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Factors associated with problematic internet use among children and adolescents with attention deficit hyperactivity disorder

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ABSTRACT

OBJECTIVE: The aim of this study is to determine the association of problematic Internet use with ADHD, personal risk factors, familial factors; compare with healthy control group and gather information about the risk factors.

METHODS: Study sample consisted of 34 children between ages of 12–16 and their families, applied to Ankara University Faculty of Medicine Department of Child and Adolescent Psychiatry with diagnosis of ADHD. Control group consisted of 36 junior high school and high school children between 12–16 ages and their families. Control group was matched with ADHD group for age and sex. K-SADS-PL was used for the DSM-IV diagnoses of the patients and the control group. Internet/Computer Use Assessment Questionnaire for Children/Adolescents, Strengths and Difficulties Questionnaire -adolescent form (SDQ) and Online Cognition Scale (OCS) were applied to children. Internet/Computer Use Assessment Questionnaire for Parents, SDQ-parent form and Family Assessment (FAS) were, applied to parents.

RESULTS: Weekly Internet usage was higher in ADHD group than the control group. OCS total scores and subscale scores were significantly higher in ADHD group. SDQ hyperactivity, conduct problems and peer problems subscale scores were significantly higher in ADHD group. FAS general functions, communication, roles and behavior control subscale scores were higher in ADHD group. There were no significant difference between groups about the Internet usage in the daily life, having computer and internet at home. In ADHD group, there was a significant correlation between OCS scores, weekly internet usage and psychiatric comorbidities Oppositional Defiant Disorder and Conduct Disorder. Also affective responsiveness subscale scores of FAS were significantly correlated with OCS scores in ADHD group.

CONCLUSION: In this study, it was noted that problematic internet use was more frequent in ADHD. During ADHD treatment, problematic Internet use may take part in the treatment goals. Interventions to problematic Internet use should consider familial emotional expression studies.

Keywords: Attention deficit hyperactivity disorder; child; family; risk factors; problematic internet use.

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The use of computers and the internet has become indispensable tools of life in this era of technology. Internet is a communication and information sharing tool that enables individuals to access all kinds of information easily and communicate quickly with other individuals irrespective of the distance among them [1, 2].

There are a number of risks of the Internet along with its being a tool that saves time, shortens distances, makes life easier. The internet, on one hand, is regarded as a technological miracle supporting individual develop-

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ment of children and adolescents, including their access to information, research, problem solving, creativity and critical thinking [3, 4]. However, from another point of view, it has been stated that the internet affects the development of personal skills negatively depending on its excessive, uncontrolled and non-purposeful use [5, 6].

Although the problematic use of the Internet can be seen at any age, adolescents are reported to be one of the major risk groups [7]. It has been stated that because of the adolescents' close attention to technology, they use the Internet more frequently than the other age groups. Adolescents' continuing cognitive, emotional and social developments make the individuals in this development period a risk group in terms of problematic use of the Internet [8–11]. Brown et al. pointed out that young people tend to use the Internet as a form of socialization, and children and adolescents are more likely to exchange real life activities with virtual reality, and emotion [12].

In a study performed in adults, it has been reported that excessive Internet use was associated with problems as unemployment, marital problems, neglect of children, and sleep disorders [13]. Internet addiction in South Korea began to be regarded as a public health problem [10] after 10 cardiopulmonary deaths [14] and a murder [15] related to the game occurred [16]. Moreover, it has been reported that there is an inverse relationship between time spent with Internet games and academic achievement, and a significant relationship between aggression and violent games [17].

When the literature was reviewed, one of the important conditions associated with problematic use of the Internet, especially in the adult group is Attention Deficit Hyperactivity Disorder (ADHD) [18–25]. Children and adolescents with Internet addiction were reported to be 2.51 times more likely to have ADHD than their non-addicted peers [18, 21, 25]. Studies in adolescents and young adults have shown that there is no significant difference between age groups in relation to ADHD-Internet addiction or dependency in these groups, and that internet addiction is significantly more common in male gender [26–31]. In addition, in many studies, it was determined that scores of attention deficit and mobility that are among the basic ADHD symptoms scores were higher [25, 32–36] in the Internet addiction group.

