0.117	0.695
	Item 20	0.291	0.109	0.664
Eigenvalues		7.05	3.14	1.64
Explained Variations		24.25	20.96	13.34
Total Explained Variation		24.25	45.21	58.56

OGAS: Online Gaming Addiction Scale

0.66 and 0.88. Descriptive data for the items and their original Turkish forms in parentheses are provided in Table 4.

According to Table 4, factor loadings were between 0.61 and 0.88. The means of the items ranged from 4.27 to 2.04, and the standard deviations ranged from 1.14 to 1.66. Communalities were between 1.31 and 2.76. Corrected item-total correlations were beyond the cutoff value of 0.30 (66, 67, 68).

Reliability

After factor analysis, the reliability of the scale and its subscales were checked. The two main criteria for reliability were "consistency between the answers obtained at different times" and "consistency between the answers acquired at the same time" (62). Cronbach's alpha, Spearman–Brown split-half, and test–retest correlations were used for reliability analyses. The results are given in Table 5.

Cronbach's alpha coefficients for the scale and its subscales were .70, indicating internal reliability, according to the common rule of .70 (67). Spearman–Brown split-half correlation coefficients also indicated high internal consistencies between the halves. Test–retest correlations also confirmed the consistency of the scale and its subscales over time.

Correlations among the factors

Pearson's correlation coefficients were used to identify the direction and degree of association between the scale and its factors. There were no exact boundaries; however, a correlation coefficient of 0.50 showed weak, between 0.50 and 0.70 corresponded to an average, and a correlation of >0.70 indicated a strong association (69). Pearson's correlation coefficients among the factors are provided in Table 6.

Differences between the means indicate that each factor denotes a different dimension (70). Therefore, the differences between the factors were tested using paired samples *t* tests, and the results are presented in Table 7.

According to Table 7, the differences between "Malfunctions" and "Success factors" and those between "Success" and "Economic profits" were significant, indicating the uniqueness of each subscale. Conversely, differences between "Malfunctions" and "Economic profits" were not significantly different from each other because of the high motivation of players to make money.

OGAS is a 21-item Likert-type scale, with 1 corresponding to "I absolutely don't agree," 2 to "I don't agree," 3 to "I am indecisive," 4 to "I agree," and 5 to "I completely agree." The lowest and the highest scores that can be attained from the scale and its subscales are provided in Table 8.

DISCUSSION

This study aimed to develop a scale that measured the consequences and motives of adolescents' online gaming habits. However, our findings resulted in a three-factor solution. In this study, expected factors such as "Belonging to a group" and "success" and "Economical profits" did not appear to be closely associated with adolescents' online gaming habits. Our findings indicated that some of the items did not appear at their expected sub-scales; such as, "I give up my sleep for an online group facility," were expected to be an item at Belonging sub-scale, "My friendships were damaged/broken due to online games," were expected to be at Loneliness sub-scale while they both came up at the Malfunctions sub-scale according to the EFA results. The resulting scale had 21 items under the following three factors: "Malfunctions," "Success," and "Economic Profits" subscales. There were no reverse-coded items, and the final scale took approximately 10–15 min to complete. Moreover, playing MMORPG is more of an issue for male adolescents. Hence, in the current study, 92% of our participants were males. For that MMORPG involves violence to some degree since the player is supposed to pursue an attempt to gain a reward in return; it may attract boys more often than the girls. Another study (71) suggested that most computer games with a subject matter of territory and aggression were popular with males. According to the study that compared male and female brains' responses to computer gaming that were about territory and score gaining, males were more focused on gaining territory; brain scans indicated that during gaming, the male brain showed more neural activity compared with the female brain. This can be an explanation for the limited attendance of females in the current study.

