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Online gaming and smartphone addictions in children and adolescents with primary headaches: a prospective case-control study

Birincil baş ağrısı olan çocuk ve ergenlerde çevrimiçi oyun ve akıllı telefon bağımlılıkları: Prospektif bir vaka kontrol çalışması

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ABSTRACT

AIM: In pediatric headache, studies evaluating effects of online gaming or smartphone usage on subjects' headache complaint are relatively limited in the literature. This study examined whether there is a relation between primary headaches and online gaming or smartphone addiction in line with causality and whether screen exposure might have an effect on children with headache.

MATERIAL AND METHOD: Children and adolescents, aged 11-18 years old, those diagnosed with primary headaches of tension-type headache or migraine were evaluated in terms of smartphone and online game addiction. Smartphone Addiction Scale-Short Version (SAS-SV) and Online Game Addiction Scale (OGAS) was used. SPSS 17.0 program was used for statistical analyses.

RESULTS: A total of 220 children and adolescents (109 of primary headache, 111 of healthy subjects), mean age was 14.3 years. Girls were significantly higher in headache group (69.7% vs. 55.9%, respectively, 2 (1) = 4.524, p = .033). Academic scores of the participants, ownerships of smartphone, personel computer or internet were all similar between headache and control subjects (for all, p>.05). There was no difference between usage of smart-phone (hours/day), online games played (hours/day) and personel computer (hours/day) on a daily basis (for all, p>.05). No difference was found between headache and control groups in terms of their SPAS-SV and OGAS scores (p>.05).

CONCLUSION: Adolescents with primary headache had similar online game and smart phone usage pattern with their counterparts had. There is a need for further studies regarding primary headaches and its underlying factors in terms of online gaming or smart phone usage.

Keywords: online gaming, smartphone, addiction, child, adolescent, primary headache

ÖZET

AMAÇ: Çocuk yaş grubu başağrılarında çevirimiçi oyun ya da akıllı telefon kullanımının çocuk ve ergenlerdeki başağrı yakınmaları üzerine olan etkilerini araştıran çalışmalar literatürde görece sınırlıdır. Bu araştırmada, birincil baş ağrıları ile çevrimiçi oyun veya akıllı telefon bağımlılığı arasında bir nedensellik ilişki olup olmadığı ve ekrana maruz kalmanın baş ağrısı olan çocuklar üzerinde bir etkisi olup olmadığı incelenmiştir.

GEREÇ VE YÖNTEM: Bu çalışmada 11-18 yaş arası çocuk ve ergenlerden, birincil baş ağrısı gerilim tipi baş ağrısı veya migren tanısı alanlar akıllı telefon ve çevrimiçi oyun bağımlılığı açısından değerlendirildi. Akıllı Telefon Bağımlılığı Ölçeği-Kısa Versiyonu (ATB-KF) ve Çevrimiçi Oyun Bağımlılığı Ölçeği (COBÖ) kullanıldı. İstatistiksel analizler için SPSS 17.0 programı kullanıldı.

SONUÇLAR: Toplam 220 çocuk ve ergenin (109'u birincil başağrılı, 111'i sağlıklı kontrol) yaş ortalaması 14,3 yıl idi. Kızların oranı başağrısı grubunda anlamlı yüksek bulundu (%69,7 vs. %55,9, 2 (1) = 4,524, p = ,033). Katılımcıların akademik puanları, akıllı telefon, kişisel bilgisayar veya internet sahipliği, baş ağrısı ve kontrol olguları arasında benzerdi (tümü için, p>,05). Günlük akıllı telefon kullanımı (saat/gün), oynanan çevrimiçi oyunlar (saat/gün) ve kişisel bilgisayar (saat/gün) kullanımı arasında bir farklılık saptanmadı (tümü için, p>,05). Baş ağrısı ve kontrol gruplarının SAS-SV ve OGAS puanları birbirine benzer bulundu (p>,05).

TARTIŞMA: Birincil başağrısı olan ergenler, akranlarıyla benzer çevrimiçi oyun ve akıllı telefon kullanım örüntüsüne sahiptir. Çevrimiçi oyun veya akıllı telefon kullanımı açısından birincil baş ağrıları ve altında yatan faktörler hakkında daha fazla araştırmaya ihtiyaç vardır.

