Psychiatria Danubina, 2014; Vol. 26, No. 4, pp 330-339 *Original paper*

HIGH RISK OF INTERNET ADDICTION AND ITS RELATIONSHIP WITH LIFETIME SUBSTANCE USE, PSYCHOLOGICAL AND BEHAVIORAL PROBLEMS AMONG 10th GRADE ADOLESCENTS

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received: 16.5.2014; revised: 28.8.2014; accepted: 5.9.2014

SUMMARY

Background: *The aim of this study was to investigate the relationship of higher risk of Internet addiction (HRIA) with lifetime substance use, psychological and behavioral factors among Turkish 10th grade students.*

Subjects and methods: *Cross-sectional online self-report survey conducted in 45 schools from the 15 districts in Istanbul, Turkey. A representative sample of 4957 10th grade students was studied between October 2012 and December 2012. Other than sociodemographic variables the survey included the Addiction Profile Index Internet Addiction Form-Screening Version (BAPINT-SV) and the Psychological Screening Test for Adolescents (PSTA).*

Results: *The participants were classified into two groups as those with HRIA (15.96%) and those with lower risk of Internet addiction. The rate of HRIA was higher in the males. The findings indicated that HRIA is related with negative consequences in school, lifetime use of tobacco, alcohol and/or drug, suicidal thoughts, self-harming and delinquent behaviors.*

Conclusions: *Male gender, lifetime use of tobacco, alcohol and/or drug, depression, attention deficit and hyperactivity symptoms and lack of assertiveness predicted the HRIA in Turkish 10th grade students. Being aware of those with HRIA is important in prevention and management of Internet addiction as well as other important problems among students, such as substance use.*

Key words: *internet addiction - substance abuse - depression - adolescents - Turkey*

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INTRODUCTION

Internet use is very common all around the world, especially for work, academic and recreational purposes. As opposed to these positive aspects, frequent and prolonged periods of Internet use is associated with psychological and sociological problems in adolescents (Lin & Tsai 2002, Kim et al. 2006, Yen et al. 2007a, Gunuc & Dogan 2013). In 2012, approximately one-third of the world's population has access to the Internet (IWS 2012a). Similarly, research demonstrated that wide and increasing use of the Internet is valid for Turkey as well (Turkish Statistical Institute 2012). Turkey is the 15th among the countries in the world with the highest number of Internet users (IWS 2012b). Since adolescents are more interested in technology, they use the Internet more often than other age groups (Gunuc & Dogan 2013). Heavy use of the Internet among adolescents, who are not yet psychologically mature and are still trying to adapt to social environments, may put them at risk for Internet addiction (IA) (Tsai & Lin 2003).

The lack of a standardized definition and diagnostic instruments that show adequate reliability and validity across countries are significant limitations in the evaluation of IA. Therefore, IA, or in other words loss of control on Internet use, has also been called under different names such as problematic Internet use, heavy Internet use, compulsive Internet use, maladaptive Internet use and pathological Internet use (PIU) (Ko et al. 2012, Durkee et al. 2012). As a result, these concepts can be referred to interchangeably since the terminology used in describing the condition is relatively inconsistent. In a recent review, it was reported that the occurrence rate of IA among adolescents ranged from 1.98% to 35.8% in Western and non-Western countries (Shek et al. 2013). Several factors on the conceptual and methodological levels have been proposed to explain the discrepancy among these findings, such as the use of different instruments, diagnostic criteria, samples, and research designs. Nevertheless, the rate of IA among high school students in Turkey was 11.6% (Canan et al. 2010) and the rate of moderate to high severe IA was 12.2% among Turkish university students (Dalbudak et al. 2013a). While the use of the Internet is wide and increasing, the psychological problems related to IA have been frequently reported in the literature, especially among young people (Ko et al. 2012, Durkee et al. 2012, Carli et al. 2013). A large body of evidence supported the gender difference in IA such that males are more likely to be involved in frequent Internet use (Chou et al. 2005, Durkee et al. 2012, Carli et al. 2013) and scored higher on risks but lower on protective factors of IA (Li et al. 2010) than females, which may explain the gender difference in IA.