This issue has also started to attract interest in our country in recent years. There are population -based studies performed with universityand high school students [8, 37–41]. However, very limited number of studies have been performed in smaller age groups in which ADHD was clinically diagnosed, and supported by detailed psychiatric examination.

The purpose of this study is to investigate the relationship between personal risk factors, familial factors, ADHD and the problematic use of the Internet, which is increasingly seen in clinical practice in our country among children and youngsters in early adolescence, and compare them with the healthy control group so as to become knowledgeable about the factors effecting its risk (if any).

The hypotheses of this study have been determined as follows:

- Problematic internet use is more frequent in children and adolescents diagnosed with ADHD than in normal controls.
- The presence of additional diagnoses, such as Oppositional Defiant Disorder, Depression and Conduct Disorder, increases the frequency and severity of problematic Internet use.
- Broken familial rapport increases the frequency and severity of problematic Internet use.

MATERIALS AND METHODS

Sampling

Following the approval of the study reviewed by the ethics committee of the University of Ankara Faculty of Medicine, 34 children aged 12-16 years who were referred to, and followed up with the diagnosis of ADHD by Polyclinic of Child and Adolescent Mental Health and Diseases of Psychiatry Department of Ankara University Faculty of Medicine between April 2013 and June 2013 and their families consisted the ADHD group, and 36 age-matched children selected among 6th, 7th, and 8th grade students of a primary school, 9th and 10th grade students of a lycée and their families were included in the study as a control group.

Individuals who were clinically thought to have mental retardation, and those with an important medical condition (such as epilepsy, asthma or physical disability) were not included in the study. Participants and their families were given detailed information about the survey and written consent was obtained indicating that they voluntarily agreed to participate in the survey.

Data collection tools

Sociodemographic Data Form

In this form prepared by the researcher, the sociodemographic characteristics of the child / adolescent and parents are questioned (parental age, education level, and occupation, monthly income, family structure, number of siblings, and children).

Internet/Computer Usage Assessment Questionnaire (Parent and Child form) for children and adolescents:

It was prepared by the researcher specifically for the research, and the following issues are questioned:.

- From where is the child connected to the Internet?
- What is the intention of top priority for using the Internet?
- For how long is the Internet used (hour/week)?
- What time of the day Internet is used?
- Which types of sites are preferred?
- How many years are computer/Internet being used?
- School success?
- Are there rules for internet use at home?

Two separate forms have been prepared one for parents, and one for children.

Strengths and Difficulties Questionnaire Forms (for parents, teachers, and the adolescents):

Strengths and Difficulties Questionnaire (SDQ) is a 25-item Likert-type questionnaire developed by Robert Goodman in 1997 for the purpose of questioning emotional and behavioral problems together with some favourable characteristics of children and adolescents aged 4–16 years [42]. Questions on the scale are answered by parents, teachers and adolescents as "not correct", "partially correct" and "absolutely correct" and scored as "0", "1" and "2" respectively. Questions 7, 11, 14, 21 and 25 of the scale are scored by reversing.

It consists of five subscales related to emotional problems, conduct problems, peer relationship problems. As scores of hyperactivity subscales increase, predisposition to problematic clinical increases, and as scores of social behavior subscales increase, predisposition to problematic clinical conditions decreases.

As each subtitle is evaluated within itself, the sum of the first four subscale scores gives the "total difficulty score". The total score obtained from the scale is between 0-40 points. Higher total score indicates increased frequency of problematic behaviors of the child or youth. The increase in social behavior subscale scores indicates that the child is less prone to clinical problems. Therefore, unlike the other subscale and total scores, increase in social behavior subscale score is a favourable indicator.

Forms of this questionnaire designed for 4-16 year olds to be responded by parents, and teachers, and forms to be responded by 11-16- year -old adolescents themselves can be completed within nearly five minutes. Adaptation of SDQ to Turkish language was realized by Güvenir et al. in 2008.

