RESEARCH ARTICLE

The relationships between the digital game addiction, alexithymia and metacognitive problems in adolescents

Ergen yaş grubunda dijital oyun bağımlılığı, aleksitimi ve üst biliş problemleri arasındaki ilişkinin incelenmesi

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SUMMARY

Objective: Digital game addiction has become a diffuse problem among adolescents. The aim of this study is to investigate the relationships between digital game addiction, alexithymia personality traits and metacognitive problems in adolescents. **Method:** 664 adolescents (51% male, n=339, 49% female, n=325) from three secondary school in Istanbul were included in this study. The mean age of male and female participants was 12.89±1.29, and 12.58±1.53 respectively. Digital game addiction scale for children (DGASFC), 20 item Toronto alexithymia scale (TAS-20), and the metacognition questionnaire for children and adolescents (MCQ-C) were applied to participants. The correlation coefficients between the scales were analyzed with Spearmen's rank order correlation test. The predictability of TAS-20 and MCQ-C subscale scores, gender and age on the status of digital game addiction was tested with binary logistic regression analysis. **Results:** There were positive correlations between DGASFC and TAS-20 total (r=.275), factor 1 (r=.250), factor 2 (r=.159), factor 3 (r=.175) scores, and MCQ-C total (r=.180) and factor 1 (r=.109) scores. Results of the binary regression analysis revealed that TAS-20 factor 1 and factor 3, and MCQ-C factor 1 scores, and the gender predict the status of digital game addiction, significantly. **Discussion:** It is suggested that addressing the problems of identifying and expressing the emotions, and metacognitive problems may increase the treatment success of the adolescents presenting with digital game addiction.

Key Words: Adolescent, game addiction, alexithymia, metacognition

ÖZET

Amaç: Dijital oyun bağımlılığı, ergenler arasında yaygın bir problem haline gelmiştir. Bu araştırmanın amacı ergen yaş grubunda dijital oyun bağımlılığı, aleksitimi kişilik özellikleri ve üst biliş sorunları arasındaki ilişkinin incelenmesidir. **Yöntem:** İstanbul'da üç orta okuldan 664 ergen (%51 erkek, s=339, % 49 kadın, s=325) çalışmaya dahil edilmiştir. Erkek ve kadın katılımcıların yaş ortalamaları sırasıyla 12.89±1.29 ve 12.58±1.53'dü. Katılımcılara çocuklar için dijital oyun bağımlılığı ölçeği (ÇİDOBÖ), 20 soruluk Toronto aleksitimi ölçeği (TAÖ-20) ve çocuklar için üst biliş ölçeği (ÜBÖ-ÇE) uygulanmıştır. Ölçekler arası korelasyonlar Spearman'ın sıralama korelasyon katsayısı testi ile analiz edilmiştir. TAÖ-20 ve ÜBÖ-ÇE alt ölçek puanları, cinsiyet ve yaşın dijital oyun bağımlılığı olma durumu üzerine öngörücü etkisi ikili durum lojistik regresyon analizi ile değerlendirilmiştir. **Bulgular:** ÇİDOBÖ ve TAÖ-20 toplam (r=.275), faktör 1 (r=.250), faktör 2 (r=.159), faktör 3 (r=.175) puanları ve de ÜBÖ-ÇE toplam (r=.180) ve faktör 1 (r=.109) puanları arasında pozitif yönde korelasyonlar bulunmuştur. İkili durum regresyon analizi sonuçları TAÖ-20 faktör 1, faktör 3, ÜBÖ-ÇE faktör 1 puanları ve cinsiyetin dijital oyun bağımlılığı olma durumunu anlamlı ölçüde öngördüğünü göstermiştir. **Sonuç:** Duyguları tanımlama ve ifade etme sorunlarının ve üst biliş problemlerinin ele alınmasının dijital oyun bağımlılığı ile başvuran ergenlerde tedavi başarısını arttırabileceği kanaatine varılmıştır.

Anahtar Sözcükler: Ergen, oyun bağımlılığı, aleksitimi, üst biliş

(Turkish J Clinical Psychiatry 2019;22:254-259)

DOI: 10.5505/kpd.2019.16769

The arrival date of article: 04.12.2018, Acceptance date publication: 28.12.2018

INTRODUCTION

Nowadays, digital games are widely played around the world, and adolescents are particularly prone to have digital game addiction (DGA) (1). In European countries, the rates of DGA of the adolescents were found to be between 0.6 % and 1.6% (2). The rate of DGA of the children and adolescents was 11.9 % for males and 2.9% for females, with an average of 8.5% in USA (3). There are several identified emotional and psychosocial risk factors in the development of DGA. It has been reported that emotional problems, loneliness, low self-esteem and low social functioning increase the risk of DGA (4). Additionally, over-engagement in digital games have negative consequences such as low academic success, increased rates of depression and anxiety disorders, deterioration of interpersonal relations, impulsiveness and delinquency (3,6,7).

