

Association of Internet Addiction in High School Students with ADHD and Tobacco/Alcohol Use

Ozge Metin¹, Ozge Saracli²,
Nuray Atasoy³, Omer Senormanci²,
Vildan Cakir Kardes⁴,
Hasret Ozan Acikgoz⁵,
Esra Demirci⁶, Ulku Besiktepe Ayan⁷,
Levent Atik⁸,
Aysegul Yolga Tahiroglu⁹

¹Assist. Prof. Dr., ⁹Assoc. Prof. Dr., Cukurova University, Faculty of Medicine, Department of Child and Adolescent Psychiatry, Adana - Turkey
²Assist. Prof. Dr., ³Prof. Dr., ³Research Assist.,
⁸Assoc. Prof. Dr., Bulent Ecevit University, Faculty of Medicine, Department of Child and Adolescent Psychiatry, Zonguldak - Turkey
⁴Psychiatrist, Zile State Hospital, Tokat - Turkey
⁶Assist. Prof. Dr., Erciyes University, Faculty of Medicine, Department of Child and Adolescent Psychiatry, Kayseri - Turkey
⁷Psychiatrist, Karabuk University Karabuk Training and Research Hospital, Karabuk - Turkey

ABSTRACT

Association of internet addiction in high school students with ADHD and tobacco/alcohol use

Objective: Our study aims at assessing the association between internet addiction (IA) and attention deficit hyperactivity disorder (ADHD) and tobacco and alcohol use/experimentation in high school students living in the province of Zonguldak.

Method: The study included 771 students enrolled in three high schools. They were assessed with a sociodemographic data form prepared by the researchers, the Chen Internet Addiction Scale (CIAS), and the Adult Attention Deficit Disorder/Attention Deficit Hyperactivity Disorder (ADD/ADHD) Diagnostic and Assessment Inventory based on the DSM-IV.

Results: In 61 cases (7.9%), IA was established, in 90 cases (11.7%) ADHD. Of the cases with IA, 40 (65.6%) were male, 21 (34.4%) female. Internet access from home ($p<0.001$) and tobacco ($p<0.001$) or alcohol ($p<0.001$) use/experimentation history were found to be associated with higher CIAS scores. The rate of ADHD was found to be higher among those with IA (36.1%) than those without IA (9.6%). There was a significant correlation between ADHD scale scores and CIAS scores ($r=0.38$, $p<0.001$).

Conclusion: According to our results, IA is associated with ADHD and alcohol/tobacco use. There is a need for follow-up studies to assess the causality of the association between ADHD, tobacco or alcohol use, and IA.

Keywords: Adolescence, alcohol, attention deficit hyperactivity disorder, internet addiction, tobacco



ÖZET

Lise öğrencilerinde internet bağımlılığının DEHB ve tütün/alkol kullanma ile ilişkisi

Amaç: Çalışmamızda Zonguldak ilinde yaşayan lise öğrencilerinde internet bağımlılığı (İB) ile dikkat eksikliği hiperaktivite bozukluğu (DEHB) ve tütün, alkol kullanma/deneme arasındaki ilişkinin değerlendirilmesi amaçlanmıştır.

Yöntem: Çalışmaya üç lisede okuyan 771 öğrenci alınmıştır. Öğrenciler araştırmacıların hazırladığı sosyodemografik veri formu, Chen İnternet Bağımlılığı Ölçeği (CİBÖ), DSM-IV'e dayalı Erişkin Dikkat Eksikliği Bozukluğu/Dikkat Eksikliği Hiperaktivite Bozukluğu (DE/DEHB) Tanı ve Değerlendirme Envanteri ile değerlendirilmiştir.

Bulgular: Olguların 61'inde (%7.9) İB, 90'ında (%11.7) DEHB saptandı. İB saptanan olguların 40'ı (%65.6) erkek, 21'i (%34.4) kızdı. Evde internet erişiminin olması ($p<0.001$), tütün ($p<0.001$) veya alkol ($p<0.001$) kullanma/deneme öyküsünün olması daha yüksek CİBÖ puanlarıyla ilişkili bulundu. İB olan olgularda DEHB oranı (%36.1) İB olmayan olgulara göre (%9.6) daha yüksek saptandı. DEHB ölçek puanları ile CİBÖ puanları arasında anlamlı ilişki saptandı ($r=0.38$, $p<0.001$).

