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ARAŞTIRMA / RESEARCH

Internet addiction among adolescents with attention-deficit/hyperactivity disorder

Dikkat eksikliği/hiperaktivite bozukluğu olan ergenlerde internet bağımlılığı

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Abstract

Purpose: The aim of the present study was to evaluate the relationship between Internet addiction (IA) and attention-deficit/hyperactivity disorder (ADHD) among adolescents.

Materials and Methods: The study was conducted with adolescents aged 12–17; ADHD group consisted of 100 children were diagnosed with ADHD and the control group of the study consisted of 95 children who did not have any psychiatric diagnosis. A total of 195 adolescents completed the Young Internet Addiction Scale (YIAS) and were assessed for ADHD symptoms. Personal Information Questionnaire was used to obtain information about characteristics of internet usage.

Results: The average YIAS score of ADHD group is 30.97±17.74 and found to be significantly higher than the control group. The most preferred website by the ADHD group is computer game sites (35%). ADHD group prefer to play adventure games mostly (27%)There is no statistically significant difference between the groups in terms of parent's control rate of internet usage, disrupting effect of internet usage on daily activity, rate of negative effects of internet usage on family relations and friendship relations and effects of internet usage on eating and sleeping habits.

Conclusion: As we know from previous studies, the association between IA and reward deficiency is also related with the high frequency of comorbid ADHD but our results are incompatible with the literature related to internet addiction and excessive use of the internet. It is considered that prospective longitudinal studies with larger groups are needed.

Keywords: Attention deficit/hyperactivity disorder, Internet addiction, adolescent, comorbidity

Öz

Amaç: Bu çalışmanın amacı, ergenler arasında İnternet bağımlılığı (IA) ile dikkat eksikliği/hiperaktivite bozukluğu (DEHB) arasındaki ilişkiyi değerlendirmektir.

Gereç ve Yöntem: Çalışma 12-17 yaş arası ergenler ile yapıldı; DEHB grubu 100 çocuktan, DEHB tanısı almış, çalışmanın kontrol grubu ise herhangi bir psikiyatrik tanı konmamış 95 çocuktan oluşmaktadır. Toplam 195 Ergen Genç İnternet Bağımlılığı Ölçeğini (YIAS) tamamlamış ve DEHB belirtileri için değerlendirilmiştir. İnternet kullanımının özellikleri hakkında bilgi edinmek için Kişisel Bilgi Anketi kullanılmıştır.

Bulgular: DEHB grubunun ortalama YIAS skoru 30.97 ± 17.74 olup kontrol grubundan anlamlı olarak yüksek bulundu. DEHB grubunun en çok tercih ettiği internet sitesi bilgisayar oyun siteleridir (% 35). DEHB grubu çoğunlukla macera oyunu oynamayı tercih etmektedir (% 27). Gruplar arasında ebeveynlerin internet kullanımı kontrol oranı, internet kullanımının günlük aktivite üzerindeki etkisinin bozulması, internet kullanımının aile ve arkadaş ilişkileri üzerindeki olumsuz etkisi açısından istatistiksel olarak anlamlı bir fark yoktur. Aynı şekilde internet kullanımının yeme ve uyku alışkanlıkları üzerinde de olumsuz bir etkisi saptanmamıştır.

Sonuç: Daha önceki çalışmalardan da bildiğimiz gibi, IA ile ödül eksikliği arasındaki ilişki de yüksek eşlik eden DEHB sıklığı ile ilişkilidir ancak sonuçlarımız internet bağımlılığı ve aşırı internet kullanımı ile ilgili literatürle uyumlu değildir

Anahtar kelimeler: Dikkat eksikliği / hiperaktivite bozukluğu, İnternet bağımlılığı, ergen, komorbidite.