Table 2. Descriptive information regarding the malfunctions subscale

	Item No	Item	Factor Loadings	$\bar{X}$	SD	Communalities	Item-Total Corrs
Malfunctions	Item 1	I do not have a regular bedtime due to online games. (Çevrimiçi oyun oynadığım için uyku düzenim bozuldu)	0.771	2.48	1.50	0.628	0.60
	Item 5	I go to bed late and get up late due to playing online games. (Çevrimiçi oyun oynadığım için geç yatıp geç kalkarım)	0.743	2.76	1.58	0.627	0.67
	Item 14	I delay my meals not to pause the game. (Çevrimiçi oyuna ara vermemek için yemeği ertelediğim olmuştur)	0.736	2.91	1.59	0.571	0.60
	Item 21	I delay my sleeping time to reach my goal (score, level, item, etc.) (Çevrimiçi oyunda hedefime ulaşmakiçin (puan, level, item vs.) uyku saatimi ertelemişimdir)	0.734	2.89	1.62	0.620	0.67
	Item 17	I give up my sleep for an online group facility. (Çevrimiçi oyun grubumuzun oyun içi bir faaliyeti için gece uykumdan feragat ederim)	0.711	2.89	1.59	0.585	0.65
	Item 12	My friendships were damaged/broken due to online games. (Çevrimiçi oyun oynadığım için arkadaşlık ilişkilerim sekteye uğradı)	0.690	2.17	1.32	0.530	0.51
	Item 9	I had my meals in front of the computer while I was playing online games. (Çevrimiçi oyun oynarken yemeğimi genelde bilgisayar başında yerim)	0.673	2.57	1.58	0.500	0.58
	Item 7	I miss classes because I play online games till late hours at night. (Gece geç saatlere kadar çevrimiçi oyun oynadığım için kaçırdığım dersler oldu)	0.661	2.54	1.59	0.540	0.59
	Item 3	I postpone my works to reach my goal (score, level, item, etc.) in online games. (Çevrimiçi oyunda hedefime ulaşmak için (puan, level, item vs.) işlerimi ertelediğim olmuştur)	0.627	2.99	1.55	0.464	0.58

Table 3. Descriptive data regarding the success subscale

	Item No	Item	Factor Loadings	$\bar{X}$	SD	Communalities	Item-Total Corrs
Success	Item 2	I feel happy when I pass a level in online games. (Çevrimiçi oyunlarda level (seviye) atladığımda mutlu hissederim)	0.794	4.21	1.19	0.632	0.39
	Item 8	I feel happy when I defeat my rival in online games. (Çevrimiçi oyunlarda rakibimi alt ettiğimde mutlu hissederim)	0.774	4.27	1.14	0.608	0.35
	Item 16	When pass a level, I feel that I get what I deserve. (Level atladığımda emeklerimin karşılığını aldığımı hissederim)	0.755	3.92	1.31	0.596	0.48
	Item 19	I am proud of myself when I defeat the players whose levels are higher than mine. (Çevrimiçi oyunda seviyesi benden yüksek oyuncuları yendiğimde gururlanırım)	0.729	4.11	1.24	0.537	0.37
	Item 18	I am proud of myself because of my achievements in online games. (Çevrimiçi oyundaki başarılarımdan dolayı kendimle gurur duyuyorum)	0.672	3.85	1.30	0.538	0.55
	Item 10	I get furious when my rival defeats me in online games. (Çevrimiçi oyunlarda rakibim beni yendiğinde öfkelenirim)	0.672	3.71	1.39	0.528	0.49
	Item 13	I feel happy when I get an item in online games. (Çevrimiçi oyunlarda yeni bir item aldığımda mutlu hissederim)	0.668	3.76	1.36	0.565	0.60
	Item 4	I do my best to reach the highest level in online games. (Çevrimiçi oyunda en üst seviyeye ulaşmak için elimden geleni yaparım)	0.606	3.84	1.36	0.504	0.58

Table 4. Descriptive data regarding the economic profits subscale

	Item No	Item	Factor Loadings	$\bar{X}$	SD	Communalities	Item-Total Corrs
Economic Profit	Item6	I make money by selling the characters I created. (Çevrimiçi oyunlarda geliştirdiğim karakteri satarak para kazanırım)	0.876	2.70	1.67	0.822	0.53
	Item1 1	I earn money by selling the items I win in online games. (Çevrimiçi oyunlarda kazandığım itemleri satarak para kazanırım)	0.827	2.71	1.64	0.760	0.54
	Item 15	I make money through online gaming. (Çevrimiçi oyun benim için kazanç kapısıdır)	0.695	2.04	1.32	0.610	0.43
	Item 20	I develop my game through swapping the characters and its features. (Takasa girerek oyun karakterimi geliştiririm)	0.664	3.02	1.66	0.538	0.50