Sonuç: Çalışmamızın sonuçlarına göre İB ve DEHB, tütün-alkol kullanımı arasında ilişki saptanmıştır. DEHB, tütün veya alkol kullanımı ve İB arasındaki ilişkilerin nedenselliğini değerlendiren izlem çalışmalarına ihtiyaç vardır.

Anahtar kelimeler: Ergenlik, alkol, dikkat eksikliği hiperaktivite bozukluğu, internet bağımlılığı, tütün

Address reprint requests to / Yazışma adresi:
Assist. Prof. Dr. Ozge Metin,
Cukurova University, Faculty of Medicine,
Department of Child and Adolescent
Psychiatry, 01330 Balcali/Adana, Turkey

Phone / Telefon: +90-322-338-6060/3246

Fax / Faks: +90-322-338-6875

E-mail address / Elektronik posta adresi:
drozgem@gmail.com

Date of receipt / Geliş tarihi:
December 30, 2014 / 30 Aralık 2014

Date of acceptance / Kabul tarihi:
February 24, 2015 / 24 Şubat 2015

Data used in this paper have been presented as a poster at the 47th National Psychiatry Congress in Antalya 2011.

INTRODUCTION

The concept of internet addiction (IA) was first described academically by Young (1), proposing symptoms such as excessive occupation with the internet, a feeling of need to use the internet, repeated attempts at stopping internet use, a loss of importance of times spent away from the internet, spending more time than planned on the internet, feeling excessively uneasy when away from the internet, potentially creating social problems. A number of terms are used to describe negative effects of internet use, such as problematic internet use (2), compulsive internet use (3), pathologic internet use (4), internet-related problems (5), and IA (1). In chapter 3 of the DSM-5, which includes conditions requiring further clinical research and experience, internet gaming disorder has been included (6). In this article, we will use the term IA.

While internet use is spreading rapidly, IA can lead to serious problems in children and adolescents whose physical and psychological development is not yet complete (7). According to data from the Turkish Statistical Institute (TUIK) for the year 2013, among persons between 16 and 74 years of age, 39.5% describe themselves as regular internet users. TUIK reports that males in all age groups are using the internet more, and the most frequent users are individuals between 16 and 24 years of age (8). The prevalence of IA among adolescents in Europe (1-9%) and the Middle East (1-12%) is at a similar level, while for Asia (2-18%) a higher level has been reported (9). According to studies carried out in Turkey, IA prevalence among young persons ranges between 1.2 and 24.2% (10-15).

In more than half the adolescent IA cases, another psychiatric disorder is reported as comorbidity (16). In young individuals, IA is often seen together with other psychiatric disorders such as attention deficit hyperactivity disorder (ADHD), depression, social anxiety disorder, pathologic addiction to gambling, and substance use disorder (9,17,18). Many studies show an association between IA and ADHD in children and adolescents (17-20).

The association of IA with tobacco, alcohol, and substance use is another topic being dwelled upon (21,22). According to problem-behavior theory, social environment, perceived environment, and psychological predispositions such as personality and behavior are components of the psychosocial framework influencing the development of problems such as alcohol, tobacco, and substance use (22). It has been emphasized that from this theoretical point of view, IA can be grouped together with other problem behaviors (22).

In the trilemma of IA, ADHD, and addiction, some questions in important areas such as the cause-effect relation, specific risk groups, risk factors or protective measures are still waiting to be answered. This study examines the relations between IA, ADHD, and tobacco/alcohol use/experimentation one by one. Our basic hypothesis is that in cases with IA, ADHD and alcohol/tobacco use/experimentation will be more common. This is the first study researching the association of IA, ADHD, and tobacco/alcohol use/experimentation among adolescents living in the province of Zonguldak. It is also the first study in Turkey to use the Chen Internet Addiction Scale in the assessment of IA and the first one to assess the relations between IA, ADHD, and tobacco/alcohol use/experimentation individually.