Alexithymia is a personality trait that is emphasized as a risk factor in the development of technology, internet and game addiction (1,10), as well as development of many psychiatric disorders such as somatoform disorders (11), depression, anxiety disorders (12), impulse control disorders (13), obsessive and compulsive disorder (14). The main characteristics of alexithymia are problems in describing and expressing of emotions. Other basic features of alexithymia may be considered as externally oriented cognitive style, limited imagination and lack of empathic thinking (15,16). Because of these type of limitations, individuals with alexithymia experience serious difficulties in establishing friendship relationships and usually have low social functioning (17). Gaetan et al. (1) suggested that, as alexithymia usually presents with flat emotional profile, and the virtual environment facilitates emotion regulation, for adolescents with alexithymia, online gaming may serve an attempt to control the alexithymic characteristics.

Another issue that may be emphasized in the development technology, internet, and online gaming addiction is the metacognitive abilities. Individuals with good metacognitive abilities can monitorize their own cognitive processes and identify and correct their own cognitive distortions and misinterpretations (18). It has been reported that metacognitive problems play a role in the development of several psychiatric disorders such as substance addiction (19), internet and technology addiction (20), obsessive-compulsive disorder (21), and mood and anxiety disorders (18). It is also stated that there is a relationship between the metacognitive problems and the development of DGA (22). Spada and Caselli (22) suggested that positive metacognitions (e.g. online gaming reduces my negative feelings), and negative metacognitions (e.g. once I start online gaming I cannot stop) about online gaming are associated with the DGA.

Previous research reported that alexithymic personality traits (20), and metacognitive problems (22) play a role in the development of technology, internet and DGA. However, to the best of our knowledge, in adolescent population there is a limited number of study in the literature examining the relationship of these topics. Considering the increasing time spent of adolescents in online games, and psychological, social and physical negative consequences of DGA (23), this study aimed to investigate the relationships between alexithymia, metacognition problems and the DGA in adolescents.

METHOD

Participants and Procedure

The power analysis was performed. The results of the power analysis indicated that minimal required number of the both female and male participants were 47. The study included 664 adolescents (51% male, n = 339; 49% female, n=325) from 3 secondary schools (two state schools, and one private school) in Küçükçekmece, İstanbul. The schools were determined according to the permission of Istanbul Provincial Directorate of National Education. The mean age of the girls was 12.58± 1.53 and the mean age of the males was 12.89± 1.29. The ethics committee permission was obtained from İstanbul Aydın University Clinical Ethics Committee. Initially, 682 adolescents were included in this study. According to the data obtained from the parents and department of psychological counseling and guidance services of the

schools, the participants who were diagnosed with mental retardation, learning disorder, and pervasive developmental disorder, and who had visual and hearing disabilities and had poor reading and writing skills were excluded from the study due to the possibility of having problems in understanding and responding the scales correctly. So, eight adolescents were excluded due to neurodevelopmental problems and disabilities. The purpose of the study and the procedure were explained in detail to the participants and their families, and the written informed consent was obtained from both parents and adolescents. The participants completed the scales under the supervision of a researcher in their classrooms. Two adolescents wanted to leave the study during the procedure, and eight adolescents were excluded from the study because of insufficient data. Finally, the statistical analysis was performed on 664 adolescents.

Instruments

Digital game addiction scale for children (DGAS-FC): The scale was developed by Hazar and Hazar (24) and contains four subscales (excessive focusing on playing and conflict, tolerance and excessive value about playing, delay in tasks and home works, deprivation) and 24 questions. DGASFC is a five-point Likert type scale, and minimum and maximum scores can be 24 and 120. The scores between 73 and 96 indicates "addiction to digital games" and between 97 and 120 indicates "highly addicted to digital games". The validity and reliability study of the scale was performed on Turkish children and adolescents aged between 10 and 14 years and Cronbach's alpha value was found as 0.90 (24).

20 item Toronto alexithymia scale (TAS-20): TAS-20 is developed by Bagby et al. (8) and is a widely used scale for evaluating alexithymia all over the world. The scale contains 20 questions and is rated as five-point Likert type. It has three subscales: difficulty in identifying feelings (factor-1), difficulty in describing feelings (factor-2), and externally-oriented thinking (factor-3). TAS-20 was adapted to Turkish by Güleç et al. (9). Bolat et al. (25) reported that the scale could be used in the adolescent population. The scores obtained from the scale can be between 20 and 100, and the scores ≥59 on the scale indicate alexithymia (9). The Cronbach's alpha value of TAS-20 was found as 0.78 in adolescent population (25).