Common correlates of IA in adolescents include losing their control on the Internet use and escalating amounts of time spent online, resulting with impairments in daily functioning, school performance, interpersonal and family relationships (Lin & Tsai 2002, Yang & Tung 2007, Park et al. 2007, Choi et al. 2009, Lam et al. 2009a, Milani et al. 2009). IA in adolescence may lead to engagement in risky activities (Tsitsika et al. 2011), self-harming behavior (Lam et al. 2009b) and suicidal ideation or attempt (Fu et al. 2010). The IA is also comorbid with other psychological symptoms and psychiatric disorders (Ko et al. 2012). For instance, in adolescents, the IA has been found to be associated with impairments in relationships (Milani et al. 2009) and has been reported to be comorbid with elevated depressive (Kim et al. 2006, Ha et al. 2007, Jang et al. 2008), hyperactive-impulsive symptoms (Yoo et al. 2004, Cao et al. 2007, Fu et al. 2010), attention-deficit hyperactivity disorder (Yen et al. 2007a, Carli et. al. 2013, Dalbudak et al. 2013b), hostility (Yen et al. 2007a), impulsivity (Cao et al. 2007, Dalbudak et al. 2013a) and aggression (Yang at al. 2005, Ko et al. 2009a, 2009b). Research also indicates that adolescents with high IA score are significantly lower on extraversion compared to non-addicted adolescents (van der Aa et al. 2009, Kuss et al. 2013). Thus, there are several psychological vulnerabilities associated with HRIA, including introversion, depression, aggression, and substance abuse (Scealy et al. 2002, Caplan 2006, Caplan et al. 2009, Selfhout et al. 2009, Senormanci et al. 2014). These psychological factors may predispose individuals to social isolation in their real lives, so they seek to fulfill their interpersonal needs from the Internet, and are thus vulnerable to IA (McKenna & Bargh 2000).

The description of IA has been constructed from the features of substance dependence due to similarities with tolerance levels and withdrawal (Young 1998, Anderson 2001). Consistent with this, adolescents with IA are more likely to engage in other chemical addiction-related behaviors, such as smoking experience (Sung et al. 2013), drug use (Ko et al. 2006, Gong et al. 2009, Fisoun et al. 2012, Sung et al. 2013) and problematic alcohol use (Ko et al. 2008), suggesting that IA may be part of a broader syndrome of dysfunctional preoccupations in vulnerable youth (Griffiths & Wood 2000, Shaffer et al. 2004, Pallanti et al. 2006, Ko et al. 2008, Sung et al. 2013). Also there are few studies relating substance use and IA (Ko et al. 2006, Fisoun et al. 2012, Sung et al. 2013, Lee et al. 2013). Adolescents who have substance use experience and are abusing the Internet as well appear to share some common personality characteristics, namely high novelty seeking, high harm avoidance, and low reward dependence according to Cloninger's personality model (Ko et al. 2006) and those that are classified under the label of "psychoticism" in the Eysenck's personality model (Fisoun et al. 2012). It is known that the most promising route to effective strategies for the prevention of adolescent substance use (Hawkins et al. 1992) and Internet abuse (Tsitsika et al. 2011) is through the identification of risk factors for these addictive behaviours. Thus, assessing the interaction between higher risk of IA (HRIA) and substance use and the variables, such as psychological and behavioral problems which may have effect on this interaction may allow discerning both risk as well as protective factors for IA and substance use in adolescents (Kuss et al. 2013).