METHOD

To recruit the study sample, a total of three high schools in the province were determined, 2 out of the 9 with admission by exam and 1 out of the 3 not requiring an entrance exam, using the stratified cluster sampling method. Targeted were all 796 students enrolled in grades 9, 10, and 11. The Provincial Directorate for National Education decided that it would not be appropriate to include students from the last grade preparing for the university entrance exam. Participation in the study was entirely voluntary. As 25 students (3.1%) refused to participate, the sample consisted of 771 students. The study was carried out in April 2011. Approval from the university ethics committee and the Provincial Directorate for National Education was obtained. All students were informed

about study method and scales to be applied; they gave their written assent with a consent form. A sociodemographic data form prepared by the researchers, the Chen Internet Addiction Scale (CIAS) (24-26), and the Adult Attention Deficit Disorder/Attention Deficit Hyperactivity Disorder (ADD/ADHD) Diagnostic and Assessment Inventory based on the DSM-IV (27) were administered to the participants in a single session in randomized order. In the classroom environment, completing all forms and scales took around 30-35 minutes. Of the students who had agreed to participate, 771 (100.0%) filled in the CIAS, 764 (99.1%) the Adult ADD/ADHD Diagnostic and Assessment Inventory based on the DSM-IV completely; hence, scores of these cases were used for the analyses.

Measures

Data were collected using a sociodemographic data form, CIAS, and the Adult ADD/ADHD Diagnostic and Assessment Inventory based on the DSM-IV.

Sociodemographic Data Form: The form prepared by the researchers included questions about the student's age, sex, grade, parents' education, availability of internet access at student's home, and the student's tobacco/alcohol experimentation/use status.

Chen Internet Addiction Scale (CIAS): The original version of the scale was prepared for a study by Chen et al. (24), based on DSM-IV scales for substance abuse and addiction. It consists of 26 items and uses a Likert-type scale with 1-4 points. Total score ranges between 26 and 84 points. The CIAS includes five subscales, namely, compulsive use, withdrawal, tolerance, time management problems, and interpersonal and health problems (25). It has been reported that the CIAS is a useful scale to measure the intensity of IA in adolescents. Cut-off point in the original version was 57/58 for screening and 63/64 for diagnosis (25). A study to confirm the validity and reliability of the Turkish scale was undertaken by Kesici and Sahin (26).

Adult ADD/ADHD Diagnostic and Assessment Inventory based on the DSM-IV:

The Adult ADD/ADHD Diagnostic and Assessment Inventory based on the DSM-IV was developed by Turgay. It consists of three subsections: Attention deficit (AD), Hyperactivity (HA), and attributes and problems relating to ADHD. In assessing the scale, 0 and 1 points are valued as negative, 2 and 3 points as positive. In the assessment made with this inventory, cases meeting at least 6 criteria in the AD and/or the HA section were counted as meeting the diagnostic criteria for ADHD. Higher scores demonstrate a more severe psychopathology. Adult ADHD Scale was developed by A. Turgay in Canada in 1995 and was also translated to Turkish by him. Validity and reliability of the scale in Turkish were confirmed in a study by Gunay et al. (27). Parent attitude was assessed, based on questions in the scale, under the 4 categories of autocratic-oppressive, democratic, over-protective, and indifferent.

Statistical Analysis

Data obtained in the study were statistically analyzed using the SPSS 17 for Windows package. According to the Kolmogorov-Smirnov test, not all variables were normally distributed; hence non-parametric statistical methods were used. For the comparison of quantitative data, Mann-Whitney U (MW-U) test was used. The Chi-square test was used to establish if there were inter-group differences regarding categorical variables. Spearman correlation analysis was carried out to determine relations between scales. In the tables, numerical variables are expressed as mean±standard deviation (mean±SD) and median (minimum-maximum), categorical variables are given as number of observations (n) and percentage (%). Significance level was set at $p < 0.05$.

RESULTS

Our study included 771 students from three different high schools, with a mean age of 16.9 ± 0.9 (14-19), 311 (40.3%) male, 460 (59.7%) female. Of these, 296

Table 1: Sociodemographic variables according to the presence of internet addiction

	CIAS score		p
	Addicted; n (%)	Non-addicted; n (%)	
Sex			
Male	40 (65.6)	271 (38.2)	<0.001
Female	21 (34.4)	439 (61.8)	
Internet access at home	57 (93.4)	519 (73.3)	<0.001
Parent attitude			
Democratic	29 (49.2)	471 (68.4)	0.010
Autocratic-oppressive	10 (16.9)	68 (9.9)	
Over-protective	17 (28.8)	145 (21.0)	
Indifferent mother-father	3 (5.1)	5 (0.7)	

Chi square test, CIAS: Chen Internet Addiction Scale.