Anahtar Kelimeler: çevrimiçi oyun, akıllı telefon, bağımlılık, çocuk, ergen, birincil baş ağrısı

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INTRODUCTION

Primary headaches define unpleasant and discomfortingeven disabilitating pain located in the head that have unknown underlying cause [1]. Based on the International Classification of Headache Disorders (ICHD-3), tension-type headache and migraine are mainly frequently seen primary headaches [2]. Tension-type headache is defined as a tight band feeling around the head causing pressure and pulsating-sensation, whereas migraine is a disturbance presenting as a throbbing headache in one side of the head accompanied with nausea, vomiting, and hypersensitivity to light and sound [2]. The underlying factors should be well known in order to diagnose it correctly, to treat it with the right interventions, and even to prevent these disorders [3]. In pediatric primary headaches, etiological factors of their developments are controversial and children and adolescents who complaint headache is neededto be thoroughly examined [4] since their negative impact on children's quality of life, their academic and social achievements is crucially prominent [5].

During childhood and adolescence periods, apart from rapid growth, hormonal, anatomic and physiological changes, cognitive and emotional maturation [6], technological devices and their usage become inevitable. Online game addiction has become more concerning issue among adolescents because of its causative effect on from family relations to their mental health [7]. In this context, there are some studies conducted with adults population pointing out that exposuring tothe screen causes headaches [8], and online gaming results in tension- type headache [9]. Similar with this situation, a study conducted with adult subjects showed that there is a relationship between smartphone usage and new-onset primary headache [10]. In pediatric headache, however, studies evaluating effects of online game on subjects' headache complaint has not been yet found in the literature. Instead of this, there are some studies conducted in COVID pandemic duration concerning internet addiction or smartphone usage and headache [11–13]. For these reasons, children and adolescent those diagnosed with primary headaches of tension-type headache or migraine were evaluated in terms of smartphone and online game addiction and compared with their counter parts. Also, these children were consultated to the Child Psychiatry department to to establish a connection between the psychiatric diagnosis (if any), and headache or smartphone addiction.

MATERIAL AND METHODS

Children and adolescents aged 11-18 years that they admitted to University of Health Sciences Ankara Training and Education Hospital Child Neurology Department due to the headache between April 2018 and December 2018 and diagnosed with two primary headaches (tension-type or migraine) using with International Headache Society's International Classification of Headache Disorders (ICHD-3, 2013) criteria [2]. Inclusion criteria for headache group were the following; normal neurological findings of cranial magnetic resonance imaging (MRI) or computerized tomography (CT), not having mental retardation (MR), and agreed to join this study and consultated to the Child Psychiatry department.

Control group was consisted of children or adolescents whom they admitted to the Pediatrics policlinics due to non-specific complaints including cold, fever, upper respiratory track infections and agreed to participate in this study. Inclusion criteria for control group were the following; normal physical examination findings for neurological disorder, not having headache o rmental retardation, and agreed to join this study.

Children and adolescents included in this study fulfilled Smartphone Addiction Scale-Short Version (SPAS-SV) and Online Game Addiction Scale (OGAS) themselves. And then, these participants were consultated to the child psychiatry department to evaluate their mental status. Psychiatric diagnoses were carried out according to the DSM-5 (APA, 2013) criteria by the child psychiatrists [14].

Tools

Demographic variable form: Demographic variables were collected via items that were created by authors. This form included variables of age, gender, academic achievements (%), ownerships of smartphone, personal computer (PC), the Internet, Daily usage of smartphone, online games played and PC as hours for the participants. Academic achievement was expressed as a percentage of the average of all courses out of one hundred full points. Other variables located in this form were mothers' and fathers' age, education levels and their working status and monthly income levels as Turkish lira (TRY). Income levels were categorized as lower (0-2000 TRY), medium (2001-4999 TRY) and higher (5000 TRY and above).

Smartphone Addiction Scale-Short Version: This a 10-item Likert-type self-reporting scale with 6-point scaling from largely untrue (as 0) and largely true (as 6) was developed by Kwon et al 15 to evaluate smartphone addiction. Total score of this scale is from 10 to 60. Its Turkish validation and reliability were shown by Akin et al [16]. Higher scores point out a risk for addiction. Cronbach alpha coefficient was reported as 0.91. Cut-off or addiction was assigned to be 31 and above.