Online cognition scale (OCS)

Developed by Davis, the OCS is a scale consisting of 36 items that question the thoughts, attitudes and beliefs about the Internet [44]. OCS Is a seven-point Likert-type scale with scores ranging from " I absolutely disagree" (1 point) to "I strongly agree" (7 points). The Turkish validity-reliability study of the OCS scale was conducted in 2005. According to the result of our study, its reliability coefficient was α=0.93, and test- retest reliability was r=.87 [45]. There are four dimensions of the OCS.

1. Loneliness-Depression (2., 22., 23., 24., 25., and 35. items) The dimension of loneliness-depression includes depressive thoughts about excessive / problematic/inappropriate use of internet.
2. Diminished Impulse Control (4., 5., 10., 11., 12., 15., 17., 21., 34., and 36. items) Diminished impulse control related to the use of the Internet, failed attempts to limit the use of the Internet, and tendency to engage in risky, and dangerous behaviours.
3. Social support sub-dimension (1., 3., 6., 7., 8., 9., 13., 14., 16., 18., 19., 26., and 31. items) Relates to the assumption that internet use of individuals may be associated with hypersensitivity to seeking social support or social rejection.
3. Distraction (20., 27., 28., 29., 30., 32., and 33 items) Subdimension that expresses the situation related to avoidance of anticipated duties in relation to the person's identity and responsibilities. It evaluates resorting to Internet with the intention to postpone some tasks or jobs.

In addition, item 12 is scored by reversing. Assessment of the scale is done by calculating total score and subscale scores. Generally speaking, the high scores of the OCS give an idea about the value attributed to the Internet, and the priority of the Internet in the individual's life.

Family Assessment Scale (FAS)

Developed by Epstein and Bishop, this scale is a measure of the extent to which the family can or can not fulfill its functions on specific matters. It consists of 60 items.

Family members rate each item with scores ranging between 1 and 4 points according to representability of each item, and they are asked to mark the items that most appropriately define their condition Its translation to Turkish, and its validity and reliability study was performed by Isil Bulut. FAS consists of seven subscales. Seven subscales consist of problem solving, communication, roles, emotional responsiveness, paying required attention, behavioral control, and general functions [46].

Schedule for Affective Disorders and Schizophrenia for School Aged –Kiddle-Sads Present and Lifetime Version (KDSADS):

Schedule for Affective Disorders and Schizophrenia for School Aged Children Kiddie-SADS Present and LifetimeVersion is a semi-structured diagnostic interview developed with the aim to assess present and the future psychopathology of children and adolescents according to the DSM-III and DSM-IV diagnostic criteria.

It was adapted from K-SADS-P in 1997 by Kaufman et al. [47]. The validity and reliability study of its Turkish adaptation was realized in 2004 by Gokler et al. [48].

The current psychiatric diagnosis of the children who participated in the study were determined according to the DSM-IV [49] diagnostic criteria using the MDQ-SCI.

Statistical evaluation

Statistical analyses were performed using SPSS 18.0 statistical package program. The Kolmogorov- Smirnov normality test was used for the analysis of fitness of the data to the normal distribution before starting the analyses. Chi-square test and/or Fisher's exact test were used to compare categorical variables. Student t-test was used to compare continuous variables, and Mann-Whitney U test was used when normal distribution was not obtained. Pearson and Spearman correlation analysis methods were used to determine the correlation among continuous data. In all statistical evaluations, the level of statistical significance was accepted as $p<0,05$.

RESULTS

A total of 70 children and adolescents including 34 ADHD (11 female, 23 male) and 36 healthy controls (13 female and 23 male) participated in the study. The mean age of the group of ADHD and control group was 13.50±1.4 years. There were no significant differences between groups in terms of age and gender. It was observed that the level of education of the parents of the children with ADHD was significantly higher than that of the control group indicating that there was a significant difference between the parents of the ADHD and the control group (Table 1).

Table 1. Sociodemographic characteristics

	ADHD	Control	p
Gender			0,741
Female	11 (32.4%)	13 (36.1%)	
Male	23 (67.6%)	23 (63.9%)	
Age	13.50±1.41	13.50±1.42	*0.932*
Education			
Mother	9.7±3.6	5.7±1.6	<0.001
Father	10.1±3.7	7.8±2.3	0.001

ADHD: Attention deficit hyperactivity disorder.