Table 2: Scale scores according to the gender

	Female	Male	Total	p
CIAS	36.0±9.9	41.4±13.0	38.2±11.6	<0.001
Compulsive internet use	7.6±2.6	8.7±3.1	8.0±2.9	<0.001
Withdrawal	7.2±2.7	8.5±3.5	7.8±3.1	<0.001
Tolerance	6.0±2.3	7.2±3.0	6.5±2.7	<0.001
Time management	6.2±1.8	7.2±2.6	6.6±2.2	<0.001
Interpersonal and health problems	8.8±2.7	10.0±3.6	9.2±3.1	<0.001
ADHD scale	41.2±20.9	40.8±22.3	41.0±21.4	0.589

MW-U: Mann Whitney-U, CIAS: Chen Internet Addiction Scale, ADHD: Attention Deficit Hyperactivity Disorder.

(38.4%) were enrolled in the 1st grade of senior high school, 272 (35.3%) in the 2nd grade, and 203 (26.3%) in the 3rd grade. Maternal education level was found to be primary school and below in 332 cases (43.3%), while paternal education level in 354 cases (46.8%) reached middle school or high school. Parent attitude was defined as democratic in 500 cases (66.8%), over-protective in 162 cases (21.7%), autocratic-oppressive in 78 cases (10.4%), and indifferent in 8 cases (1.1%). 576 cases (74.9%) stated that they had internet access at home. Tobacco use/experimentation was found in 167 cases (21.7%), alcohol use/experimentation in 98 cases (12.7%).

In the comparative analyses, cases were categorized into two groups, those above the cut-off point specified in the original CIAS (57/58) classed as addicted, those below as non-addicted. 61 cases (7.9%) were included in the "addicted" group. Table 1 shows the sociodemographic variables according to the presence of IA. In the addicted group, male sex is dominant, and the ratio of those with internet access at home is higher

than among those with no internet access (Table 1). In the addicted group, autocratic-oppressive, indifferent, and over-protective parent attitudes were found at a higher rate than in the non-addicted group (Table 1). The education level of the parents did not differ between the groups.

In the assessment made with the Adult ADD/ADHD Diagnostic and Assessment Inventory based on the DSM-IV, cases meeting at least 6 criteria in the AD and/or the HA section were counted as meeting the diagnostic criteria for ADHD. According to this inventory, ADHD was found in 90 cases (11.7%). The scale scores according to the gender are shown in Table 2. Of the girls with ADHD, 9 (40.9%) fell into the IA group, of the boys 13 (59.1%) ($p=0.179$). The mean CIAS score of the ADHD cases (44.8 ± 15.9) was significantly higher than the score of the non-ADHD cases (37.3 ± 10.6) ($p<0.001$).

ADHD and alcohol/tobacco use according to the presence of IA is shown in Table 3. Mean CIAS score in cases with a history of tobacco use/experimentation

Table 3: ADHD and alcohol/tobacco use according to the presence of internet addiction

	Addedictd	Non-addedictd	p
	n (%)	n (%)	
ADHD			
Present	22 (36.1)	68 (9.6)	<0.001 ^a
Absent	39 (63.9)	642 (90.4)	
ADHD subtype			
Attention deficit	4 (18.2)	18 (26.5)	<0.001 ^a
Hyperactivity	9 (40.9)	37 (54.4)	
Combined type	9 (40.9)	13 (19.1)	
Total ADHD score	61.3±22.1	39.3±20.5	<0.001 ^b
Tobacco use/experimentation			
Present	18 (29.5)	149 (21.0)	0.121 ^a
Absent	43 (70.5)	561 (79.0)	
Alcohol use/experimentation			
Present	11 (18.0)	87 (12.3)	0.195 ^a
Absent	50 (82.0)	622 (87.7)	

^aChi square, ^bMW-U: Mann Whitney-U, ADHD: Attention Deficit Hyperactivity Disorder

(41.0±12.5) was significantly higher than in cases without such a history (37.4±11.2) ($p<0.001$). Mean CIAS score in cases with alcohol use/experimentation history (43.4±12.3) was higher than in cases without such a history (37.6±11.4) ($p<0.001$).

Between ADHD scale total score and CIAS total score, Spearman correlation analysis established a significant positive correlation ($r=0.38$, $p<0.001$). In girls and boys, Spearman correlation analysis established a significant positive correlation in girls and boys ($r=0.36$, $p<0.0001$; $r=0.45$, $p<0.001$, respectively).

DISCUSSION

While the result of our study examining IA alongside ADHD and tobacco-alcohol use/experimentation supports our hypothesis by showing a significantly elevated rate of ADHD in the presence of IA, it is worth noting that the same correlation was not found for tobacco and alcohol use/experimentation.