The metacognition questionnaire for children and adolescents (MCQ-C): MCQ-C was developed by Bacow et al. (26) and evaluates metacognition problems of the children and adolescents. The Turkish validity and reliability study was conducted by Irak (27). The Cronbach alpha value of the MCQ-C on Turkish children and adolescent population was found as 0.73. The four-point Likert-type scale includes four subscales (positive meta-worry, negative meta-worry, superstitious, punishment and responsibility beliefs, cognitive monitoring) and 24 questions. The lowest and highest scores that can be obtained from the scale are 24 and 96, respectively. Higher scores indicate more severe metacognitive problems.

Statistical Analysis

Those who received a score of ≥73 from the DGASFC scale considered as the addicted group, and those who scored <73 points considered as the non-addicted group. Kolmogorov-smirnov test revealed that the data was not normally distributed ($p < 0.05$). The mean scores, standard deviations of the scales were calculated. Correlation coefficients between the DGASFC, TAS-20 and MCQ-C scores were analyzed by Spearman's rank correlation test. Backward binary regression analysis was performed in order to explore whether subscale scores of TAS-20, MCQ-C, age and sex were related to DGA. The level of statistical significance was accepted at <0.05 and <0.001 levels.

RESULTS

Total scores of DGASFC, TAS-20, MCQ-C of the females were 42.83±16.41, 49.70± 10.08, 57.42±10.99; and of the males were 52.29±18.21, 50.53±10.55, 56.35±10.37, respectively. Scale and subscale mean scores and standard deviations of females and male participants are presented in Table 1.

There were positive correlations between DGAS-

Table 1: Mean scores and standard deviations of the DGASFC, TAS-20, and MCQ-C of the participants

	Gender	M	SD
DGASFC	Female	42.83	16.41
	Male	52.29	18.21
TAS-20 F1	Female	15.94	5.95
	Male	16.08	6.38
TAS-20 F2	Female	12.79	4.01
	Male	12.60	4.24
TAS-20 F3	Female	20.98	4.16
	Male	21.84	3.79
TAS-20 total	Female	49.70	10.08
	Male	50.53	10.55
MCQ-C F1	Female	10.53	3.67
	Male	11.12	4.17
MCQ-C F2	Female	15.10	4.45
	Male	15.64	4.58
MCQ-C F3	Female	14.89	4.36
	Male	14.29	4.57
MCQ-C F4	Female	16.99	4.01
	Male	16.51	4.39
MCQ-C total	Female	57.42	10.99
	Male	56.35	10.37

M: Mean, SD:Standart Deviation, DGASFC= Digital game addiction scale for children TAS-20=20 item Toronto alexithymia scale; MCQ-C =The metacognition questionnaire for children; F1:Factor1, F2:Factor2, F3:Factor3, F4:Factor 4.

FC scores and TAS-20 total (r=.275), TAS-20 factor 1 (r=.250), factor 2 (r=.159), factor 3 (r=.175) scores, significantly (p<0.001). There were positive correlations between DGASFC scores and MCQ-C total (r=.109, p <0.05), and MCQ-C factor 1 (r=.180, p<0.001) scores, significantly. Correlation coefficients between the DGASFC scores, and TAS-20, MCQ-C total and subscale scores are presented in Table 2.

The prevalence of DGA in adolescents was 9.5 % (n=63). The addiction rates were found as 5.2 % for females (n=17), and 13.5 % (n=46) for males.

Binary logistic regression analysis results indicated that, TAS-20 factor 1 (o.r= 1.080, p <0.001) and factor 3 (o.r = 1.075, p = 0.044) scores, and gender (o.r = 0.404, p = 0.001) significantly predict the status of digital game addiction. There were no significant predictive effects of age, TAS-20 factor 2, MCQ-C factor 2, factor 3 and factor 4 total scores on the status of digital game addiction (p>0.05). The results of the backward binary logistic regression analysis are presented in Table 3.

DISCUSSION

The results of this study indicate that difficulty in identifying emotions and excessive externally-oriented thinking in alexithymia, and positive meta-worry problems increase the risk of DGA in early adolescence. We found that the prevalence of DGA were 5.2 % for females, and 13.5 % for males. Consistent with the literature (6,28), the results revealed that being male predicts the development of DGA. In our study, age did not have a significant effect on the status of DGA. However, it should be considered that our sample includes only adolescents between 12-14 years of age, and we suggest that this may limit the effect of age on the status of DGA.

Difficulties in recognizing emotions may lead the individuals to problems in understanding his/her own negative affect, and the cognitive processes related to negative affect (29). The individuals, who do not have sufficient comprehension of negative affect and its revealing cognitive processes, may have more inclination to several mental disorders such as anxiety disorders, depression and beha-

Table 2: Correlation analysis of the DGASFC total scores, and MCQ and TAS-20 total and subscale scores.

