

Examination of the Associations between Digital Game Addiction, Abilities of Reading Mind in the Eyes and Alexithymia: An Adolescent Sample from Ordu Province

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Date of receipt: 08 February 2019

Date of accept: 26 March 2019

ABSTRACT

Objective: The aim of this study is to examine the relationships between digital game addiction, abilities of reading mind in the eyes and alexithymia personality characteristics.

Method: Six hundred and sixty-two adolescents between the ages of 15 and 17 from two secondary schools in Ordu Province (n = 358 females, 57%; n = 286 males, 43%) were included in the study. Digital game addiction scale for children (DGASFC), Child Form of Reading the Mind in the Eyes Test (Eyes Test) and 20 item Toronto alexithymia scale (TAS-20) were administered to participants. The scale scores of female and male participants were compared by independent sample t test. Correlations between the scales were analyzed by Pearson product moment correlation test. The predictive effects of skills of reading mind in the eyes, alexithymia, gender and age on the development of digital game addiction were evaluated by multivariate linear regression analysis.

Results: Digital game addiction scores of males were significantly higher than females. The scores of DGASFC were negatively correlated with the scores of Eyes Test and positively correlated with total scores of TAS-20 and its subscales' scores, significantly. Regression analysis revealed that the scores of Eyes Test, TAS-20 factor 1 and factor 3, and gender were significantly predict the digital game addiction levels.

Conclusions: The therapeutic interventions to improve abilities of reading mind in the eyes, identifying emotions, and empathic thinking skills may be beneficial for the adolescents which present with digital game addiction.

Key words: digital game addiction, abilities of reading mind in the eyes, alexithymia, adolescence

ÖZ

Dijital Oyun Bağımlılığı, Gözlerden Zihin Okuma Becerileri ve Aleksitimi Arasındaki İlişkinin İncelenmesi: Ordu İlinde Bir Ergen Örnekleme

Amaç: Dijital oyun bağımlılığı ile gözlerden zihin okuma becerileri ve aleksitimi kişilik özellikleri arasındaki ilişkinin incelenmesidir.

Yöntem: Ordu ilinden iki ortaöğretim kurumundan 15 ile 17 yaş aralığında 662 ergen (s= 358 kız, %57; s= 286 erkek %43) çalışmaya dahil edilmiştir. Değerlendirme araçları olarak Çocuklar İçin Dijital Oyun Bağımlılığı Ölçeği (ÇİDOBÖ), Gözlerden Zihin Okuma Testi-Çocuk Formu (GZOT-ÇF) ve 20 soruluk Toronto Aleksitimi Ölçeği (TAÖ-20) kullanılmıştır. Kız ve erkek katılımcılar arası ölçek puanları bağımsız örneklem t testi ile karşılaştırılmıştır. Ölçekler arası korelasyonlar Pearson momentler çarpımı korelasyon testi ile analiz edilmiştir. Gözlerden zihin okuma becerileri, aleksitimi, cinsiyet ve yaşın, dijital oyun bağımlılığı gelişimi üzerine yordayıcı etkileri çok değişkenli doğrusal regresyon analizi ile değerlendirilmiştir.

Bulgular: Erkeklerin dijital oyun bağımlılığı puanları kızlardan anlamlı oranda yüksek bulunmuştur. ÇİDOBÖ puanları, GZOT-ÇF puanları ile pozitif yönde, TAÖ-20 toplam ve alt ölçek puanları ile negatif yönde anlamlı korelasyonlar göstermiştir. Regresyon analizi, GZOT-ÇF, TAÖ-20 faktör 1 ve faktör 3 puanları ile cinsiyetin, dijital oyun bağımlılığı düzeylerini anlamlı ölçüde yordadığını göstermiştir.

Sonuç: Dijital oyun bağımlılığı ile başvuran ergenlerde, gözlerden zihin okuma becerilerinin geliştirilmesi, duyguların tanımlanması ve empatik düşünme becerisinin artırılmasına yönelik terapötik müdahaleler faydalı olabilir.