Online Game Addiction Scale: Developed by Kaya in 2013 with internal consistency of Cronbach alpha coefficient as 0.91, and shown as validated by Basol and Kaya [17], it is a 21-item 5-point Likert-type self-report evaluating scale of onlinegame addiction. Total scores vary from 21 to 105. Higher scores mean higher risk for addiction. Four categories were also possible to evaluate online game addiction as the following; 21-42 scores mean "there is nonegative effects of onlinegaming on daily life of the individual", 43-63 scores means "mild effect of daily functions", 64-84 as "medium deteriorating effect" and 85-105 as "severely negative effect on fuctioning of the individual".

Ethical approval was obtained from the Local Ethics Committee of University of Health Sciences Ankara Training and Education Hospital (document numbered with 23.05.2018/0046/469). Written consent were obtained from children's parents and adolescents themselves.

Statistical Analyses: Power analysis of this study revealed that 100 children and adolescent with the primary headache and 100 of control would be sufficient.

Continuous variables were defined as mean, median, minimum-maximum values and categorical ones as frequency (n) and percentage (%). SPSS 17.0 (Chicago Inc., 2008) program was used for statistical analyses. Continous variables' normal distribution issue was examined via Kolmogorov-Smirnov Test. Student t test or Mann Whitney U test were used to compare between two groups. Triple comparisons was carried out with ANOVA or Kruskal-Wallis test. Categorical variables were compared using the Pearson or Fisher's exact test. Spearman correlation analysis were used for evaluating of SPAS and OGAS scores with other independent variables. $p<.05$ was accepted as significant.

RESULTS

A total of 220 children and adolescents (138 of girls, 82 of boys) were evaluated. Mean age was 14.3 years and there was similarity between headache (n = 109) and control (n = 111) groups ($p>.05$). Gender proportion, on the other hand, was different and girls were significantly higher in headache group (69.7% vs. 55.9%, respectively, $x2$ (1) = 4.524, $p = .033$). Academic scores of the participants, ownerships of smartphone, personel computer or internet were all similar between headache and control subjects (for all, $p>.05$). There was also another similarity between usage of smartphone (hours/day), online games played (hours/day) and personel computer (hours/day) on a Daily basis (for all, $p>.05$). Parents' demographics and income levels of two groups were also similar.

Psychiatric comorbidity of the participants was evaluated by child psychiatrists and based on DSM-5 criteria. Consequently, it was noticed that 33.2% of all participants (n = 73/220) did not come for psychiatric examination. Nonetheless, there was not significant difference between headache and control groups in terms of having a psychiatric disorder. Anxiety disorders (5.9%, n = 13), depressive disorder (4.1%, n = 4.1), and attention deficit hyperactivity disorder (1.8%) were mainly found disorders. DSM-5 psychiatric diagnoses and their proportions were presented in the Table 1.

Table 1. Demographics and clinical features of twogroups and their comparisons

	Total	Headache	Control	Statistics	
	n=220	n=109	n=111	t, z or χ2	pvalue
Age (years)[a]	14.3 (2.0)	14.4 (1.8)	14.3 (2.1)	-.327	.744
Gender, n (%)				4.524	.033
Girls	138 (62.7)	76 (69.7)	62 (55.9)		
Boys	82 (37.3)	33 (30.3)	49 (44.1)		
Academic scores (%)[a]	76 (12.3)	76.6 (11.0)	75.4 (13.4)	-.691	.491
SP ownership (years)[b]	2 (0-9)	2 (0-8)	2 (0-9)	-.761	.447
PC ownership (years)[b]	1 (0-17)	1 (0-15)	2 (0-17)	-.975	.330
Internet owner (years)[b]	2 (0-15)	2 (0-15)	2 (0-11)	-.572	.567
SP usage (hours/day)[b]	3 (0-16)	3 (0-16)	3 (0-16)	-.174	.862
Online gaming (hours/day)[b]	0.5 (0-10)	1 (0-10)	1 (0-10)	-1.610	.107
PC usage (hours/day)[b]	1 (0-11)	1 (0-11)	1 (0-11)	-1.369	.171
Mothers'					
Age (years)[a]	39.5 (5.5)	40.1 (5.8)	39.0 (5.1)	-1.498	.136
Education (years)[a]	6.3 (3.0)	6.1 (2.4)	6.6 (3.4)	1.426	.155
Working status, n (%)	21 (9.9)	6 (5.9)	15 (13.5)	3.483	.062
Fathers'					
Age (years)[a]	44.1 (7.1)	44.6 (7.8)	43.6 (6.4)	-1.058	.291
Education (years)[a]	7.7 (2.8)	7.4 (2.7)	8.1 (2.9)	1.783	.076
Working status, n (%)	200 (95.7)	96 (95.0)	104 (96.3)	.197	.657
Income (monthly), n (%)				3.579*	.059
Lower (0-2000 TL)	115 (52.3)	62 (56.9)	53 (47.7)		
Medium (2001-4999 TL)	97 (44.1)	46 (42.2)	51 (45.9)		
Higher (5000 and + TL)	8 (3.6)	1 (0.9)	7 (6.3)		
Comorbidity, n (%)				.938#	.333
Yes	31 (14.1)	18 (16.5)	13 (11.7)		
No	116 (52.7)	56 (51.4)	60 (54.1)		