Evaluating the factors that are related with HRIA at this level is important to manage this problem since it is expected to become IA. This is the first study considering HRIA among 10th grade students that represents Istanbul. Located between Europe and Asia with a population of 15 million, Istanbul is the biggest city of Turkey which is a developing country with majority being Muslim. Thus evaluating the relationship between HRIA and substance use among high school students in Istanbul is very important not just for Turkish youth, but possibly for youth in many other developing and/or Muslim nations (Pumariega et al. 2014). Nevertheless, since not only religious factors but also cultural differences and governmental restrictions on the Internet use may differ between countries, evaluation of HRIA in Turkish 10th grade students in Istanbul may also help to understand regional differences when compared to other countries. Finally, although there are web-based large scale survey studies conducted in South Korea that evaluated the correlation between substance abuse and IA in adolescents (Sung et al. 2013, Lee et al. 2013), as far as we know, this is the first study that evaluated the relationship of HRIA with psychological and behavioral problems together with lifetime use of substance. The aim of this study was to investigate the relationship of HRIA with variables such as lifetime use of substance, psychological and behavioral factors among 10th grade students in Istanbul/Turkey.

SUBJECTS AND METHODS

Subjects and Procedure

In Turkey, elementary education starts at 7 years of age. The first 8 years of elementary education is obligatory (primary school). Students may then attend secondary school. The duration of secondary school education may vary between 4 and 5 years, due to extra year of foreign language education. Tenth-grade students in different geographical areas in Istanbul were enrolled into the study (Evren et al. 2014).

The sample size was determined as 5,000 taking into account earlier studies. Frequencies from 1% to 50% are within an acceptable range of accuracy with this sample size (90% power, the estimated accuracy limit of from 1% to 50% ±5). Based on the experience gained from previous studies, it was estimated that factors such as non-response, improper completion of the questionnaire

or fewer students than expected would be around 15%, and the total sample size was computed to be 5750 (Evren et al. 2014).

Multi-stage sampling was performed to select subjects. Districts from both sides of the city were selected in order to provide an appropriate distribution. Fifteen representative districts at the time of the evaluation were elected (by choosing one from the two neighbouring districts). Multi-stage sample was initially stratified according to Istanbul's 15 districts. The primary sampling units were schools, selected with a probability proportional to student enrolment numbers (45 schools from the 15 districts). Next, 1 or 2 classes within each participating school were selected systematically with equal probability sampling (Evren et al. 2014).

The total number of students, the total number of classes and the number of classes in each school were determined. The average class size was determined by dividing the total number of students by the number of classes. By dividing the number of questionnaires to be administered by the average class size, the cluster size according to weighted distribution (number of classes of the survey will be implemented) was determined. Sampling interval was determined by dividing the number of classes by the total number of classes where the survey would be implemented. All schools are listed alphabetically. The number of classes in the schools and the names of the schools were listed. To determine the classes to include in the study, the sampling interval was used. Other classes were skipped according to the selected sampling interval. All students in selected classes were included in the study sample. The number of students in different classes were similar in different schools and districts (Evren et al. 2014).

The study was carried out between October 2012 and December 2012. The study was conducted online. A website was prepared for online participation. The Ethical Committee of the hospital approved the study. A research assistant has been assigned for each school included in the study. Research assistants from 45 schools were given an education for how to participate in the study. The study protocol was thoroughly explained to students by these research assistants. The students were asked to fill out the form within the web site. Questionnaires in the system were filled in anonymously. Informed consent was approved by students online before continuing with further questions. In the online system the student who wishes not to answer the questions were allowed not to answer and leave the program without filling the questionnaire.

Five thousand three hundred eighty three students participated in the study and entered the system from the Internet and filled the questionnaire. Exclusion criteria were leaving more than 10% of the questionnaire blank or leaving the questions regarding the Internet and/or substance use. Although none of the participants refused to participate in the study, 410 students were excluded because they left some parts of the scales unfilled, 16 students were excluded because of the trap question. Thus, a representative sample of 4957 students participated in the study. When we compared the students excluded from the study with the ones included in the study, mean of age (16.69±6.44, 15.58±2.85 respectively, $t=3.57$, $p<0.001$) and male ratio (62.8% and 52.7% respectively, $\chi^2=16.11$, $df=1$, $p<0.001$) were higher in the excluded group.