Anahtar Sözcükler: dijital oyun bağımlılığı, gözlerden zihin okuma becerileri, aleksitimi, ergenlik

INTRODUCTION

Today, with the advancement of computer, smart phone and internet technologies, the frequency of participation in digital games increases in adolescent age group. It has been reported that digital games have positive effects like increasing in entertainment, competition experiences with peers and social interactions, etc. on adolescents.¹ However, it has been reported that excessive engagement in digital games was related to impairments in interaction with family and friends, decrease in leisure time with qualified activities,² depression, low academic achievement, behavioral problems,³ sleep problems,⁴ muscle and skeletal system problems⁵ and headache.⁶ Internet game addiction is defined as a potential disorder in the third part of the DSM-5 (Diagnostic and Statistical Manual of Mental Disorders 5th Version).⁷ The rates of game addiction were found to be between 1.6% and 3% in Europe and 7.5% and 10% in Asia.⁸ Although the rates of game addiction in the females have been increased in recent years, males are still in a higher risk group in terms of game addiction.⁹

It is reported that the individuals who feel alone and have low social adaptation play the digital and online games in order to avoid negative affect and, they are at risk for developing the DGA (digital game addiction).^{10,11} It is reported that depressive and socially isolated individuals have low levels of self-worth, whereas their online self-worth levels are high.¹² Thus, depressive, socially isolated individuals may feel comfortable and secure when participating in interpersonal communication in online and digital environments.^{13,14} Aggression is also reported to be a risk factor for DGA development.¹⁵ It has been reported that aggressive individuals prefer active games,¹⁶ maintain their aggressive behavior patterns in violent digital games, gain points and levels with aggressive play, thereby they progress to the gameplay behavior in an addiction level.¹⁷ In addition, it was emphasized that the aggressive behavior pattern could easily increase anxious affect, which may limit the social interactions.¹⁸ Thus, aggressive individuals may start playing more often online games to increase their limited social interaction because of their low adaption and increased anxious affect, and progress to the DGA.¹⁹

Another psychological factor associated with internet, technology and game addictions may be alexithymia personality characteristic.^{20,21} Alexithymia is a personality trait characterized by difficulty in identifying and expressing emotions, extrovert cognitive characteristics and limited imagination.²² It has been reported that due to lack of empathy, individuals with alexithymia may experience problems in interpersonal relationships and social interaction and, may have high risk of social isolation.²³ Individuals with alexithymia personality characteristics are also reported to display mood and anxiety disorders,²⁴ obsessive and compulsive disorder,²⁵ behavioral addictions²⁶ and impulse control problems and aggressive behavioral patterns.²⁷

One of the issues that will be emphasized on the development of DGA is the abilities of theory of mind. An individual with good ability of theory of mind can make good projections about other people's thought processes and their emotional reactions to these processes.^{28,29} It has been reported that children with good abilities of theory of mind may have better social interaction with peers because of their positive affect.³⁰ The abilities of reading mind in the eyes evaluates the skills of reading emotion by focusing on eyes and mimics and is used to measure the abilities of theory of mind.³¹ It has been reported that low functionality in the abilities of reading mimic and emotion may be related to interpersonal conflicts³² and, behavioral problems.³³ Chen et al.³⁴ reported that there is a relationship between development of internet addiction and the skills of reading emotion.

The relationships between alexithymia personality characteristics and internet, technology and game addiction^{20,21} and the relationships

between low functionality in the abilities of reading emotion and in the skills of theory of mind, and internet addiction have been previously reported.³⁴ However, to the best of our knowledge, the number of studies investigating the relationships between alexithymia personality characteristics, the abilities of reading mind in the eyes and DGA are still limited. In the light of this data, the aim of this study is to examine the relationships between DGA, alexithymia and the abilities of reading mind in the eyes in adolescent age group.