Table 5. Reliability analysis for the scale and subscales of online game addiction scale

	Cronbach Alpha Internal Consistency Coefficient	Spearman-Brown Split Half Reliability	Test-Retest Reliability
OGAS	0.91	0.94	0.94
Malfunctions Factor	0.90	0.91	0.82
Success Factor	0.88	0.88	0.71
Economic Profits Factor	0.83	0.88	0.83

OGAS: Online Gaming Addiction Scale

Table 6. Correlation coefficients between online game addiction scale factors

	Malfunctions	Success	Economic Profits
Malfunctions	1		
Success	0.421**	1	
Economic Profits	0.525**	0.275**	1

p**<.01

Table 7. Paired samples t test results of Online Game Addiction Scale factors

	Average Difference	t Value
Malfunctions-Success	-1.27	-20.12**
Malfunctions-Economic Profits	0.07	1.07
Success- Economic Profits	1.34	17.68**

p***<.001

According to the data obtained from 30,000 MMORPG players, "Achievement," "Socializing," and "Immersion" motivated players. "Immersion" and "Achievement" corresponded to "Malfunctions" and "Success" of OGAS, respectively. A survey with 1471 participants reported that participants played games to "increase the level of game characters," "feel oneself superior to others," and "earn money selling products" (72). In terms of their meaning, their two factors corresponded to "Success" and "Economic profits" of OGAS. In another study, "Confidence" and "Awarded with a prize" were reported to be motivators of online gaming (73). A review of the items suggested that "Confidence" overlapped with "Success" was safe, whereas "Award with a prize" coincided with "Economic profit" factor of OGAS. Online game playing hours of children and adolescents needs to be managed by their families and teachers because the players have difficulty in limiting themselves (74). I was stated that the gaming addicts would rather spend more time in the cyber world rather than sleeping, eating or communicating (75). "Malfunctions" subdimension of OGAS reffered to this problem. It is a fact that the ones who are successful in video games are at the same time the ones who earn money through gaming. This can be the reason for the low correlation between "Economic profits" and "Success"subdimensions. The characters/items that were bought/sold are objects won/sold by successful players. In addition, successful players play games to enjoy reaching goals and not necessarily to gain economic profit. The association between "Success" and "Malfunctions" factors suggested that the more time a player spends in front of the screen, struggling to be successful, the more problems he/she may encounter. The relatively high association between "Economic profit" and "Malfunctions" suggested that there was no such thing as "gaining" because playing online games for extended periods of hours could bring a number of negative consequences. Unidimensionality of the scale and its subscales were confirmed using item-total correlations and paired samples *t* test.

It is important to identify the motives behind excessive online gaming behavior and its consequences rather than only detecting if there was a habitual engagement. No one can deny that we depend too much on technology because we all use computers and Internet for various purposes. OGAS is anticipated to help parents and educators in

Table 8. Lowest and highest possible scores for the scale and each subscale

Scale and Subscales	Lowest Score	Highest Score	Score Range and Their Meaning
OGAS	21	105	21-42 None, 43-64 Low, 65-84 Average, 85>High
Malfunctions Factor	9	45	9-18 None, 19-27 Low, 28-36 Average, 37>High
Success Factor	8	40	8-16 None, 17-24 Low, 25-32 Average, 33>High
Economic Profits Factor	4	20	4-8 None, 9-12 Low, 13-16 Average, 17>High

OGAS: Online Gaming Addiction Scale

acknowledging the problems before a pastime engagement in MMORPGs turns into an overly habitual play. It would not be wise or clever to suggest excluding technology from youngsters' lives considering the wide range of benefits it provides. Instead, approaches that direct youngsters to more beneficial uses of technology and the effect of their application can be studied. Through counseling programs, parents can obtain guidance to help their adolescents playing digital games excessively rather than getting frustrated by a judgmental, no end attitude. Researchers may also consider studying the proposed construct with its association with other psychological constructs (such as depression, self-esteem, self-efficacy, effective study habits, and time management skills) to have a comprehensive, yet prevailing understanding of the issue for all parties. Furthermore, we suggest that the validity of the scale's conceptual structure should be tested in a future study using a confirmatory factor analysis on a different data set.