When the level of familarity with Internet and the intentions of its use in the groups were examined, it was observed that the ADHD group used computer for longer periods (p=0.008) and the weekly duration of Internet use was significantly higher than the control group (p=0.009). When purposes of Internet use were compared, the ADHD group engaged more frequently in social sharing sites, e-mail, betting sites, online games, chatting, dating sites, shopping sites, web design, media access such as TV, music videos, This difference was statistically significant in terms of usage of e-mail, online games and chat sites. On the other hand, the control group was found to be more frequently interested in searching information, using homework sites, loading offline games, reading newspapers and news, and this difference was statistically significant in the fields of accessing into information and homework sites (Table 2).

When the scale scores of the groups were examined, it was found that in the subscales of "Communication", "Roles", "Behavior Control" and "General Family Functions" subscale scores of the Family Assessment Scale appeared to be statistically significantly higher in the ADHD group (Table 3).

Parents whose children in the ADHD group assigned

Table 2. Comparison of the levels of familiarity of children, and adolescents with Internet, and computer use

	ADHD group		Control group		p
	n	%	n	%	
Internet use	33	97.1	33	91.7	0.615[1]
Havin computer at home	33	97.1	31	86.1	0.199[1]
Uninterrupted internet access at home	28	82.4	25	69.4	0.208[2]
How many years he/she is using computer? (mean±SD)	5.2±2.6		3.7±1.6		0.008[3]
Weekly internet use (hours) (mean±SD)	15.73±14.36		7.66±6.90		0.009[3]
Purposes of using Internet					
Social networking site	25	73.5	21	58.3	0.181
E-mailing	14	41.2	6	16.7	0.023[1]
Search for information	21	61.8	30	83.3	0.043[1]
Home works	26	76.5	35	97.2	0.012[2]
Online gaming	19	55.9	7	19.4	0.002[1]
Offline gaming	6	17.6	7	19.4	0.847
Chatting	17	50	5	13.9	0.001[1]
Dating sites	1	2.9	0	0	0.486
Shopping sites	4	11.8	1	2.8	0.192
Web design, blogs	3	8.8	1	2.8	0.350
Pornographic sites	0	0	0	0	
News portals	6	17.6	9	25	0.454
Media (TV, music, video etc)	21	61.8	17	47.2	0.222
Betting sites	3	8.8	2	5.6	0.669
Other	2	5.9	0	0	0.232

ADHD: Attention deficit hyperactivity disorder; SD: Standard deviation; [1]Fisher's exact test; [2]Pearson chi-square test, [3]Mann-Whitney U test.

significantly higher scores to all of the subscale items of Online Cognition Scale when compared with the control group (Table 3).

Parents whose children in the ADHD group had assigned significantly higher scores to subscale items of 'Strengths and Difficulties Questionnaire Problems," including Conduct Problems',' Hyperactivity '',' Peer Relationship Problems',' Prosocial Behaviors' than the parents of the control group (Table 3).

Rates of additional diagnoses in the ADHD group were investigated using KD-SADS. Spearman correlation analyses showed a mild-to-moderate positive correlation between OCS scores and ODD and Conduct Disorders in the ADHD group. It was also determined that as the education level of the mother increased, the total scores of the OCS also increased which indicated the presence of a weak correlation between these parametres (Table 4).

The relationship between the total score of OCS and other subscale scores was examined by Pearson correlation analysis. As the scores related to the problematic Internet use increased, scores of dysfunction related to the emotional reactions in the family increased and the adolescents using the Internet had more frequently indicated emotional and conduct problems related to themselves.

Problems related to problem solving, communication and roles in family functionality were positively correlated with adolescent self-report and behavioral scores and negatively, and moderately with SDQ-parents-social behavior scores. This situation was interpreted as the problems of the puberty increased when the problem-solving skill in the family decreased. In addition, negative relationships with the subscale of SDQ-parents-social behaviors, which reveal the social skills of adolescents, indicate that these problems in the family can lead to problems in social relations (Appendix 1).