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INTRODUCTION

Problematic internet use or internet addiction (IA) are terms most commonly used when referring to loss of control over or maladaptive patterns of internet use leading to clinically significant impairment or distress[1,2]. The high heterogenity makes it difficult to define these behaviors and other terms have been used to describe this phenomenon include 'compulsive internet use', 'pathological internet use' and 'internet dependency'[3]. Studies suggest that overall prevalence of IA in adolescents ranges between 2% and 18%[4,5]. There is significant association between IA and Attention Deficit and Hyperactivity Disorder (ADHD) symptoms in adolescents[6]. Furthermore, IA is frequently related to psychiatric disorders and ADHD is the most common psychiatric disorder among adolescents with IA[7]. The presence of psychiatric comorbidities may have negative impact on psychosocial functioning and treatment outcome for IA. Several researchers have tried to construct diagnostic criteria for IA. There was no consensus on IA diagnostic criteria until the American Psychiatric Association (APA) proposed the Internet Gaming Disorder (IGD) in Section III of DSM-5 in 2013 as a condition for further study[8]. Heterogenity of internet use includes a variety of activities such as gaming, cybersex, downloading, social networking and gambling. Addiction to specific internet activities make it difficult to identify a distinct pathophysiology and it has been claimed that the term 'internet addiction' should be replaced by addictions to specific internet activities[9]. DSM-5 proposed the diagnostic criteria of IGD to define addiction to Internet gaming but it should be considered that IGD is different concepts from IA[8]. According to the lack of reward hypothesis, individuals who do not provide enough satisfaction with natural rewards (water, food, sexuality) turn to the substances and behaviors that stimulate the reward path[10]. It is known that internet use is a quick reward with a short delay providing more reward seeking and behavioral motivation wich impulsivity is seen as a risk factor. Impulsivity can be seen as a major factor contributing to substance use disorder as in ADHD and it has been proposed that impulsivity is involved in vulnerability to substance addiction among individuals with ADHD[11, 12, 13,14]. In terms of IA and ADHD coexistence the adverse influence of ADHD on social relationships that persist into adolescence and internet use can provide social support. Some researchers argued that there is a relationship between social skills deficits and IA in adolescents with ADHD[15]. In the light of increasing evidence of strong relationship between IA and ADHD, and both previous cross-sectional and prospective studies, it can be said that adolescents diagnosed with ADHD are under a higher risk of IA than those without ADHD.

In our study, we aimed to investigate whether there is a significant difference between the levels of computer game addiction in children with and without diagnosis of ADHD. The presence of psychiatric comorbidities may have further impact on psychosocial functioning and treatment outcome for IA and this highly heterogeneous spectrum of addictive behavior related to internet activities deserves further research.

MATERIALS AND METHODS

Participants

Participants were recruited from a clinical sample of adolescents aged 12–17 years who were consecutively referred to our Child and Adolescent Psychiatry outpatient clinic in Haydarpaşa Numune Training and Research Hospital. The study sample for the ADHD group was consisted of 100 children diagnosed with ADHD for first time and free from any psychiatric treatment. Adolescents with comorbid any psychiatric disorders like depression, anxiety disorders, bipolar and related disorders, obsessive and compulsive disorders and related disorders, schizophrenia, autism spectrum disorder and the related diagnosis of social communication disorder, mental retardation and substance addiction were excluded from the study. The control group of the study consisted of 95 children aged between 12 and 17 years who consecutively referred to the same clinic with any psychiatric complaints and decided that they have any significant psychiatric diagnosis after psychiatric examination.

Procedure

Comprehensive information obtained from a clinical examination which included interviews with both youth and parent. Written informed consent about the study was signed by parent for each adolescent. Adolescents and their families were informed that they have the right to withdraw from the study if

they wanted to do so. All participants examined by same child and adolescent psychiatrist. ADHD diagnose was based on the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V; APA, 2013) criteria (18). The personal information questionnaire developed for this research and Young's Internet Addiction Scale were applied to all 195 adolescents.

Measures

Young's Internet Addiction Scale (YIAS)

The YIAS is a self-report questionnaire composed of 20 questions with a 5-point Likert scale ranging from 1 (rarely) to 5 (always). The scale was translated and adapted to Turkish language by Bayraktar[16,17]. The 20 items of the YIAS are calibrated, with scores ranging from 20 to 100, with higher scores reflecting a greater tendency toward addiction. Three types of internet use were identified; IA, limited symptoms and no symptoms. The corresponding scores were; ≥80, 50–79 and <50, respectively. Cut-off points of the YIAS may differ from one country to another based on the internet use style of the culture. The cut-off point of the Turkish YIAS was reported as ≤ 80. The internal consistency of the Turkish YIAS is 0.91.

Personal Information Questionnaire

The personal information form prepared by researchers, in order to learn the sociodemographic informations of the participants. The participants were asked to provide their information about the participant's level of class, gender, family internet usage characteristics (time spent at internet, places where the internet is used, purposes of internet usage, most prefered computer games and websites they used).