Ethics Committee Approval: The study was carried out according to the rules in Helsinki Declaration.

Informed Consent: The sample of the study was regular adolescents who play online games in their free time. They were not diagnosed patients with online game addiction. Therefore, patient consent form was not included.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - ABK, GB; Design - ABK, GB; Supervision - GB; Resource - ABK, GB; Materials - ABK, GB; Data Collection and/ or Processing - ABK; Analysis and/ or Interpretation - ABK, GB; Literature Search - ABK; Writing - ABK; Critical Reviews - GB.

Conflict of Interest: No conflict of interest was declared by the authors.

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

REFERENCES

1. Genuis SJ, Genius SK. Internet interactions: Adolescent health and cyberspace. Can Fam Physician 2005; 51(3): 329-331. PMid:15794014 PMCid:PMC1472962
2. Gross EF. Adolescent Internet use: What we expect, what teens report. Applied Development Psychology 2004; 25: 633-649. [CrossRef]
3. Fonseca H. Is internet use unhealthy?. Swiss Medical Weekly 2014. Published 4 December 2014. [CrossRef]
4. Pew Research Center 2015. The Pew Research Center's Internet & American Life Project Surveys. http://www.pewinternet.org/fact-sheets/teens-fact-sheet/, 01/12/2015.
5. Gentile DA, Anderson CA. Video games. N. J. Salkind Editör. Encyclopedia of Human Development içinde. 3. Baskı. Thousand Oaks, CA: Sage Publications; 2006; s. 1303-1307.
6. ESA (Entertainment Software Association) 2015. Essential facts about the computer and video game industry. http://www.theesa.com/wp-content/uploads/2015/04/ESA-Essential-Facts-2015.pdf, 15/04/2015.
7. Leonard D. Live in your world, play in ours: Race, video games, and consuming the other. Studies in Media & Information Literacy Education 2003; 3(4): 1-9. [CrossRef]
8. Öztürk O, Odabaşıoğlu G, Eraslan D, Genç Y, Kalyoncu AO. Internet bağımlılığı: Kliniği ve tedavisi (Internet addiction: Clinic and treatment). Bağımlılık Dergisi 2007; 8: 36-41.
9. Zervopoulos JA. The Diagnostic and Statistical Manual of Mental Disorders (DSM): An overview. Published in the Expert Witness Manual State Bar of Texas Family Law Section's 1999. http://www.dallasbar.org/sites/default/files/jaz-dsm.pdf, 19/02/2015.
10. Griffiths MD. Internet addiction: Fact or fiction?. The Psychologist 1999; 12(5): 246-250.
11. Widyanto L, Griffiths M. Internet addiction: A critical review. International Journal Mental Health and Addiction 2006; 4: 31–51. [CrossRef]
12. Goldberg I, 1996. Goldberg's message. http://users.rider.edu/~suler/psycyber/supportgp.html, 06/04/2015.
13. Young KS. Internet addiction: The emergence of a new clinical disorder. Cyberpsychology & Behavior 1998; 1(3): 237-244. [CrossRef]
14. Young KS, Rodgers RC. The relationship between depression and internet addiction. Cyberpsychology & Behavior 1998; 1(1): 25-28. [CrossRef]
15. Aboujaoude E, Koran LM, Gamel N, Large MD, Serpe RT. Potential markers for problematic internet use: A telephone survey of 2513 adults. CNS Spectrum 2006; 11(10): 750-755. [CrossRef]
16. Caplan SE. Preference for online social interaction a theory of problematic internet use and psychosocial well-being. Communication Research 2003; 30(6): 625-648. [CrossRef]
17. Shapira NA, Lessig MC, Goldsmith TD, Szabo ST, Lazoritz M, Gold MS, Stein DJ. Problematic internet use: Proposed classification and diagnostic criteria. Depression and Anxiety 2003; 17: 207-216. [CrossRef]
18. Brian DNG, Weimer-Hasting P. Addiction to the internet and online gaming. Cyberpsychology & Behavior 2005; 8(2): 110-113. [CrossRef]