Measures

The questionnaire administered online in the study was similar with the questionnaire used formerly in Turkey (Ogel et al. 2001, 2004, 2006). This questionnaire was adapted and developed from a large international scale used in European school survey known as the European School Survey Project on Alcohol and Other Drugs (ESPAD) (Hibell et al. 1997). Psychometric properties of this questionnaire has been studied (Ogel et al. 2003, 2011, 2012a) and previously used in published studies (Corapcioglu & Ogel 2004, Toprak et al. 2011). The questionnaire included sections about demographic data, family characteristics, school life and performance, social contacts, lifetime use of substances including tobacco, alcohol and drugs.

The Addiction Profile Index Internet Addiction Form - Screening Version (BAPINT-SV) includes 2 of the 18 questions of BAPINT, which is a self-rating scale that evaluates the risk of Internet addiction (Ogel et al. 2012b). Chang & Man Law (2008) categorized Internet use into four macro-areas: compulsive internet use, excessive time spent online and failure to control it; withdrawal symptoms when being restricted from internet use; using the internet for social comfort; and negative social, academic or work consequences related to internet use. Two of these four areas were evaluated with BAPINT-SV with Likert-type answers; 1-Spending time on the Internet within the last 3 months (a-Never, b-1-5 times a week or less, c-up to 3 h 59 min a day, d-4 to 5 h 59 min a day, e- 6 h or more a day) and 2-Does spending time on the Internet effect your life negatively? (a-Never, b-Very little effect, c-Partial effect, d-It Effects, e-Too much effect). Correlation of BAPINT-SV with BAPINT is high ($r=0.82$, $p<0.001$) (Ogel et al. 2012b). BAPINT-SV is validated among adolescents and university students and when point 4 is taken as a cut-off point sensitivity was found as 0.72, whereas specificity as 0.83 (PPV: 97.5, NPV: 75.7) (Ogel et al. 2012b). Cronbach's α for BAPTINT-SV was 0.76 in the present study.

The Psychological Screening Test for Adolescents (PSTA) was developed by adaptation of the Examination and Assessment Form for Juvenile Offenders (ARDEF), which was developed with the purpose of investigating risk of recidivism and needs of children and adolescents who are in conflict with the law (Ogel et al. 2011). By shortening the number of ARDEF items PSTA questions were formed for screening purposes. The scale has 6 subscales; depression, anxiety, attention

deficit and hyperactivity symptoms (ADHS), anger, lack of assertiveness and sensation seeking. The scale has 27 questions with answers "yes" or "no", whereas ADHS subscale with 5 questions has 3 answers "yes", "partially" and "no". The statistical investigations for validation have shown that PSTA has an interrater reliability of r=0.89 and a high internal reliability (α=0.79) (Ogel et al. 2012a). There is a high level of positive correlation between Youth Self Report, which is widely used among 6 to 18 years old adolescents for psychological problems, and PSTA total score (r=0.60) (Erol et al. 1995). Cronbach's α for depression was 0.72, for anxiety 0.60, for ADHS 0.77, for anger 0.75, for lack of assertiveness 0.67 and for sensation seeking 0.70, whereas for PSTA it was 0.80 in the present study.

Statistical analysis

The statistical package SPSS 17.0 for Windows (SPSS, 278 Chicago, IL) was used for all the analyses. Student t test was used to compare groups according to current age and PSTA subscale scores. Categorical variables were compared by means of the χ^2 statistics. Odds ratios and 95% confidence intervals were calculated. Taken the IA index as a dependent variable, logistic regression model (Enter) was performed. For all statistical analysis, P values were 2 tailed, and differences were considered significant at $p<0.05$.