Statistical analysis

IBM SPSS Statistics 22 for statistical analysis (SPSS IBM, Turkey) programs were used to analyze data. The convenience of the parameters to normal distribution was evaluated by Shapiro Wilks test. In the comparison of two groups of the parameters which are normally distributed in the comparison of the quantitative data, as well as the descriptive statistical methods (mean, standard deviation, frequency) Student t-test was used. Chi-square test, fisher exact test, fisher freeman halton test and continuity (Yates) correction were used to compare qualitative data. Significance was evaluated as $p < 0.05$.

RESULTS

82 (42.3%) girls and 112 (57.7%) boys were included in the study. 51.3% of the participants consitituted ADHD group(n=100). The rest of 195 participants (48.7%) consisted control group(n=95). The proportion of adolescents aged 12-14 years in the ADHD group (%69.7) is higher than the control group (p=0.022). Sociodemographic variables of the sample are seen in Table 1.

Mean YIAS score of ADHD group was 30.97±17.74 points and significantly higher than control group (p=0.044). Rate of getting disciplinary punishment during the lifetime at hyperactivity group was found to be significantly higher than the control group (%32 vs %12.6 p: 4,000). There was no statistically significant difference between the groups in terms of school achievement, distribution of activities of leisure time, rates of having a mobile phone, distribution of places of residence. Rate of having an internet connection in mobile phone was significantly lower in ADHD group (%70.1 vs %83.2) (Table 1).

There was no statistically significant difference between groups in terms of having a computer at home and internet usage rates (p>0.05). Rate of using internet for 9 years and over, the rate of using internet at home and spending 5-10 hours times per week on internet were found to be statistically lower in ADHD group (p<0.05). General characteristics of computer and internet use among groups shown at Table 2.

ADHD group had a significantly higher rate of using internet "always" to play games than the control group (19% vs 4.2%) Children with ADHD are always more likely to use the internet to play games than the control group (p=0.001). The rates of using the internet mostly for non-purposeful use, using for watching videos, using for chatting, using to enter social networking sites, and using for studying / doing research are lower in the ADHD group compared to the control group (Table 3).

Table 1. General characteristics of groups.

		ADHD group	Control group	Total
		n (%)	n (%)	n (%)
YIAS Scores		30.97±17.74	26.37±13.85	28.73±16.09
Age	12-14	69 (69.7%)	51 (53.7%)	120 (61.9%)
	15-17	30 (30.3%)	44 (46.3%)	74 (38.1%)
Gender	Female	21 (21.2%)	61 (64.2%)	82 (42.3%)
	Male	78 (78.8%)	34 (35.8%)	112 (57.7%)
School Grade	5	4 (4%)	0 (0%)	4 (2.1%)
	6	13 (13.1%)	0 (0%)	13 (6.7%)
	7	15 (15.2%)	16 (16.8%)	31 (16%)
	8	20 (20.2%)	33 (34.7%)	53 (27.3%)
	9	22 (22.2%)	14 (14.7%)	36 (18.6%)
	10	15 (15.2%)	30 (31.6%)	45 (23.2%)
	11	8 (8.1%)	2 (2.1%)	10 (5.2%)
	12	2 (2%)	0 (0%)	2 (%1)
Disciplinary penalty	Yes	31 (32%)	12 (12.6%)	43 (22.4%)
	No	66 (68%)	83 (87.4%)	149 (77.6%)
School performance	Very good	9 (9.3%)	12 (12.6%)	21 (10.9%)
	Good	30 (30.9%)	43 (45.3%)	73 (3%8)
	Average	49 (50.5%)	34 (35.8%)	83 (43.2%)
	Bad	6 (6.2%)	6 (6.3%)	12 (6.3%)
	Very bad	3 (3.1%)	0 (0%)	3 (1.6%)
Academic achievement	Bad	9 (9.3%)	4 (4.2%)	13 (6.8%)
	Average	50 (51.5%)	37 (38.9%)	87 (45.3%)
	Good	30 (30.9%)	45 (47.4%)	75 (39.1%)
	Very good	8 (8.2%)	9 (9.5%)	17 (8.9%)
Place of living	Public dorm	4 (4.1%)	3 (3.2%)	7 (3.6%)
	Private dorm	2 (2.1%)	0 (0%)	2 (1%)
	Rental House	28 (28.9%)	20 (21.1%)	48 (25%)
	Parent's own house	63 (64.9%)	72 (75.8%)	135 (70.3%)