19. Canbaz S, Sunter AT, Peksen Y, Canbaz MA. Prevalence of pathological internet use in a sample of Turkish school adolescents. Iranian Journal Public Health 2009; 38(4): 64-71.
20. Davis RA. A cognitive-behavioral model of pathological internet use. Computers in Human Behavior 2001; 17: 187-195. [CrossRef]
21. Cao F, Su L. Internet addiction among Chinese adolescent: Prevalence and psychological features. Child: Care, Health and Development 2006; 33(3): 275–281. [CrossRef]
22. Choi K, Son H, Park M, Han J, Kim K, Lee B, Gwak H. Internet overuse and excessive daytime sleepiness in adolescents. Psychiatry and Clinical Neurosciences 2009; 63: 455–462. [CrossRef]
23. Morahan–Martin J. Internet abuse addiction? Disorder? Symptom? Alternative explanations?. Social Science Computer Review 2005; 23(1): 39-48. [CrossRef]
24. Lee YS, Han DH, Yang KC, Daniels MA, Na C, Kee BS, Renshaw PF. Depression like characteristics of 5HTTPLPR polymorphism and temperament in excessive internet users. Journal of Affective Disorders 2008; 109(1-2): 165-169. [CrossRef]
25. Chou C, Condron L, Belland JC. A review of the search on internet addiction. Educational Psychology Review 2005; 17(4): 363-388. [CrossRef]
26. Leung L. Net generation attributes and seductive properties of the internet as predictors of online activities and internet addiction. Cyberpsychology & Behavior 2004; 7(3): 333-348. [CrossRef]
27. Horzum MB, Ayas T, Balta OC. Çocuklar için Bilgisayar Oyun Bağımlılığı Ölçeği (Computer Game Addiction Scale for Children). Türk Psikolojik Danışma ve Rehberlik Dergisi 2008; 3(30): 76-88.
28. Huang ASC. The bright and dark side of cyberspace: The paradoxical media effects of internet use on gratifications, addiction, social and psychological well being among Taiwan's net-generation. Unpublished PhD Thesis 2004. University at Carbondale.
29. Irwansyah MA. Internet uses, gratifications, addiction, and loneliness among international students. Unpublished PhD Thesis 2005, University of Hawaii, Department of Communication.
30. Morahan-Martin J, Schumacher P. Incidence and correlates of pathological internet use among college students. Computers in Human Behavior 2000; 16: 13-29. [CrossRef]
31. Yang SC, Tung CJ. Comparison of internet addicts and non-addicts in Taiwanese high school. Computers in Human Behavior 2007; 23(1): 79–96. [CrossRef]
32. Rapeepisarn K, Wong KW, Fung CC, Khine MS. The relationship between game genres, learning techniques and learning styles in educational computer games. Lecture Notes in Computer Science 2008; 5093: 497–508. [CrossRef]
33. Binark M, Bayraktutan-Sütçü G. Kültür Endüstrisi Ürünü Olarak Dijital Oyun (Digital Gaming as Cultural Industry Product). İstanbul: KalkedonYayınları; 2008.
34. Kirriemuir J. Video gaming, education and digital learning technologies. D-Lib Magazine 2002; 8(2). http://www.dlib.org/dlib/february02/kirriemuir/02kirriemuir.html, 06/06/2015.
35. Flisher C. Getting plugged in: An overview of internet addiction. Journal of Pediatrics and Child Health 2010; 46: 557-559. [CrossRef]
36. Peltoniemi T. Net addiction in Finland. First Prevnet Conference of Telematics in Addiction Prevention 2002, Athens, Greece.
37. Young KS, Pistner M, O'mara J, Buchanan J. Cyber-disorders: The mental health concern for the new millennium. Cyberpsyhology & Behavior 1999; 2(5): 475-479. [CrossRef]
38. Ntvmsnbc 2012. Oyun bağımlısı genç bilgisayar başında öldü (Game addiction young when playing died). http://www.ntvmsnbc.com/id/25400238/#storyContinued, 05/07/2015.
39. Daily News 2010. Florida mom Alexandra Tobias pleads guilty to murdering baby for crying during her Farmville game. http://www.nydailynews.com/news/national/florida-mom-alexandra-tobias-pleads-guilty-murdering-baby-crying-farmville-game-article-1.192666, 13/04/2015.