Headache group were divided into two groups as tension-type headache (n = 77) and migraine (n = 32) based on Headache Classification Committee of the International Headache Society. Then all demographics were compared with in three groups. Migraine was significantly higher in girls (81.3%, x2 (2) = 7.098, p = .029). There was also a higher rate of psychiatric comorbidity in migraine group than that of tension-type headache (34.4% vs. 9.1%, χ2(2) = 12.014, p = .002). Depression and anxiety were prominently found to be psychiatric comorbidities (see Table 2).

Table 2. The comparison of the variables in terms of having primary headaches

	n=77	n=32	n=111	F or χ2	p value
Age (years)[a]	14.2 (1.9)	14.8 (1.7)	14.3 (2.1)	.827	.439
Gender, n (%)				7.098	**.029**
Girls	50 (64.9)	26 (81.3)	62 (55.9)		
Boys	27 (35.1)	6 (18.8)	49 (44.1)		
Academic scores (%)[a]	77.2 (10.7)	75.0 (10.6)	75.4 (13.4)	.632	.532
SP ownership (years)[b]	2 (0-8)	2 (0-6)	2 (0-9)	.648	.723
PC ownership (years)[b]	1 (0-11)	1 (0-15)	2 (0-17)	1.008	.604
Internet owner (years)[b]	2 (0-11)	2.5 (0-15)	2 (0-11)	.658	.720
SP usage (hours/day)[b]	2.5 (0-16)	2.7 (0-12)	3 (0-16)	.033	.984
Online gaming(hours/day)[b]	0.5 (0-8)	0.5 (0-3)	1 (0-10)	2.610	.271
PC usage (hours/day)[b]	1 (0-10)	0.5 (0-10)	1 (0-11)	2.344	.310
Comorbidity, n (%)				12.014#	**.002**
Yes	7 (9.1)	11 (34.4)	13 (11.7)		
No	44 (57.1)	12 (37.5)	60 (54.1)		
N/A	26 (33.8)	9 (28.1)	38 (34.2)		
DSM-5 diagnoses, n (%)					
Depressive disorder	2 (2.6)	6 (18.8)	1 (0.9)		
Anxiety disorders	5 (6.5)	5 (15.6)	4 (3.6)		
ADHD	0	0	4 (3.6)		
Communication disorders	0	0	2 (1.8)		
Elimination disorders	0	0	2 (1.8)		
None	44 (57.1)	12 (37.5)	60 (54.1)		
N/A	26 (33.8)	9 (28.1)	38 (34.2)		

[a]: Mean (Standard deviation), [b]: Median (minimum-maximum)
PC: personal computer, SP: smartphone ADHD: Attention deficit hyperactivity disorder
F: ANOVA test. χ2: Kruskal-Wallischi-square test

As regards SPAS-SV and OGAS scores, there was no significant difference between headache and control subjects neither SPAS-SV nor OGAS median scores. There was also similarity between two gropus in terms of addiction thresholds for SPAS-SV scores, and risk defined for OGAS (for all variables, p>.05, see Table 3).