Table 2. Characteristics of computer and internet use among groups

		ADHD group	Control group	Total
		n (%)	n (%)	n (%)
Having computer at home	Yes	82 (87.2%)	80 (84.2%)	162 (85.7%)
	No	12 (12.8%)	15 (15.8%)	27 (14.3%)
Using internet	Yes	83 (89.2%)	92 (96.8%)	175 (93.1%)
	No	10 (10.8%)	3 (3.2%)	13 (6.9%)
Internet usage rates	Less than 1 year	9 (9.8%)	2 (2.1%)	11 (5.9%)
	1-2 years	20 (21.7%)	12 (12.6%)	32 (17.1%)
	3-4 years	23 (25%)	19 (20%)	42 (22.5%)
	5-6 years	20 (21.7%)	16 (16.8%)	36 (19.3%)
	7-8 years	14 (15.2%)	18 (18.9%)	32 (17.1%)
	More than 9 years	6 (6.5%)	28 (29.5%)	34 (18.2%)
Place of where internet most used	Internet cafe	6 (6.5%)	0 (0%)	6 (3.2%)
	Home	73 (79.3%)	86 (90.5%)	159 (85%)
	Schooll	3 (3.3%)	5 (5.3%)	8 (4.3%)
	Other	6 (6.5%)	3 (3.2%)	9 (4.8%)
	Both home and internet cafe	4 (4.3%)	1 (1.1%)	5 (2.7%)
The average time spent online per week	Less than 2 hours	16 (17.4%)	3 (3.2%)	19 (10.2%)
	2,5-5 hours	21 (22.8%)	31 (32.6%)	52 (27.8%)
	5-10 hours	24 (26.1%)	36 (37.9%)	60 (32.1%)
	10-15 hours	15 (16.3%)	12 (12.6%)	27 (14.4%)
	More than 15 hours	16 (17.4%)	13 (13.7%)	29 (15.5%)

Most preferred sites on the Internet	Computer game	35 (35%)	22 (23.2%)	57 (29.2%)
	Music	24 (24%)	29 (30.5%)	53 (27.2%)
	Educational	10 (10%)	5 (5.3%)	15 (7.7%)
	Chat	9 (9%)	16 (16.8%)	25 (12.8%)
	Movie	12 (12%)	13 (13.7%)	25 (12.8%)
	Spor	3 (3%)	6 (6.3%)	9 (4.6%)
	Science and technology	0 (0%)	3 (3.2%)	3 (1.5%)
	Other	7 (7%)	1 (1.1%)	8 (4.1%)
Most preferred computer games	Sports	17 (17%)	11 (11.6%)	28 (14.4%)
	Racing	16 (16%)	21 (22.1%)	37 (19%)
	Adventure	27 (27%)	15 (15.8%)	42 (21.5%)
	Shooter	8 (8%)	0 (0%)	8 (4.1%)
	Puzzle	7 (7%)	12 (12.6%)	19 (9.7%)
	Fighting	15 (15%)	19 (20%)	34 (17.4%)
	Other	10 (10%)	17 (17.9%)	27 (13.8%)

Table 3. Puposes of using internet among groups.