METHOD

Participants and Procedure

The power analysis was applied to determine the number of female and male participants who should be included in the data analysis. As a result of the power analysis, it was understood that 32 participants from both females and males were sufficient for data analysis. Even though 32 female and male participants were sufficient, in order to increase the generalizability of the results 662 participants were obtained. The study included 662 adolescents ($n = 358$ females, 57%; $n = 286$ males, 43%) aged between 15 and 17 years from an Anatolian high school and a Science high school in Ordu Province. The mean age of the females was 15.79 ± 1.66 and of the males was 15.87 ± 1.35 . Before conducting the research, the Provincial National Education Directorate of Ordu was contacted and two public schools were determined according to the number of participants planned for the research. Then the school directorates were contacted. Initially, 670 participants were included. The exclusion criteria were determined as having a diagnose of autism spectrum disorder, learning disorder, mental retardation, visual and auditory problems. Informations about medical and psychiatric history were received from guidance services and families. There was not any participant excluded from the study because of having a medical and psychiatric history. This may be due to the fact that the participants were obtained from adolescents attending Anatolian high school and Science high school. The purpose of the research and the procedure were explained in detail to the participants and their families, and written informed consent was taken from them. The participants were given 45 minutes to fill the scales and the scales were filled in the classroom under the supervision of a researcher. Six participants (4 males, 2 females) refused to complete the study. The data could not be obtained from two female participants properly and as a result, the statistical analysis was conducted on 662 participants. Before conducting the study, consent was obtained from Istanbul Aydin University Clinical Research Ethics Committee.

Measures

Digital Game Addiction Scale For Children (DGASFC): The 24-item DGASFC with four sub-dimensions (extreme focus on digital game play and conflict, development of tolerance during game time and value given to the game, procrastination of individual and social tasks/assignments, psychological-physiological reflection of deprivation and plunge into play) was developed by Hazar and Hazar.³⁵ The scale is rated as five-point likert type. The scores between 73 and 96 indicates "addicted" groups and the scores between 97 and 120 indicates "highly addicted" groups. The lowest and highest scores can be obtained from the scale are 24 and 120. The scale was found to be valid and reliable for adolescent sample in Turkey and Cronbach's alpha coefficient was found to be 0.9.³⁵

Toronto Alexithymia Scale - 20 (TAS-20): TAS-20, developed by Bagby et al.³⁶, has been widely used in the evaluation of alexithymia throughout the world. The reliability and validity study of the scale on Turkish sample was carried out by Gulec et al.³⁷ Bolat et al.³⁸ reported that TAS-20 was valid and reliable for Turkish adolescent age group, and found that Cronbach alpha value as 0.78.³⁸ The scale, which is

rated as five-point Likert type, consists of 20 items and three factors. First factor is "difficulty in identifying feelings" second factor "difficulty in describing feelings" and third factor "externally-oriented thinking". The scores obtained from the scale can be between 20 and 100, and the scores above 59 on the scale indicate alexithymia.^{36,37}

Table 1. Comparison of DGASFC, Eyes Test, TAS-20 scale and subscale scores between genders

Scale	Groups	Mean	sd	t	p
Age	Female	15.79	1.66	-0.64	0.52
	Male	15.87	1.35		
DGASFC	Female	35.50	13.56	-10.91	<0.001
	Male	49.80	18.57		
DGASFC Factor 1	Female	9.90	4.25	-8.73	<0.001
	Male	13.52	5.89		
DGASFC Factor 2	Female	11.69	5.29	-11.74	<0.001
	Male	17.524	6.96		
DGASFC Factor 3	Female	8.21	3.46	-8.45	<0.001
	Male	11.01	4.67		
DGASFC Factor 4	Female	5.70	2.27	-8.97	<0.001
	Male	7.75	3.29		
Eyes Test	Female	21.03	2.65	2.15	0.032
	Male	20.45	3.95		
TAS-20 Total	Female	55.98	10.63	2.71	0.007
	Male	53.59	11.49		
TAS-20 Factor 1	Female	18.96	6.25	2.99	0.003
	Male	17.42	6.71		
TAS-20 Factor 2	Female	14.88	4.17	2.97	0.003
	Male	13.84	4.64		
TAS-20 Factor 3	Female	22.13	3.90	-0.63	0.526
	Male	22.34	4.13		

Independent sample t test, DGASFC: Digital game addiction scale for children, TAS-20: 20 item Toronto alexithymia scale, Eyes Test: Child Form of Reading the Mind in the Eyes Test, sd: Standart deviation.