In our high school sample, we found an IA rate of 7.9%, ADHD 11.7%, tobacco use/experimentation 21.7%, and alcohol use/experimentation 12.7%. Studies carried out with adolescents report various IA rates, depending on the methods of measurement applied. Studies applying CIAS determined IA rates in adolescents between 7.5 and 19.4% (28,29). Two studies conducted

with high school samples in Turkey found IA rates of 6.6% and 24.2%, respectively (13,30). A study done among adolescents in seven European countries found that 13.9% displayed non-functional internet use (31). The IA rate in our sample was lower than in the Far Eastern societies where the scale was developed but close to the rates found in Western countries.

While the majority of studies reports IA to be more common in males (13,32), there are also studies that have not found any difference in IA by gender (33). Our results support findings suggesting that IA is found more commonly in males.

Many studies have shown the association of IA with individual, familial, and environmental risk factors (9,29). Our finding that IA rates are higher in cases with internet access from home show parallels with publications stating that internet availability is a risk factor for IA (29,30). In the modality of children's use of internet and other media, families are playing an important role. Parents' knowledge about the risks of abusing media tools is the most determining factor for the prevention of addiction (34). While there are studies that, similar to our results, did not find a correlation between the parents' level of education and IA (13,33), there are other studies that found a lower education level of fathers in IA cases (35) or established a high paternal education level as a risk factor for IA (36). These

contradictory results suggest that, rather than the high level of education, the level of knowledge specific to the issue may be more predictive. It can be expected that once knowledge and awareness have been achieved at a societal level, in societies where parents are generally sensitive to the IA risk and to protection from this danger, parent information can increasingly save children and adolescents from IA more effectively. On the other hand, we should not forget that in developing societies like in Turkey, this balance may be tipped in the other direction. Therefore, more comprehensive studies are needed to assess parents' awareness levels and their attitude to children's use of media tools in more detail.

In studies determining parents' attitudes in IA cases, expressions such as "strict, inflexible" (37), "punitive, interfering-rejecting" (38), "over-controlling, inconsistent" (39), "less supportive, cold" (36), or "protective" (38) are frequently found. The fact that our study found unhealthy parent attitudes such as autocratic-oppressive, uncaring, and over-protective to be elevated in the IA group parallels results from other relevant studies. When assessing our findings, we need to consider that data about parent attitude is based on a single question, attitudes of the two parents have not been assessed individually, and the adolescents' perception of their parents may not entirely reflect reality.

With regard to the frequency of addictive substance use reported in the literature, in conformity with our results, in developing countries tobacco is found in the first place (40), while in European countries alcohol is the leading substance (41). There are studies showing that alcohol use increases the IA risk (33) and that in a large proportion of IA cases substance use experimentation is present (21,42). A study with adolescents in Korea reported that alcohol use did not constitute a risk for IA in the entire cohort, but in girls it was found as a risk, while in males, tobacco use was a risk factor for IA (35). Uneri et al. (13), analyzing a high school sample in Turkey, did not find a statistically significant effect of adolescents' smoking on IA scores. From the literature, it has become clear that there is a relationship between increased novelty-seeking behavior and adolescent substance use (43) and IA (42);

at the same time, novelty/pleasure seeking and low reward dependence create a predisposition for IA (29). While in our study mean CIAS scores in cases with tobacco or alcohol use/experimentation were found to be elevated, the level of tobacco or alcohol use/experimentation rates in IA cases was not statistically significant. We think that our results may have been affected by the fact that alcohol and cigarette use are socially proscribed behaviors, inducing especially adolescents with problematic behavior to conceal their cigarette and alcohol use.

It has been reported that in ADHD cases IA is seen more frequently; that the presence of ADHD indicates a higher addiction score and, according to some studies, that the most commonly found comorbidity in IA is ADHD (17,18,20). While most studies on IA are cross-sectional, one research following adolescents for 2 years indicated that one of the strongest risk factors for IA is ADHD (44). One study made with a high school sample in Turkey found an association between attention deficit and hyperactivity symptoms and the IA score (30). In our research, the ADHD rate in increased scores in IA cases, the significant positive correlation between CIAS and ADHD scores and the elevated CIAS scores in ADHD cases are consistent with results from other studies assessing the association of ADHD and IA.

IA rates in girls and boys with ADHD were not different, and the significant positive correlation between CIAS and ADHD scores was valid for both sexes. Aside from studies reporting that the association of ADHD and IA is more prominent in female students (44), there are also studies stating, consistent with our results, that ADHD is correlated with both sexes (18).