		ADHD group	**Control group**	**Total**
		n (%)	**n (%)**	**n (%)**
Aimlessly Surfing	Always	14 (14%)	7 (7.4%)	21 (10.8%)
	Mostly	18 (18%)	34 (35.8%)	52 (26.7%)
	Sometimes	28 (28%)	30 (31.6%)	58 (29.7%)
	Very rare	24 (24%)	13 (13.7%)	37 (19%)
	Never	16 (16%)	11 (11.6%)	27 (13.8%)
Watching video	Always	27 (27%)	12 (12.6%)	39 (20%)
	Mostly	31 (31%)	49 (51.6%)	80 (41%)
	Sometimes	22 (22%)	25 (26.3%)	47 (24.1%)
	Very rare	16 (16%)	9 (9.5%)	25 (12.8%)
	Never	4 (4%)	0 (0%)	4 (2.1%)
Chatting	Always	21 (21%)	13 (13.7%)	34 (17.4%)
	Mostly	15 (15%)	39 (41.1%)	54 (27.7%)
	Sometimes	24 (24%)	27 (28.4%)	51 (26.2%)
	Very rare	30 (30%)	12 (12.6%)	42 (21.5%)
	Never	10 (10%)	4 (4.2%)	14 (7.2%)
Studying / doing research	Always	19 (19%)	11 (11.6%)	30 (15.4%)
	Mostly	20 (20%)	30 (31.6%)	50 (25.6%)
	Sometimes	29 (29%)	43 (45.3%)	72 (36.9%)
	Very rare	28 (28%)	9 (9.5%)	37 (19%)
	Never	4 (4%)	2 (2.1%)	6 (3.1%)
Gaming	Always	19 (19%)	4 (4.2%)	23 (11.8%)
	Mostly	26 (26%)	21 (22.1%)	47 (24.1%)
	Sometimes	21 (21%)	32 (33.7%)	53 (27.2%)
	Very rare	23 (23%)	14 (14.7%)	37 (19%)
	Never	11 (11%)	24 (25.3%)	35 (17.9%)
Using social networking sites	Always	16 (16%)	15 (15.8%)	31 (15.9%)
	Mostly	17 (17%)	41 (43.2%)	58 (29.7%)
	Sometimes	24 (24%)	26 (27.4%)	50 (25.6%)
	Very rare	31 (31%)	10 (10.5%)	41 (21%)
	Never	12 (12%)	3 (3.2%)	15 (7.7%)

Table 4 shows that, there is no statistically significant difference between the groups in terms of rates of having a mobile phone however, the rate of having an internet connection in mobile phone in ADHD group is significantly lower than the control group (p=0.049). There is no statistically significant difference between the groups in terms of parent's control rate of internet usage (p=0.221), disrupting

effect of internet usage on daily activity (p=0.094), rate of negative effects of internet usage on family relations (p=0.280) and friendship relations (p=0.924) and effects of internet usage on eating (p=0.145) and sleeping habits (p=0.311).

Table 4. Other parameters between groups.

		ADHD group	Control group	Total
		n (%)	n (%)	n (%)
Having mobile phone	Yes	77 (79.4%)	85 (89.5%)	162 (84.4%)
	No	20 (20.6%)	10 (10.5%)	30 (15.6%)
Having internet connection on mobile phone	Yes	68 (70.1%)	79 (83.2%)	147 (76.6%)
	No	29 (29.9%)	16 (16.8%)	45 (23.4%)
Parental control of Internet usage	Yes	64 (69.6%)	57 (60%)	121 (64.7%)
	No	28 (30.4%)	38 (40%)	66 (35.3%)
Disrupting effect of internet usage on daily activity	Yes	34 (34%)	22 (23.2%)	56 (28.7%)
	No	66 (66%)	73 (76.8%)	139 (71.3%)
Negative effects of internet usage on family relations	Yes	30 (30%)	22 (23.2%)	52 (26.7%)
	No	70 (70%)	73 (76.8%)	143 (73.3%)
Negative effects of internet usage on friendship relations	Yes	6 (6%)	7 (7.4%)	13 (6.7%)
	No	94 (94%)	88 (92.6%)	182 (93.3%)
Affecting relationships with teachers	Yes	8 (8%)	4 (4.2%)	12 (6.2%)
	No	92 (92%)	91 (95.8%)	183 (93.8%)
Effects of internet usage on sleeping habits	Yes	32 (32%)	37 (38.9%)	69 (35.4%)
	No	68 (68%)	58 (61.1%)	126 (64.6%)
Effects of internet usage on eating habits	Yes	15 (15%)	7 (7.4%)	22 (11.3%)
	No	85 (85%)	88 (92.6%)	173 (88.7%)

DISCUSSION

The previous studies about IA report high rates of comorbidity with ADHD. Beside this, it has also been reported that severity of ADHD symptoms predict the severity of IA symptoms[7,18,19,20]. In the present study, we found that adolescents with ADHD had significantly higher YIAS score than control group. The average YIAS score of ADHD group was 30.97±17.74 in our study. So according to cut off points they have no symptoms about IA. Enagandula R et al. (2018) found mean YIAT score of 50 children with ADHD was 50 and of 50 normal children was 30[21].They showed that, in the ADHD group, children having higher scores on YIAT also have higher mean duration of internet usage.In contrast, we found the rate of using internet for 9 years and over, the rate of using internet at home and spending 5-10 hours times per week on internet were statistically lower in ADHD group than the control group. Considering the relationship between internet addiction and impulsivity with ADHD and behavioral disregulation the incidence of IA in adolescence may be expected to increase with ADHD[22,23,24.] But in our study, the number of adolescents aged 12-14 years in the ADHD group is higher than the control group. So this age range factor may effect on our results. It is thought that large-scale and long-term studies are needed on this subject. Kahraman Ö. et al. (2018) conducted a study with 111 patients with ADHD aged 12-18 and 108 healthy contols. They found that internet access at home was significantly higher in control group when compared to ADHD group[25]. In our study, there was no statistically significant difference between groups in terms of having a computer at home and internet usage rates, while the rate of having an internet connection in mobile phone in ADHD group was significantly lower than the control group.