Table 3. Comparison of various scale scores of the groups

	ADHD group Mean±SD	Control group Mean±SD	p
FAS Subscales			
Problem solving	1.99±0.64	1.73±0.50	0.970
Communication	1.87±0.53	1.60±0.47	**0.024**
Roles	2.11±0.46	1.87±0.29	**0.018**
Emotional responsiveness	1.77±0.59	1.52±0.47	0.055
Gereken ilgiyi gösterebilme	2.36±0.47	2.32±0.39	0.840
Conduct control	2.08±0.39	1.81±0.41	**0.011**
General family functionality	1.82±0.54	1.46±4.27	**0.002**
OCS Subscales			
Loneliness/depression	18.85±6.94	11.75±5.09	**<0.001**
Decreased impulse control	35.67±12.55	23.41±9.19	**<0.001**
Social Support	51.00±15.75	35.02±11.59	**<0.001**
Distraction	26.55±9.43	19.52±6.21	**0.001**
Total Score	132.08±38.67	89.72±26.87	**<0.001**
GGA-Parents Subscales			
Emotional problems	3.82±2.32	2.78±2.41	0.054
Conduct problems	3.32±2.26	1.06±0.86	**<0.001**
Hyperactivity	6.00±2.81	3.03±1.85	**<0.001**
Peer relationship problems	4.06±1.90	2.42±1.46	**<0.001**
Social behaviours	7.03±2.39	8.75±1.33	**0.001**
Total difficulty score	17.21±6.37	9.28±4.76	**<0.001**
SDQ-Adolescent			
Emotional problems	3.71±2.66	3.58±2.81	0.718
Conduct problems	3.41±2.31	1.69±1.39	**<0.001**
Hyperactivity	5.15±2.59	3.36±2.21	**0.005**
Peer relationship problems	3.85±2.21	3.28±1.86	0.181
Social behaviours	7.71±2.19	8.06±2.48	0.205
Total difficulty score	16.12±7.11	11.92±7.13	**0.012**

SD: Standard deviation; OCS: Online Cognition Scale; SDQ: Strengths and Difficulties Questionnaire; FAS: Family Assessment Scale; ADHD: Attention deficit hyperactivity disorder; Mann-Whitney U test.

DISCUSSION

In our study; the factors related to the problematic Internet use by children and adolescents were investigated. The problematic Internet use has been found to be mkore frequent in children and adolescents with ADHD. When the patterns of Internet use among children with ADHD and adolescents were examined, it was found that the presence of accompanied ODD and CD, longer periods of Internet use, disordered family functionality related to emotional reactions was associated with problematic Internet use.

When the groups were examined in terms of additional psychiatric disorders additional psychiatric diagnoses were detected in 70.6% of the patients in the ADHD group at a significantly higher rate relative to the control group. Additional psychiatric disorders have been frequently detected in ADHD. It has been suggested that 60–100% of ADHD patients have one or more additional psychiatric diagnoses [50]. The most common comorbidities in ADHD in order of their decreasing frequency are: Oppositional Defiant Disorder (ODD), Learning Disorders, Conduct Disorders (CD), Anxiety Disorders, and Depression [51, 52]. In our study, ODD

Table 4. Relationship between the presence of additional diagnosis,educational levels of the parents, and OCD scores in the ADHD group

	OCD (total score)	
	r	p
Presence of an additional diagnosis	**0.451**	**0.007**
Depression	0.170	0.337
Separation anxiety	0.096	0.591
Phobia	0.134	0.450
OCD	-0.028	0.875
ODD	0.343	0.047
Conduct Disorder	0.358	0.038
SLD	-0.182	0.303
Educational level		
Mother	.237	0.024
Father	-.074	0.271

Spearman Correlation Analysis; OCD: Obsessive compulsive disorder; ODD: Oppositional defiant disorder; SLD: Specific learning difficulty; OCS: Online cognition scale.

(26.5%), depression (23.5%) and CD (17.6%) were most frequently found diagnoses in the ADHD group.