Child Form of Reading the Mind in the Eyes Test (Eyes Test):

Eyes Test, which consists of 28 items, is a measurement tool that evaluates the ability of referring to the mental processes of the other individuals by looking at the eyes and mimics. In Eyes Test, developed by Baron-Cohen et al.,³¹ subjects are given a thought and emotion and asked to select the correct option from four black and white images. The scale has been shown to be valid and reliable in children over six years of age and adolescents in Turkey; and Girli³⁹ has calculated the Cronbach alpha value of Turkish Eyes Test as 0.72.

Table 2. Correlation analysis of DGASFC, Eyes Test and TAS-20 scales and subscales

	1	2	3	4	5	6	7	8	9	10
1. Eyes Test	1									
2. TAS-20 F1	009	-								
3. TAS-20 F2	-041	574**	-							
4. TAS-20 F3	-098*	124*	155**	-						
5. TAS-20 total	-046	861**	792**	496**	-					
6. DGASFC total	-121*	187**	140**	202**	239**	-				
7. DGASFC F1	-121*	188**	124*	199**	232**	930**	-			
8. DGASFC F2	-092*	171**	132*	142**	204**	921**	783**	-		
9. DGASFC F3	-105*	164**	137*	207**	225**	895**	800**	736**	-	
10. DGASFC F4	-137**	138**	108*	.211**	200**	839**	748**	686**	725**	-

Pearson product moment correlation test, DGASFC: Digital game addiction scale for children, TAS-20: 20 item Toronto alexithymia scale, Eyes Test: Child Form of Reading the Mind in the Eyes Test, F=factor, *p<0.05 **p<0.001.

Statistical Analysis

In order to analyze whether the data show normal distribution, the kurtosis and skewness values were calculated and due to the values were in the range of ± 1.5, the data were assumed to have a normal distribution. The scores of DGASFC, TAS-20 and Eyes Test of the male and female participants were compared with the independent samples t test. The correlations between scale scores was analyzed with Pearson product moment correlation test. The predictive effect of TAS-20 subscale scores, Eyes Test total scores, age and gender on DGASFC total scores were evaluated by stepwise multivariate linear regression analysis. Statistical significance levels were determined as p <0.05 and p <0.001 values.

RESULTS

There were no significant differences in terms of mean age of the male (15.87 ± 1.35) and the females participants (15.79 ± 1.66) (p>0.05). The males' total score of DGASFC (p <0.001) and TAS-20 (p = 0.007) were significantly higher than that of females. The males' scores of Eyes Test (p = 0.032) were significantly lower than that of females. Table 1 shows the statistical comparisons of the scores of the male and female participants in terms of DGASFC, TAS-20, Eyes Test scale and subscale scores and age.

Pearson product-moment correlation coefficients indicated that the total scores of DGASFC was negatively correlated with the total scores of Eyes Test (r=.239, p<0.001) and positively correlated with the total score of TAS-20 factor 1 (r = .187, p <0.001), factor 2 (r = .140, p <0.001), and factor 3 (r = .202, p <0.001) scores. There was no significant correlation between Eyes Test and TAS-20 total scores (p>0.05). The correlation coefficients between the scales are presented in Table 2.

DGASFC scores as dependent variables, and Eyes Test scores, TAS-20 sub-factor scores, gender and age as independent variables were included in multivariate linear regression analysis. The results indicated that Eyes Test scores (p = 0.035), TAS-20 factor 1 (p = 0.001) and factor 3 (p = 0.001) scores and gender (p = 0.001) significantly predict the level of DGA.

DISCUSSION

This research was carried out with 662 adolescents between the ages of 15 and 17 in two secondary schools in Ordu, and as a result, it was found that low abilities of reading mind in the eyes and alexithymia personality characteristics increased the risk development of DGA in adolescent population. In addition, in accordance with the literature,^{1,20,40} the levels of DGA were higher in males than in females.

There was no relationship between age and DGA.