Internet use for gaming was higher in ADHD group in the study before mentioned and these results are consistent with our study. As a result of the studies in the literature, it can be said that ADHD diagnosis also provides a predisposition to gaming addiction[26,27]. Impulsivity and its association with IGD could make adolescents vulnerabile to the rewarding effects of gaming and to IGD[28]. Similarly, in our study adolescents with ADHD are always more likely to use the internet to play games than

the control group. But as opposed to impulsivity and behavioral dysregulation with ADHD, the rates of using the internet mostly for non-purposeful use, using for watching videos, using for chatting, using to enter social networking sites are lower in the ADHD group compared to the control group. As far as we know, there is little literature about the types of computer games played by children with ADHD. Our ADHD group prefer to play adventure games the most from internet games. Considering that playing a computer game is associated with the dopaminergic system in the brain and stimulates the brain's reward mechanism, it seems likely that adventure games are more attractive for the children with ADHD[29].

Another important point is that, there is no statistically significant difference between the groups in terms of disrupting effect of daily use of internet on rutine activity, rate of negative effects of internet usage on family relations, friendship relations, internet usage on eating and sleeping habits. As we know from previous studies, association between IA and reward deficincy is also related with the high frequency of comorbid ADHD[30,31]. Our results are incompatible with the literature related to internet addiction and excessive use of the internet. These results are interpreted as there is a need for longitudinal studies in ADHD groups.

This study is a cross-sectional study and conducted with a narrow group. Besides, the scale used in the study is a self-report questionnaire which may compromise the validity of diagnosis, especially considering that adolescents would minimize their problems with internet. Prospective longitudinal studies with larger groups are needed.

Yazar Katkıları: Çalışma konsepti/Tasarımı: MGL, MZE; Veri toplama: MGL; Veri analizi ve yorumlama: MGL, MZE; Yazı taslağı: MGL, MZE; İçeriğin eleştirel incelenmesi: MZE; Son onay ve sorumluluk: MZE, MGL; Teknik ve malzeme desteği: MGL; Süpervizyon: MZE; Fon sağlama (mevcut ise): yok.
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REFERENCES

1. An J, Sun Y, Wan Y, Chen J, Wang X, Tao F. Associations between problematic Internet use and adolescents' physical and psychological symptoms. J Addict Med. 2014;8:282–87.
2. Xu J, Shen, L, Yan C, Hu H, Yang F, Wang L et al. Personal characteristics related to the risk of adolescent Internet addiction: A survey in Shanghai, China. BMC Public Health. 2012;12:1106.
3. Shaw M, Black DW. Internet addiction: Definition, assessment,epidemiology and clinical management. CNS Drugs. 2008;22:353–65.
4. Ge Y, Se J, Zhang J. Research on relationship among internet-addiction, personality traits and mental health of urban left-behind children. Glob J Health Sci. 2014;7:60–9.
5. Bahrainian A, Khazaee A. Internet addiction among students: The relation of self esteem and depression. Bull Environ Pharmacol Life Sci. 2014;3:1–6.
6. Yen JY, Ko C H, Yen CF, Wu HY, Yang MJ. The comorbid psychiatric symptoms of Internet addiction: Attention deficit and hyperactivity disorder (ADHD), depression, social phobia, and hostility. J Adolesct Health. 2007;41:93–8.
7. Bozkurt H, Coskun M, Ayaydin H, Adak I, & Zoroglu, SS. Prevalence and patterns of psychiatric disorders in referred adolescents with internet addiction. Psychiatry Clin Neurosci. 2013;67:352–9.
8. Starcevic V. Is Internet addiction a useful concept? Aust N Z J Psychiatry 2013;47:16-9.
9. Crews FT, Boettiger CA. Impulsivity, frontal lobes and risk for addiction. Pharmacol Biochem Behav. 2009;93:237–47.
10. Urcelay GP, Dalley JW. Linking ADHD, impulsivity, and drug abuse: A neuropsychologicalperspective. Curr Topics Behav Neurosci. 2012;9:173–197.
11. Gullo MJ, Loxton NJ, Dawe S. Impulsivity: Four ways five factors are not basic to addiction. Addict Behav. 2014;39:1547–56.
12. Shirley MC, Sirocco KY. Introduction to special section: ADHD, impulsivity,and alcohol abuse. Exp Clin Psychopharmacol. 2014;22:97–9.
13. Blum K, Cull JG, Comings ED. Biogenetics of reward deficiency syndrome. Sci Am. 1996;84:132-45.
14. Chou WJ, Huang MF, Chang YP, Chen YM, Hu HF, Yen CF. Social skills deficits and their association with Internet addiction and activities in adolescents with attention-deficit/hyperactivity disorder. J Behav Addict. 2017;6:42-50.
15. Young KS. Psychology of Computer Use: XL. Addictive use of the Internet: A case that breaks the stereotype. Psychol Rep. 1996;79:899–902.
16. Bayraktar F. The role of Internet use in adolescent development (Master's thesis). İzmir, Ege University, 2001.