When the levels of children and adolescents' acquaintance with computer and Internet have been examined; it has been determined that there was no difference between both groups in terms of the factors such as using Internet in daily life, having a computer, and Internet access at home. These results are important in that they demonstrate that Internet and the computer occupy an important part of the lives of children and young people independent of the economic conditions of the family. On the other hand, although opportunities of Internet access were reported as comparable, it has been determined that ADHD group used computers, and Internet for statistically significantly longer periods when compared with the control group, This condition suggests that access to computers, Internet and technology products is easier amd more frequent in recent years, but it also reveals that ADHD children and their parents who are genetically predisposed to ADHD have been at increased risk for the problematic Internet use.

When the period in which children and adolescents spend their time in front of the computer and Internet was examined, it was found that the ADHD group used computer and Internet for significantly longer periods that is an average of 15.73±14.36 hours per week. When the relevant literature is examined in this regard; problematic internet use was reported as over 8.48 hours per week in a study performed by Morahan-Martin and Schumaher [53]. In the study of Kelleci et al. performed in our country, it has been reported that daily use of Internet over 2 hours is related to mental disorders [38].

In a study performed by Üneri et al.with high school students, it was stated that the increase in time spent on Internet is related to internet dependency [40]. In a population -based study Yolga-Tahiroglu et al. defined the use of Internet for 12 hours or more per week as a problematic Internet use [54]. We found that children and adolescents with ADHD participated in this study had clinically significant Internet dependency with longer Internet use per week when compared with the control group.

When the children and adolescents were examined in terms of the places where Internet and computer were used; the control group had more frequently used computers at school, while any statistically significant difference was not detected in terms of other locations of computer use. In our study, respective percentages of children and adolescents in the ADHD group stated that they preferred to use computer and Internet at school (85.3%), at internet café (17.6%), and at school (8.8%).

The children and adolescents in the control group stated that they preferred to use Internet, and computer at home (74.3%), at internet café (17.1%) and at school (31.4%). In a similar study conducted with male university students in our country, the respective percentages of students stated that they were using computer and internet at home (80.6%), at school (8.7%) and at internet café (9.2%) [55]. It is thought that the increased use of computer and Internet at home among adolescents between the ages of 12–24 have contributed to higher frequency of Internet use at home.

When the children and adolescents were examined according to their purpose of using Internet and computer, the patients in the ADHD group used Internet more frequently for e-mailing, playing online games, and and chatting The control group used the internet more frequently than the ADHD group for searching information and doing homework. Social networking sites were highly used by both groups, without any significant difference between them. Our results are also important in terms of demonstrating that online social media, and gaming addiction, which are considered as new addiction types in recent years, carry a greater risk for adolescents with ADHD [25, 56–58].

When the mean total scores of Online Cognition Scale (OCS), and its subscale scores rated by children and adolescents were examined, all mean OCS subscale and total scores of the ADHD group were found to be significantly higher than those of the control group. Higher OCS scores give an idea about the value attributed to the Internet, and the degree of its priority in the life of the individual. Based on this finding, it can be said that the ADHD group is more prone to use the Internet problematically.

In another study OCS scores of age-matched children, and adolescents with ADHD were reported to be significantly higher than the population in general [59].

The average weekly Internet usage hours and OCS scores of children and adolescents with ADHD who participated in the study were significantly higher than those of the control group, however extreme values were observed when the distribution intervals were examined. What are the differences between children and adolescents with and without problematic Internet and computer in the ADHD group? What are the factors that lead to these differences? In order to investigate the answers to these questions, the ADHD group has been examined within itself in terms of Internet usage patterns. In our study, it was determined that as the duration of internet and computer use of children and adolescents in the ADHD group increased, also OCS scores increased. In other words, as the time spent on the computer and Internet increases the rate of problematic usage increases, the personal importance attributed to the Internet by the user, and its priority in the life of the person also increases. In a study conducted with university students, a significant relationship was found between the OCS scores and the duration of weekly Internet use [55]. Our study also supports this finding. When the relationship between OCS scores and weekly internet usage was examined in the ADHD group, a statistically but moderately significant correlation was found between duration of weekly Internet use, and loneliness/depression, decreased impulse control, social support subscales, and their total scores. The strongest relationship is between the loneliness/depression subscale scores and the duration of Internet use. In a recent review where 20 studies has been evaluated, depression (75%), anxiety (57%), obsessive-compulsive symptoms (60%), aggression (66%), and ADHD (100%) were detected in respective percentages of individuals with problematic internet use. In the light of the relevant literature, as was the case with other age groups, feelings of depression and loneliness were determined as important risk factors for the problematic Internet use among adolescents with ADHD.