Table 3. Scale scores of smartphone and onlinegame addictions between two groups

	Total	Headache	Control	Statistics	
	n=220	n=109	n=111	z or χ2	p value
Scores & Categories					
SPAS-SV[b]	23 (10-60)	23 (10-60)	23 (10-60)	-.408	.683
SP addiction, n (%)				2.317	.128
Lower (up to 31)	153 (69.5)	81 (74.3)	72 (64.9)		
Upper (31 and above)	67 (30.5)	28 (25.7)	39 (35.1)		
OGAS[b]	38 (11-99)	36 (21-99)	39 (11-99)	-1.315	.189
OG addiction, n (%)				1.424*	.715
No risk (21-42)	142 (64.5)	73 (67.0)	69 (62.2)		
Mild risk (43-63)	62 (28.2)	29 (26.6)	33 (29.7)		
Medium risk (64-84)	11 (5.0)	4 (3.7)	7 (6.3)		
High risk (85-105)	5 (2.3)	3 (2.8)	2 (1.8)		

[b]: Median (minimum-maximum)
z: Mann Whitney U test, χ2: Pearsonchi-square test, *: Fisher'sexact test
SP: smart phone, SPAS-SV: Smartphone addiction scores short version, OGAS: Online game addiction scores, OG: Online gaming

These scales' scores were compared with intension-type, migraine and control group should there was a difference in terms of having any specific headache. There was, however, headache subtypes and control subjects were similar SPAS-SV or OGAS median scores (p>.05). All variables were shown in the Table 4.

Table 4.The comparison of sub-type headaches' variables with the control subjects

	TTH	Migraine	Control	Statistics	
	n=77	n=32	n=111	z or $\chi 2$	p value
Scores & Categories					
SPAS-SV[b]	22 (10-60)	25 (10-48)	23 (10-60)	.843	.656
SP addiction, n (%)				2.444	.295
Lower (up to 31)	58 (75.3)	23 (71.9)	72 (64.9)		
Upper (31 and above)	19 (24.7)	9 (28.1)	39 (35.1)		
OGAS[b]	38 (21-92)	32 (21-99)	39 (11-99)	2.544	.280
OG addiction, n (%)				2.928*	.831
No risk (21-42)	50 (64.9)	23 (71.9)	69 (62.2)		
Mild risk (43-63)	21 (27.3)	8 (25.0)	33 (29.7)		
Medium risk (64-84)	4 (5.2)	0	7 (6.3)		
High risk (85-105)	2 (2.6)	1 (3.1)	2 (1.8)		

TTH: tention-type headache, M: migraine, χ^2: Kruskal-WallisorPearsonchi-square test
SP: smart phone, SPAS-SV: Smartphone addiction scores short version, OGAS: Online game addiction scores, OG: Online gaming

Correlation analysis, on the other hand, of all samples (n=220) revealed that SPAS-SV were positively correlated with OGAS scores (r = .425, p<.001), age (r = .281, p<.001), smart phone ownership (r = .301, p = .001), personel computer ownership (r = .158, p = .019), internet ownership (r = .298, p = .001), smart phone Daily usage (r = .397, p<.001), time spent Daily for online games (r = .302, p<.001), personel computer Daily usage (r = .326, p<.001). Similar to this findings, OGAS were positively correlated with smart phone ownership (r = .212, p = .002), personel computer ownership (r = .214, p = .003), internet ownership (r = .247, p<.001), smart phone Daily usage (r = .226, p = .001), time spent Daily for online games (r = .527, p<.001), personel computer Daily usage (r = .311, p<.001).
In headache group (n=109), on the other hand, SPAS-SV were positively correlated with OGAS (r = .273, p = .004), age (r = .333, p<.001), smart phone ownership (r = .341, p <.001), personel computer ownership (r = .278, p = .003), internet ownership (r = .353, p <.001), smart phone Daily usage (r = .393, p<.001), and personel computer Daily usage (r = .420, p <.001). OGAS, on the other hand, were positively correlated with smart phone ownership (r = .207, p = .020), personel computer ownership (r = .337, p <.001), internet ownership (r = .311, p = .001), time spent Daily for online games (r = .535, p<.001), personel computer Daily usage (r = .365, p <.001) (see Table 5).

Table 5. Spearman correlation analysis of the variables of all participants (n = 220) and headache group (n = 109)

	All participants (n = 220)		Headache group (n = 109)	
	SPAS-SV	OGAS	SPAS-SV	OGAS
Age (years)	.281**	NS	.333**	NS
SP-ownership(years)	.301**	.212**	.341**	.207**
PC-ownership(years)	.158*	.214**	.278*	.337**
NET-ownership (years)	.298**	.247**	.353**	.311**
SP usage (hr/day)	.397**	.226**	.393**	NS
OG usage (hr/day)	.302**	.527**	NS	.535**
PC usage (hr/day)	.326**	.311**	.420**	.365**

*: significance at 0.05 (two-tailed), **: significance at 0.01 (two-tailed), NS: Not-significant, hr: hours
OGAS: Online gameaddictionscores, SPAS-SV: Smartphone addiction scores short version. SP: Smart phone, PC: Personel computer, NET: The Internet

Interms of gender, boys were found to have significantly higher OGAS than that of girls (median scores 41.5 vs. 34.5, respectively, z = -2.971, p = .003, see Table 6).