17. American Psychiatric Association. Diagnostic and Statistical Manual Of Mental Disorders (5th ed.). Arlington, VA, American Psychiatric Publishing. 2013.
18. Ko CH, Yen JY, Chen CS. Psychiatric comorbidity of internet addiction in college students: An interview study. CNS Spectr. 2008;13:147-153.
19. Dalbudak E, Evren, C. The relationship of internet addiction severity with attention deficit hyperactivity disorder symptoms in Turkish university students; impact of personality traits, depression and anxiety. Compr Psychiatry. 2014;55:497-503.
20. Dalbudak E, Evren C, Aldemir S, Taymur I, Evren B, Topcu M. The impact of sensation seeking on the relationship between attention deficit/hyperactivity symptoms and severity of Internet addiction risk. Psychiatry Res. 2015;228:156-61.
21. Enagandula R, Singh S, Adgaonkar GW, Subramanyam AA, Kamath RM. Study of Internet addiction in children with attention-deficit hyperactivity disorder and normal control. Ind Psychiatry J. 2018;27:110-4.
22. Cao F, Su L, Liu T, Gao X. The relationship between impulsivity and internet addiction in a sample of Chinese adolescents. Eur Psychiatry. 2007;22:466-71.
23. Sonuga-Barke EJ. Psychological heterogeneity in AD/HD – A dual pathway model of behaviour and cognition. Behav Brain Res. 2002;130:29–36.
24. Harstad E, Levy S, & Committee on Substance Abuse. Attentiondeficit/hyperactivity disorder and substance abuse. Pediatrics. 2014;134:e293-301.
25. Kahraman Ö, Demirci EÖ. Internet addiction and attention-deficit-hyperactivity disorder: Effects of anxiety, depression and self-esteem.Pediatr Int. 2018;60:529-34.
26. Hyun GJ, Han DH, Lee YS, Kang KD, Yoo SK, Chung US, Renshaw PFRisk factors associated with online game addiction: A hierarchical model. Comput Hum Behav. 2015;48:706-13.
27. VadlinS, Åslund C, Hellström C, Nilsson KW. Associations between problematic gaming and psychiatric symptoms among adolescents in two samples. Addict Behav. 2016;61:8-15.
28. Yen JY, Liu TL, Wang PW, Chen CS, Yen CF, Ko CH. Association between internetgaming disorder and adult attention deficit and hyperactivity disorder and their correlates: Impulsivity and hostility.Addict Behav. 2017;64:308-13.
29. Blum, K, Braverman ER, Holder JM., Lubar JF, Monastra VJ, Miller D. Comings DE. Reward deficiency syndrome: a biogenetic model for the diagnosis and treatment of impulsive, addictive and compulsive behaviors. J Psychoactive Drugs. 2000;32:1-112.
30. Yoo HJ, Cho SC, Ha J, Yune SK, Kim SJ, Hwang J. Attention deficit hyperactivitysymptoms and internet addiction. Psychiatry Clin. Neuros. 2004;58:487-94.
31. Weinstein A, Lejoyeux M. Internet addiction or excessive internet use. Am J Drug Alcohol Abuse. 2010;36:277-83.