When familiarity levels of the cases in the ADHD group with Internet and computer are examined in relation with internet usage patterns, a significant correlation between the factors such as using Internet in daily life, having a computer, and Internet access at home and OCS scores, and weekly Internet use was not detected. Although the duration of computer use (year) of the ADHD group was higher than the control group, no correlation was found between the OCS scores and duration of weekly Internet use.

In a similar study performed with lyceé students, it has been reported that the presence of Internet at home and youngster possessing a computer in his/her private room the is not related to Internet addiction [40]. In a study conducted with university students, any significant correlation was not found between the duration of Internet use by the students in years, OCS scores, and duration of weekly Internet use. Unlike our study, in this study, it was stated that young people with their own computers had higher OCS scores and weekly Internet usage times [55].

When the relationship between the intention of using Internet and computer and Internet use patterns are examined in ADHD group, online games were found to be moderately related to OCS scores, while chatting was also moderately correlated with the duration of weekly use.

In a population-based study, Kormas et al. reported that using the Internet for interactive gaming, chatting, and searching for sexual information is a predictor of problematic Internet use [60]. In the study by Mottram et al. performed with adults aged older than 17 years, using the Internet for gaming and non-business purposes, and being affiliated with online groups predicted problematic Internet use [61]. In his study with adult internet addicts, Bernardi et al. stated that use of Internet for chatting in women, its use for interactive gaming in men is related to Internet dependency [62].

When the relationship between comorbid psychiatric disorders and Internet use patterns in ADHD group was examined, the additional diagnoses of Oppositional Defiant Disorder (ODD) and Conduct Disorder (DB) were found to be significantly related to both the OCS scores and the duration of the weekly Internet use.

When the literature was reviewed, though association between ADHD, and other mental disorders had been mentioned, it was noticed that there were no studies re-

lated to the additional diagnoses of Conduct Disorder, and ODD accompanying ADHD This is thought to be due to the use of different diagnostic tools, the use of self-reporting scale in most studies, and the lack of diagnostic evidence of conduct problems within them, as a result of differences in study methods and assessment methods.

In a recent study conducted in our country with clinical samples selected from adolescents, and children aged 10 to 18 years who were diagnosed with Internet addiction; ADHD was the most frequently diagnosed condition in 83.3% of the patients. In addition, incidence rates of ODD (23%) and CD (15%) were also found similar to the rates in our study, but it was not specified whether these diagnoses accompanied ADHD [63].

When the relationship between SDQ subscale scores and Internet usage patterns is examined in the ADHD group, a moderately significant correlation between OCS scores and emotional problems, conduct problems and total difficulty subscale scores was detected. Only a moderately significant correlation was found between the duration of weekly use, and, the subscales of conduct problems in both SDQ-parent and SDQ-teacher forms. In the study by Kormas et al. where SDQ was used, the presence of a correlation between the conduct problems, hyperactivity subscale scores, and problematic Internet use was indicated [60].

When the relationship between FAS subscale scores and Internet use patterns was examined in the ADHD group, a statistically significant relationship was detected between OCS scores and emotional responsiveness subscale scores only. Moderately positive correlation between the OCS and this subscale indicates that the use of problematic Internet increases when the unhealthy expression of emotional reactions in the family increases. This finding suggests that an adolescent who does not express his/her emotional reactions appropriately or an adolescent who does not receive appropriate emotional responses from his/ her parents use the Internet more inefficiently. This is an important finding. Problems with internet use are common problems encountered in children with ADHD, and interventions to address this need should also address intrafamilial expressions of emotion.

A statistically significant relationship was not found between the duration of weekly Internet use and FAS subscale scores. It has been also observed that other difficulties in family functionality generally increase the parents' negative scores in the SDQ regarding their children, and in this case the adolescents themselves also overestimates conduct problems and mobility symptoms

This condition may be related to two important factors. Firstly, ADHD may be the cause of both maladjustment of family functionality and problematic use of the Internet, and secondly, generally chaotic structure of the families of the adolescent with ADHD may be an additional risk factor that increases the effect of ADHD on the problematic use of the Internet. It seems that conduction of further studies are required related to this issue.