Regarding subtypes of ADHD found in our IA cases, subtype HA and combined type were found at the same rate and more common than the type dominated by AD (Table 3). In a study made with adolescents in China, a significant positive correlation was found between IA scores and impulsivity and attention scores (19). In the literature, ADHD is often characterized by increased reward sensitivity, getting bored easily (45), preference for fast changing and quickly response-producing stimuli, orientation towards smaller, short-term rewards rather than long-term rewards, impulsivity (19) and

disinhibition (46). It has been suggested that these characteristics are sufficiently catered to by internet use or that self-control deficits intrinsic to ADHD may increase the predisposition for IA (17,45). Furthermore, it has been proposed that IA might be a new subtype of impulse control disorder (47). Questions such as “is impulsivity a risk factor for IA or a result of IA, or can both hypotheses be valid?” still remain to be answered (48). A close association between IA and impulsivity is consistent with our findings that in IA cases ADHD subtype HA and combined type are more commonly found.

The most important limitations of our study are the exclusive reliance on self-report scales rather than clinical assessment and the undifferentiated assessment of tobacco-alcohol use and experimentation. Furthermore, when assessing IA, relevant factors such as duration, location, and

purpose of use have not been considered. Given the cross-sectional design, causal relations between the variables included could not be assessed.

In the high school sample, assessment with CIAS showed, consistent with the literature, that IA is more prevalent in youths with ADHD. Though tobacco-alcohol use/experimentation rates were found to be statistically similar in youths with and without IA, CIAS scores in adolescents with tobacco-alcohol use/experimentation were higher than in those not using tobacco or alcohol. We maintain that our results are important for the joint assessment of IA, ADHD, and tobacco-alcohol use/experimentation and the establishment of a close association between each pair of these three states. There is a need for future follow-up studies to elucidate the mechanisms behind the association between IA, ADHD, and tobacco-alcohol use and the causality of these relations.

REFERENCES

1. Young KS. Internet addiction: a new clinical phenomenon and its consequences. *Am Behav Sci* 2004; 48:402-415. [\[CrossRef\]](#)
2. Caplan SE. Problematic Internet use and psychosocial well-being: development of a theory-based cognitive-behavioral measurement instrument. *Comput Human Behav* 2002; 18:553-575. [\[CrossRef\]](#)
3. Meerkerk GJ, Van Den Eijnden RJ, Garretsen HF. Predicting compulsive Internet use: it's all about sex! *Cyberpsychol Behav* 2006; 9:95-103. [\[CrossRef\]](#)
4. Davis RA. A cognitive-behavioral model of pathological Internet use. *Comput Human Behav* 2001; 17:187-195. [\[CrossRef\]](#)
5. Widyanto L, Griffiths M, Brunnsden V, McMurrin M. The psychometric properties of the Internet related problem scale: a pilot study. *Int J Ment Health Addiction* 2008; 6:205-213. [\[CrossRef\]](#)
6. Petry NM, Rehbein F, Gentile DA, Lemmens JS, Rumpf HJ, Mößle T, Bischof G, Tao R, Fung DS, Borges G, Auriacombe M, González Ibáñez A, Tam P, O'Brien CP. An international consensus for assessing internet gaming disorder using the new DSM-5 approach. *Addiction* 2014; 109:1399-1406. [\[CrossRef\]](#)
7. Tsai CC, Lin SSS. Internet addiction of adolescents in Taiwan: an interview study. *Cyberpsychol Behav* 2003; 6:649-652. [\[CrossRef\]](#)
8. <http://www.tuik.gov.tr/PreHaberBultenleri.do?id=13569>. Study on Information Technology Use in Households, 2013 Accessed: 12.06.14. (Turkish)
9. Spada MM. An overview of problematic Internet use. *Addict Behav* 2014; 39:3-6. [\[CrossRef\]](#)
10. Senormanci O, Saracli O, Atasoy N, Senormanci G, Kokturk F, Atik L. Relationship of internet addiction with cognitive style, personality, and depression in university students. *Compr Psychiatry* 2014; 55:1385-1390. [\[CrossRef\]](#)
11. Batigun AD, Hasta D. Internet addiction: an evaluation in terms of loneliness and interpersonal relationship styles. *Anatolian Journal of Psychiatry* 2010; 11:213-219. (Turkish)
12. Batigun AD, Kilic N. Relations between internet addiction and personal characteristics, social support, psychological symptoms, and some socio-demographic variables. *Turkish Journal of Psychology* 2011; 26:1-10. (Turkish)
13. Uneri OS, Tanidir C. Evaluation of internet addiction in a group of high school students: a cross-sectional study. *Dusunen Adam The Journal of Psychiatry and Neurological Sciences* 2011; 24:265-272. (Turkish) [\[CrossRef\]](#)
14. Canbaz S, Sunter AT, Peksen Y, Canbaz M. Prevalence of pathological internet use in a sample of Turkish school adolescents. *Iran J Public Health* 2009; 38:64-71.