40. St. Petersburg Times 2001. Father guilty in death of son. http://www.sptimes.com/News/010301/Hillsborough/Father_guilty_in_deat.shtml, 03/12/2015.
41. Sky News 2008. Father kills daughter over Xbox console. http://news.sky.com/story/569482/father-kills-daughter-over-xbox-console, 03/12/2015.
42. The Guardian 2010. Girl starved to death while parents raised virtual child in online game. http://www.theguardian.com/world/2010/mar/05/korean-girl-starved-online-game, 03/12/2015.
43. The Times 2009. Teenager Daniel Petric shot parents who took away Xbox. http://www.thetimes.co.uk/tto/news/world/americas/article1999136.ece, 03/12/2015.
44. Sabah Newspaper 2010. Bilgisayar oyunu gerçek oldu! (Computer game became real!). http://www.sabah.com.tr/Dunya/2010/06/01/bilgisayar_oyunu_gercek_oldu, 03/12/2015.
45. Aktüel Magazine 2013. Kiralik katil tuttu! (Hired assassins!). http://www.aktuel.com.tr/Teknoloji/2013/01/09/kiralik-katil-tuttu, 13/04/2015.
46. Guinness World Records 2013a. Greatest aggregate time playing an MMO or MMORPG videogame (all players). http://www.guinnessworldrecords.com/world-records/most-popular-free-mmorpg, 06/05/2015.
47. Guinness World Records 2013b. Longest game marathon. http://www.guinnessworldrecords.com/world-records/longest-video-games-marathon, 06/05/2015.
48. Davis RA, Flett GL, Besser A. Validation of a new scale for measuring problematic internet use: Implications for pre-employment screening. Cyberpsychology & Behavior 2002; 5(4): 331-345. [CrossRef]
49. Komnenic D, Filipovic S, Vukosavljevic-Gvozden T. Assessing maladaptive cognitions related to online gaming: Proposing an adaptation of online cognitions scale. Computers in Human Behavior 2015; 51: 131-139. [CrossRef]
50. Hussain Z, Williams GA, Griffiths MD. An exploratory study of the association between online gaming addiction and enjoyment motivations for playing massively multiplayer online role-playing games. Computers in Human Behavior 2015; 20: 221-230. [CrossRef]
51. Hyun GJ, Han DH, Lee YS, Kang KD, Yoo SK, Chung US, Renshaw PF. Risk factors associated with online game addiction: A hierarchical model. Computers in Human Behavior 2015; 48: 706-713. [CrossRef]
52. Shen C, Chen W. Social capital, coplaying patterns, and health disruptions: A survey of Massively Multiplayer Online Game participants in China. Computers in Human Behavior 2015; 52: 243-249. [CrossRef]
53. Balcı K, Salah AA. Automatic analysis and identification of verbal aggression and abusive behaviors for online social games. Computers in Human Behavior 2015; 53: 517-526. [CrossRef]
54. Agina AM, Tennyson RD. Towards understanding the positive effect of playing violent video games on children's development. Procedia-Social and Behavioral Sciences 2012; 69: 780–789. [CrossRef]
55. Yıldırım A, Şimşek H. Sosyal Bilimlerde Nitel Araştırma Yöntemleri (Qualitative Research Methods in the Social Sciences). Ankara: Seçkin Yayınları; 2006
56. Kuss DJ, Louws J, Wiers RW. Online game addiction? Motives predict addictive play behavior in massively multiplayer online role-playing games. Cyberpsychologial Behavoir Social Network 2012; 15(9): 480-5. [CrossRef]