Reading the mind in the eyes is an ability that allows one to evaluate the other individual's mental processes and related emotional reactions by following his/her eyes and mimics.^{31,41} Individuals with well-developed abilities of reading mind in the eyes will be able to adapt well in

the areas of interpersonal communication and social interaction, since they can give appropriate responses in social interactions based on the other's mental processes and emotional reactions.⁴² However, the risk of being exposed to exclusion and social isolation may be high for individuals with low abilities of reading mind in the eyes. Thus, it can be hypothesized that due to the fact that digital games can increase social communication and bring respect in online environments after obtaining success, adolescents with low abilities of reading mind in the eyes can play digital games frequently and they can progress to addictions. This information may explain our results. In addition, due to social adjustment problems, individuals with low abilities of reading mind in the eyes may have high levels of insecurity and worthlessness, and may experience depression and anxiety problems.⁴³ It has been reported that there was a relationship between depression and anxiety problems and DGA.¹⁵ Positive emotions derived from digital games can be used as a coping mechanism with internalizing problems, and this can progress to play digital games at addiction levels.

Table 3. The predictive effect of TAS-20 sub-factors and Eyes Test scores, gender and age on digital game addiction

Model 4	R	R ²	Adapted R ²	B	β	t	p	%95 C.I
Dependent variable: DGASFC								
Constant	0.427	0.382	0.377	10.831		1.702	0.074	-1.040 22.703
TAS-20 F1				0.504	0.187	5.158	<0.001	0.312 0.696
TAS-20 F3				0.765	0.175	4.806	<0.001	0.452 1.077
Eyes Test				-0.406	-0.077	-2.117	0.035	-0.783 -0.03
Gender				9.098	0.324	8.995	<0.001	7.112 11.084

Multivariate linear regression analysis; stepwise; Excluded variables: TAS-20 F2, age.

C.I: Confidence interval; TAS-20: 20 item Toronto alexithymia scale, Eyes Test: Child Form of Reading the Mind in the Eyes Test.

In this study, it was found that alexithymia personality characteristics also increased the risk of development of DGA. Individuals with alexithymia may exhibit aggressive behaviors due to weakness in empathic thinking skills.⁴⁴ Individuals who exhibit aggressive behavior patterns may have high predisposition to aggressive games in digital environment.¹⁷ Considering the popularity of multiplayer violence/war related online games among adolescents and the risk of addictions since such games require a long time across the screen,⁴⁵ it can be better understood that the relationship between alexithymia and DGA. In addition, it has been reported that since individuals with alexithymia experience problems in identifying and expressing emotions, and empathic thinking, their interpersonal communication skills are low compared to general population.²² Digital games may be preferred by adolescents with alexithymia, they can allow them to communicate with people through the online environment but not by face to face.^{46,47}

In conclusion, in accordance with the expectations in our research, it was observed that low abilities of reading mind in the eyes, alexithymia personality characteristics and male gender are related to increased risk of DGA development. In adolescents presenting with DGA and showing alexithymia personality characteristics, we suggest that providing an appropriate therapeutic environment to recognize and express their feelings may decrease negative affect and may be effective in treatment of DGA. In addition, intervention programs aiming to increase empathic thinking and to improve abilities of recognition of other people's mental processes and emotional reactions may increase social adjustment and may decrease internalizing problems in adolescents with low skills of reading mind in the eyes or alexithymia personality characteristics. Thus, this intervention programs

may increase the success in DGA treatment. Such programs can be performed during the clinical interview by using pictures that show human mimics and faces, and reflect certain emotions. Additionally by re-evaluating the individual's real life experiences in the therapeutic environment and by trying to develop empathic thinking by considering these experiences in clinical field.

Limitations

The cross-sectional nature of the study prevents definitive inferences about causality. Longitudinal studies may be helpful in the development of our knowledge in this issue. In addition, the sample of the study consists of adolescents in Ordu province. Studies in different regions may help us to better understand the impact of sociodemographic factors on outcomes. Our study was conducted on adolescents aged between 15 and 17 years. Studies in childhood and early adolescence age group may be helpful in increasing our knowledge about the relationships between variables researched in different age groups. It was reported that attention deficit and hyperactivity disorder (ADHD) is significantly associated with the increased risk of game addiction.⁴⁸ The diagnosis of ADHD has not been differentiated and, considering the risk of influencing the results, this is also a limitation of this study.

However, we think that the current research is still useful for clinicians and academicians because to the best of our knowledge it is the first research focusing together on the relationship between the

variables of DGA, alexithymia personality characteristics and abilities of reading mind in the eyes.

Conflict of interest

The authors state that there is no conflict of interest.

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