15. Aktepe E, Olgac-Dundar N, Soyoz O, Sonmez Y. Possible internet addiction in high school students in the city center of Isparta and associated factors: a cross-sectional study. *Turk J Pediatr* 2013; 55:417-425.
16. Tsitsika A, Critselis E, Louizou A, Janikian M, Freskou A, Marangou E, Kormas G, Kafetzis D. Determinants of Internet addiction among adolescents: a case-control study. *Scientific World Journal* 2011; 11:866-874. **[CrossRef]**
17. Yoo HJ, Cho SC, Ha J, Yune SK, Kim SJ, Hwang J, Chung A, Sung YH, Lyoo IK. Attention deficit hyperactivity symptoms and internet addiction. *Psychiatry Clin Neurosci* 2004; 58:487-494. **[CrossRef]**
18. Yen JY, Ko CH, 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 Adolesc Health* 2007; 41:93-98. **[CrossRef]**
19. Cao F, Su L, Liu T, Gao X. The relationship between impulsivity and Internet addiction in a sample of Chinese adolescents. *Eur Psychiatry* 2007; 22:466-471. **[CrossRef]**
20. Tahiroglu AY, Celik GG, Fettahoglu C, Yildirim V, Toros F, Avci A, Ozatalay E, Uzel M. Problematic internet use in the psychiatric sample compared community sample. *Archives of Neuropsychiatry* 2010; 47:241-246. (Turkish)
21. Lee YS, Han DH, Kim SM, Renshaw PF. Substance abuse precedes Internet addiction. *Addict Behav* 2013; 38:2022-2025. **[CrossRef]**
22. Ko CH, Yen JY, Yen CF, Chen CS, Weng CC, Chen CC. The association between Internet addiction and problematic alcohol use in adolescents: the problem behavior model. *Cyberpsychol Behav* 2008; 11:571-576. **[CrossRef]**
23. Hays RD, Stacy AW, DiMatteo MR. Problem behavior theory and adolescent alcohol use. *Addict Behav* 1987; 12:189-193. **[CrossRef]**
24. Chen SH, Weng LJ, Su YJ, Wu HM, Yang PF. Development of Chinese Internet Addiction Scale and its psychometric study. *Chin J Psychol* 2003; 45:279-294. (Chinese)
25. Ko CH, Yen JY, Chen CC, Chen SH, Yen CF. Gender differences and related factors affecting online gaming addiction among Taiwanese adolescents. *J Nerv Ment Dis* 2005; 193:273-277. **[CrossRef]**
26. Kesici S, Sahin I. Turkish adaptation study of Internet Addiction Scale. *Cyberpsychol Behav Soc Netw* 2010; 13:185-189. **[CrossRef]**
27. Gunay S, Savran C, Aksoy UM, Maner F, Turgay A, Yargic I. The norm study, transliter equivalence, validity, reliability of adult hyperactivity scale in Turkish adult population. *Psychiatry in Turkiye* 2006; 8:98-107. (Turkish)
28. Ko CH, Yen JY, Yen CF, Chen CC, Yen CN, Chen SH. Screening for Internet addiction: an empirical study on cut-off points for the Chen Internet Addiction Scale. *Kaohsiung J Med Sci* 2005; 21:545-551. **[CrossRef]**
29. Ko CH, Yen JY, Yen CF, Lin HC, Yang MJ. Factors predictive for incidence and remission of internet addiction in young adolescents: a prospective study. *Cyberpsychol Behav* 2007; 10:545-551. **[CrossRef]**
30. Ozturk FO, Ekinci M, Ozturk O, Canan F. The relationship of affective temperament and emotional-behavioral difficulties to internet addiction in Turkish teenagers. *ISRN Psychiatry* 2013; 2013:961734. **[CrossRef]**
31. Tsitsika A, Janikian M, Schoenmakers TM, Tzavela EC, Olafsson K, Wójcik S, Macarie GF, Tzavara C, Richardson C. Internet addictive behavior in adolescence: a cross-sectional study in seven European countries. *Cyberpsychol Behav Soc Netw* 2014; 17:528-535. **[CrossRef]**
32. Durkee T, Kaess M, Carli V, Parzer P, Wasserman C, Floderus B, Apter A, Balazs J, Barzilay S, Bobes J, Brunner R, Corcoran P, Cosman D, Cotter P, Despalins R, Graber N, Guillemin F, Haring C, Kahn JP, Mandelli L, Marusic D, Mészáros G, Musa GJ, Postuvan V, Resch F, Saiz PA, Sisask M, Varnik A, Sarchiapone M, Hoven CW, Wasserman D. Prevalence of pathological internet use among adolescents in Europe: demographic and social factors. *Addiction* 2012; 107:2210-2222. **[CrossRef]**
33. Lam LT, Peng ZW, Mai JC, Jing J. Factors associated with Internet addiction among adolescents. *Cyberpsychol Behav* 2009; 12:551-555. **[CrossRef]**
34. Barkin S, Ip E, Richardson I, Klinepeter S, Finch S, Krcmar M. Parental media mediation styles for children aged 2 to 11 years. *Arch Pediatr Adolesc Med* 2006; 160:395-401. **[CrossRef]**
35. Heo J, Oh J, Subramanian SV, Kim Y, Kawachi I. Addictive internet use among Korean adolescents: a national survey. *PLoS One* 2014; 9:e87819. **[CrossRef]**
36. Li W, Garland EL, Howard MO. Family factors in Internet addiction among Chinese youth: A review of English- and Chinese-language studies. *Comput Human Behav* 2014; 31:393-411. **[CrossRef]**
37. Liang L, Tang D, Tao R. Family function of the adolescents with excessive Internet usage. *Chin Ment Health J* 2007; 21:837-840.
38. Lang Y, Jia F, Li H, Su L. Investigation and analysis of related factors of junior middle school students with Internet addiction disorder. *Chinese Journal of Clinical Psychology* 2008; 16:417-419.
39. Li Y. Internet addiction and family achievement, control, organization. *Chin Ment Health J* 2007; 21:244-246.