57. Shapira NA, Goldsmith TD, Keck JrPE, Khosla UM, McElroy SL. Psychiatric features of individuals with problematic internet use. Journal of Affective Disorders 2000; 57: 267-272. [CrossRef]
58. Young KS. Internet addiction: A new clinical phenomenon and its consequences. American Behavioral Scientist 2004; 48(4): 402-415. [CrossRef]
59. . Kalaycı Ş. Faktör analizi (Factor analysis). Kalaycı Ş, editor. SPSS Uygulamalı Çok Değişkenli Istatistik Teknikleri içinde. 3. Baskı. Ankara: Asil Yayıncılık; 2010; s. 321-334. PMCid:PMC3886057
60. Şencan H. Sosyal ve Davranışsal Ölçümlerde Güvenirlik ve Geçerlik (Reliability and Validity in Social and Behavioral Measurements) . Ankara: Seçkin Yayınları; 2005. PMCid:PMC2361864
61. Costello AB, Osborne JW. Dream Interpretation: As a Psychotherapeutic Technique. UK: Radcliffe; 2005.
62. Büyüköztürk Ş. Sosyal Bilimler için Veri Analizi El Kitabı (Manual of Data Analysis for Social Sciences). Ankara: Pegem Akademi; 2010.
63. Başol G. Eğitimde Ölçme ve Değerlendirme (Measurement and Evaluation in Education). Ankara: Pegem Akademi; 2013. PMCid:PMC3723155
64. Kaiser HF. The application of electronic computers to factor analysis. Educational and Psychological Measurement 1960; 20: 141-151. [CrossRef]
65. Cattell RB. The Scree test for the number of factors. Multivariate Behavioral Research 1966; 1(2): 629-637. [CrossRef]
66. De Vaus D. Analyzing social science data: 50 key problems in data analysis. Thousand Oaks, CA: Sage Publications; 2002.
67. Nunnally JC, Bernstein IH. Psychometric Theory. 3rd Edition. New York: MCGraw Hill; 1994.
68. Traub RE. Reliability for the Social Sciences: Theory and Applications. Thousand Oaks, CA: Sage Publications; 1994.
69. Durmuş B, Yurtkoru ES, Çinko M. Sosyal Bilimlerde SPSS'le Veri Analizi (Data Analysis with SPSS in Social Sciences). İstanbul: Beta Yayıncılık; 2011.
70. Başol G, Gencel IE. Yansıtıcı düşünme ölçeği'nin geçerliği ve güvenirliği: Bir ölçek uyarlama çalışması (The validity and reliability of the Reflective Thinking Scale: A scale adaption study). Kuram ve Uygulamada Eğitim Bilimleri 2013; 13(2): 929-946.
71. Hoeft, F., Watson, C. L., Kesler, S. R., Betttinger, K. E., & Reiss, A. L. (2008). Gender differences in the mesocorticolimbic system during computer game-playing. Journal of Psychiatric Research. 42(4), 253-8. [CrossRef]
72. Kim EJ, Namkoong K, Ku T, Kim SJ. The relationship between online game addiction and aggression, self-control and narcissistic personality traits. European Psychiatry 2008; 23: 212-218. [CrossRef]
73. Chang JH, Zhang H. Analyzing online game players: From materialism and motivation to attitude. Cyberpsychology & Behavior 2008; 11(6): 711-714. [CrossRef] http://dx.doi.org/10.1089/cpb.2007.0147
74. Rau PPL, Peng SY, Yang CC. Time distortion for expert and novice online game players. Cyberpsychology & Behavior 2006; 9(4): 396-403. [CrossRef]
75. Young KS. Understanding online gaming addiction and treatment issues for adolescents. American Journal of Family Therapy 2009; 37(5): 355–372. [CrossRef]