Our study has certain limitations. Only limited number of children were included in the study which is not sufficient to generalize the results. In addition, the study group included cases with ADHD who were admitted to our clinic. Studies in the social sample can give different results. Another limitation is that the selected control group is at a lower socioeconomic level than the ADHD group. However, since the use of the Internet has become so widespread nowadays, the difference between the two groups is not important in terms of access to Internet and computer use.

Conclusion

Our study is one of the first studies that compared the control group with ADHD group in terms of problematic Internet use by youngsters in the early adolescence. It also evaluated family functionality, and its relationship to Internet usage patterns. We hope that this study will shed light on other studies and also promote conduction of further similar studies

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Appendix 1. Relationship between OCS, and FAS Subscale Scores in the ADHD group

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1.	OCS total	-																			
2.	FAS-Problem Solving	0.13	-																		
3.	FAS-Communication	0.26	**.49****	-																	
4.	FAS-Roles	0.19	**.57****	**.58****	-																
5.	FAS-Emotional responsiveness	**0.40****	**.43****	**.69****	**.59****	-															
6.	FAS-Showing required affection	0.19	**.51****	**.41***	**.56****	**.42***	-														
7.	FAS-Conduct control	0.10	**.48****	**.52****	**.61****	**.57****	.22	-													
8.	FAS-General family functionality	0.24	**.71****	**.64****	**.69****	**.63****	**.39***	**.46****	-												
9.	SDQ-Parents TOTAL SCORE	0.27	.07	**.48****	**.37***	**.53****	-.03	.22	**.51****	-											
10.	SDQ-Parents -Emotional Problems	0.30*	-.11	.25	.18	**.46****	-.09	.14	.30	**.65****	-										
11.	SDQ--Parents-Conduct Problems	0.25	.18	**.52****	**.51****	**.35***	.03	.23	**.63****	**.75****	.28	-									
12.	SDQ-Parents-Hyperactivity	-0.02	.07	.40*	**.34***	.30	.10	.24	.26	**.71****	.18	**.48****	-								
13.	SDQ-Parents- Peer relationship problem	-0.26	-.06	.06	-.08	.33	-.19	-.06	.19	**.57****	**.35***	.27	.11	-							
14.	SDQ-Parents- -Social Behaviours	-0.09	**-.35***	**-.40***	**-.39***	.27	-.02	**-.38***	**-.38***	**-.41****	.05	-.47**	-.44**	-.20	-						
15.	SDQ-Adolescent-TOTAL SCORE	**0.44****	.00	.24	.26	.22	.05	.05	**.34***	**.41***	.33	.42**	.06	.36*	.15	-					
16.	SDQ-Adolescent-Emotional Problems	**-0.47****	-.15	.10	.17	.30	.07	-.03	.13	.18	**.42***	.06	-.22	-.34*	.27	**.75****	-				
17.	SDQ-Adolescent-Conduct Problems	**0.41****	**.41***	**.49****	**.44****	**.35***	.21	.29	**.59****	**.45****	.10	.63**	.24	.26	-.21	**.64****	.28	-			
18.	SDQ-Adolescent-Hyperactivity	-0.31	-.17	.07	.16	.00	-.06	.09	.12	.32	.29	.26	.19	.14	.24	**.75****	**.39***	.32	-		
19.	SDQ-Adolescent-Peer relationship problem	-0.24	-	.10	-.25	.05	-.55	-.11	.12	.21	.13*	-.11	.31	.11	**.71****	**.44****		.30	.44*	-	
20.	SDQ--Adolescent-Social Behaviours	-0.28	-.16	-.20	-.09	-.07	.07	-.06	-.32	-.33	-.05	-.34*	-.38*	-.12	.39*	-.11	.22	-.21	-.17	-.21	-

Pearson Correlation Analysis; FAS: Family Assessment Scale; OCS: Online Cognition Scale.