40. Acuda SW, Eide AH. Epidemiological study drug use in urban and rural secondary schools in Zimbabwe. *Cent Afr J Med* 1994; 40:207-212.
41. Hibell B, Anderson B, Bjarnason T, Kokkevi A, Morgan M, Narusk A. The 1995 ESPAD Report: Alcohol and other drug use among students in 26 European countries. The Swedish Council for Information on Alcohol and other Drugs, Stockholm, 1997.
42. Ko CH, Yen JY, Chen CC, Chen SH, Wu K, Yen CF. Tridimensional personality of adolescents with Internet addiction and substance use experience. *Can J Psychiatry* 2006; 51:887-894.
43. Kuo PH, Yang HJ, Soong WT, Chen WJ. Substance use among adolescents in Taiwan: associated personality traits, incompetence, and behavioral/emotional problems. *Drug Alcohol Depend* 2002; 67:27-39. **[CrossRef]**
44. Ko CH, Yen JY, Chen CS, Yeh YC, Yen CF. Predictive values of psychiatric symptoms for Internet addiction in adolescents: a 2-year prospective study. *Arch Pediatr Adolesc Med* 2009; 163:937-943. **[CrossRef]**
45. Castellanos FX, Tannock R. Neuroscience of attention-deficit/hyperactivity disorder: the search for endophenotypes. *Nat Rev Neurosci* 2002; 3:617-628. **[CrossRef]**
46. Sun DL, Chen ZJ, Ma N, Zhang XC, Fu XM, Zhang DR. Decision-making and prepotent response inhibition functions in excessive internet users. *CNS Spectr* 2009; 14:75-81.
47. Meerkerk GJ, Van Den Eijnden RJJM, Franken IHA, Garretsen HFL. Is compulsive Internet use related to sensitivity to reward and punishment, and impulsivity? *Comput Human Behav* 2010; 26:729-735. **[CrossRef]**
48. Lin SSJ, Tsai CC. Sensation seeking and internet dependence of Taiwanese high school adolescents. *Comput Human Behav* 2002; 18:411-426. **[CrossRef]**