DGASFC	TASF1	TASF2	TASF3	MCQF1	MCQF2	MCQF3	MCQF4	MCQ-t	TAS -t
-	.250**	.159**	.175**	.180**	.073	.082	.014	.109*	.275**
	-	.586**	.034	.088*	.206**	.152**	.038	.179**	.852**
		-	.051	.022	.187**	.120*	.029	.131*	.771**
			-	.022	.047	.053	.178**	.101*	.448**
				-	.005	.105*	.074	.390**	.057
					-	.544**	.268**	.720**	.192**
						-	.385**	.796**	.125*
							-	.647**	.040
								-	129*
									-

Spearman's rank order correlation test, DGASFC = Digital game addiction scale for children; TAS-t=Toronto alexithymia scale total scores; MCQ-t= The metacognition questionnaire total scores; F1: Factor 1, F2: Factor 2, F3: Factor 3, F4: Factor 4,* p<0.05, ** p<0.001, bold: statistically significant

Table 3: Predictive effects of alexithymia, metacognition problems, gender and age on the status of digital game addicton

Step 6 Addicted: (9.5 %, n=63) Non addicted (91.5 %, n=601)	B	Wald	S.E	O.R (Exp B)	p	% 95 C.I (Low-High)
Constant	-6.348	38.882	1.018	0.002	<0.001	
TAS-20 F1	0.077	12.485	0.022	1.080	<0.001	1.035-1.128
TAS-20 F3	0.072	4.055	0.036	1.075	0.044	1.002-1.153
MCQ-C F1	0.131	16.586	0.032	1.339	<0.001	1.071-1.213
Gender (categorical)	-0.907	8.740	0.307	0.404	0.003	0.221-0.737

Backward binary logistic regression analysis.
Model 6; Excluded variables: Age, TAS-20 F2; MCQ-C F2, F3, F4;
DGASFC= Digital game addiction scale for children, TAS-20: 20 item Toronto alexithymia scale; MCQ-C= The Metacognition questionnaire for children and adolescents. F1: Factor 1, F2: Factor 2, F3: Factor 3, F4: Factor 4.*
O.R: odds ratio, C.I= confidence interval, p<0.05, ** p<0.001.

vioral problems (17). Digital games may bring a sense of strength, success and pleasure that are difficult to reach in real life. So, digital games may serve as a facility to improve the negative affect that may be seen in depression and anxiety disorder frequently. These data may explain the increased risk of DGA in adolescents who experience problems in recognizing the emotions. Adolescents with anxiety disorders have also the increased risk of introversion and social isolation (30). We suggest that digital gaming may play a compensatory role in the situation of social dysfunction and concomitant negative affect, and the individual with high anxiety levels may proceed to DGA. Impulse control disorders have also been reported to increase the risk of game addiction (3). The inability to express feelings which is the one of essential features of alexithymia may increase the risk of DGA by increasing impulse control problems in adolescents (10) and this may explain our results. It was reported that significant rate of adolescents play war and adventure games (31). Impulse control problems may especially be important in developing DGA about those type of aggressive games. In order to improve our knowledge about this topic, further studies should be performed about the relationships between impulse control problems and aggressive games.

In our study, it was found that positive metacognitive problems increase the risk of DGA. Positive metacognitive problems include the cognitive processes and beliefs point out that worrying is a good condition, and will bring benefit in emotional, academic and social field (e.g. “If I worry about something, I'll have less problems in the future”, “Being worried helps me solve my problems”). This situation may prevent the individual from developing a solution for the negative emotions such as anxiety and stress, and the individual can progress to DGA as the severity and duration of negative affect prolongs. In addition, positive metacognition problems may also lead to an exaggeration in affirming consequences of game addiction, as “spending more time on games makes me feel good”, “if I play more, I will have more friends and I will be less bored”. This information may explain the relation between DGA and positive metaworrying problems in adolescents revealed by our study results.

Our study should be considered with its limitations. The cross-sectional nature of our study does not provide any clear cause-and-effect relationship. In addition, our study was conducted on adolescents aged between 12 and 14 years due to the validity of the DGASFC in adolescents under 14 years of age. Research in different age groups should contribute to our knowledge in this issue. Nevertheless, to the best of our knowledge, our study is also the first one in the international literature which focuses on these issues altogether. Therefore, we believe that it will make a significant contribution to the literature.

CONCLUSION

The results of our study suggest that the therapeutic interventions for identification and expression of the negative feelings in the adolescents with DGA may provide positive results in treatment. So, we suggest that providing the adolescent a secure therapeutic environment to explore and express his/her stress, anxiety or depressive feelings will improve the results of the treatment in DGA. Additionally, dealing with metacognitive problems in the therapeutic process may increase treatment success. For example, after revealing the cognitive

problems such as “if I play more, I will have more friends”, the clinicians may ask the question “let’s think about your thoughts, yes you may have some point. However, I wonder can you have more friends if you make plan about the time limit of playing the digital games.”

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