Table 6. Gender differences in the sample (n = 220) in terms of addiction scales' scores

	Total	Boys	Girls	Statistics	
	n=220	n=82	n=138	z value	pvalue
SPAS-SV[b]	23 (10-60)	21.5 (10-60)	23 (10-60)	-.889	.374
OGAS[b]	38 (11-99)	41.5 (21-99)	34.5 (11-99)	-2.971	.003

[b]: Median (minimum-maximum), z: Mann Whitney U test
SPAS-SV: Smartphone addiction scores short version, OGAS: Online game addiction scores

DISCUSSION

Demographics of all variables were similar between headache and control except headache rate was higher in girls. Girls have been consistently found that they are vulnerable primary headache. Larsson et al 18 reported in a 14-year-long-term follow-up community-based sample consisting of 1266 participants that girls had more headache proportions than that of boys.
Based on DSM-5 criteria, there was not significant difference between headache and control groups in terms of having a psychiatric disorder. Although there are some reports pointing out that anxiety and depressive disorder are significantly seen pathologies at a higher proportions in primary headaches 19-21, our samples' psychiatric diagnoses were similar with the controls. One factor that could be intervened with this result might be stemming from that around a third adolescents diagnosed with primary headache were not evaluated by child psychiatrist because they did not come to the psychiatric examination.
As regards headache subtypes, although tansion-type headache and migraine's all demographics were similar with that of controls, there was a significance in migraine group in terms of gender and psychiatric comorbidity pointing out that migraine was significantly higher in girls and psychiatric comorbidity had a significantly higher rate in adolescents with migraine than that of tension-type headache or control. Gender differences in primary headache are well-documented in the literature and girls are tend to more vulnerable to develop headache [1, 3, 18].
In our samples, depression and anxiety were prominently found to be psychiatric comorbidities. Consistent with this result, one study, conducted by Rousseau-Salvadar et al. [20]. Reported that adolescents with migraine had higher depression and anxiety symptoms than that of youths with tension-type headache. Similar to this report, Blaauw et al. [21] showed that among 4872 adolescents, anxiety and depression symptoms were 2-times higher in those who had headache than that of not. Our findings revealed only migraine is a risk factor for depression not anxiety and it could be not generalized since a third of headache subject did not.
Addiction evaluations of the subjects with primary headache and compared their findings obtained by SPAS-SV and OGAS with control group revealed that there was no significant difference between headache and control subjects. This suggests that adolescents with headache use their smartphone or play online games as their counterparts do. Since there was no study directly evaluate online game addiction or smart phone use in primary headache subjects, our study's findings could not be compared.
Interms of gender, boys were found to have sighificantly higher OGAS than that of girls. Online gaming is one of the popular health concern that it might result in adjustment issues of the individuals and it has a risk for addictive behavior development [22]. Youth boys are simply vulnerable for developing addiction for gaming in electronic-medium [23].
This study was also aimed to whether screen exposure might have an effect on subjects with headache. Although there was no difference between ownership or usage of smartphone, PC, the Internet, there were a significant and positively correlated association between SPAS-SV and OGAS, or smart phone ownership, smart phone Daily usage, time spent Daily for online games and personel computer Daily usage as well. These findings suggest that adolescents are at risk for smart phone or online game addiction as their Daily usage of them increases.
Limitations of this study
There was a limitation of that roughly a third of samples who admitted to the neurology and pediatrics polyclinics could not be examined because they

did not come to the psychiatry consultation. This might affect psychiatric comorbidity rates of the samples. Other limitations worth mentioning is that socioeconomic levels of all participants were from lower-side of the population.
In conclusion, headache and control group had similar smart phone use and online game addiction scale scores. Headache, especially migraine is higher with girls and the frequency of psychiatric comorbidity in headache grup general, and in migraine, particular, is significantly higher than that of controls. Boys are in danger for online game addiction with or without headache.

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