RESULTS

The ratio in terms of genders in the sample was almost equal. The majority of students had three or fewer siblings (91.4%), lived with their parents (89.2%) and studied in government schools (95.1%). The socio-demographic characteristics of the cohort were coherent with the population distribution for this age (Ministry of National Education 2012).

The duration of time students spent on the Internet within the last 3 months, the negative effect of spending time on the Internet on persons' life according to the gender are shown on Table 1. The rate of spending time on the Internet everyday was higher in males (58.6%) than in females (44.3%). Also the rates of those who reported that the Internet had partial effect, effect and too much effect on their life were higher in males (18.3%, 11.9% and 5.4% respectively) than females (14.0%, 7.4% and 3.5% respectively). Mean score of BAPINT-SV and rate of those considered as having a HRIA were higher in males (Table 1). Spending time on the Internet and its effect on individuals life was mildly correlated (total sample r=0.359, p<0.001) both for females (r=0.366, p<0.001) and males (r=0.329, p<0.001) (not shown).

According to the cut-off point of BAPINT-SV the rate of HRIA was 15.96% among Turkish adolescents in the present study, whereas the rate of those with lower risk of IA (LRIA) was 84.04%. The mean of age was higher in the group with HRIA. Rates of school related variables, lifetime use of substances, delinquent behavior (physical harm from a friend, involving in physical fight within the last year, to bear arms and having more problem with the law), considering mental health bad or very bad, seeking professional help, self harming behavior and suicidal thoughts or attempt were higher in the group with HRIA. Similarly mean of PSTA subscale (depression, anxiety, ADHS, anger, lack of assertiveness and sensation seeking) scores were higher in the group with HRIA than the group with LRIA (Table 2).

Table 1. Gender differences according to spending time on the Internet within the last 3 months, effect of spending time on the Internet on persons' life, the Addiction Profile Index Internet Addiction Form Screening Version (BAPINT-SV) score and high risk of Internet addiction

	Female		Male			
	n=2343	%	n=2614	%	χ^2	*p*
Spending time on the Internet within the last 3 months					147.74	<0.001
Never	248	10.6	140	5.4		
1-5 times a week or less	1058	45.2	942	36.0		
Up to 3 hours 59 minutes a day	785	33.5	1017	38.9		
4 hours to 5 hours 59 minutes a day	159	6.8	277	10.6		
6 hours or more a day	93	4.0	238	9.1		
Does spending time on the Internet negatively effect your life?					87.81	<0.001
Never	1113	47.5	945	36.2		
Very little effect	647	27.6	740	28.3		
Partial effect	328	14.0	478	18.3		
It effects	173	7.4	311	11.9		
Too much effect	82	3.5	140	5.4		
Internet Addiction score (mean±SD)	2.40	1.67	3.04	1.81	-12.93	<0.001
High risk of Internet addiction*	265	11.3	526	20.1	71.54	<0.001

*Odds Ratio (95% Confidence Interval)=1.98 (1.68-2.32)

Table 2. Age, variables related with school, psychological and behavioral variables according to the lower and higher risk of Internet addiction (IA)

	Lower Risk of IA		Higher Risk of IA			
	n=4166	%	n=791	%	χ^2	*p*
Age (mean±SD)	15.51	2.38	15.82	4.15	t=-2.07	0.039
School related variables						
Low grades at the end of semester[a]	262	6.3	123	15.5	79.59	<0.001
Disciplinary punishment[b]	403	9.7	141	17.8	45.22	<0.001
Absenteeism[c]	306	7.3	131	16.6	70.24	<0.001
Truancy before age of 13[d]	1083	26.0	334	42.2	85.77	<0.001
Lifetime substance use						
Cigarette smoking[e]	924	22.2	319	40.3	116.55	<0.001
Hookah[f]	1809	43.4	463	58.5	61.14	<0.001
Tobacco[g*]	2007	48.2	516	65.2	77.40	<0.001
Alcohol[h]	1362	32.7	384	48.5	73.22	<0.001
Drugs[i**]	409	9.8	164	20.7	77.48	<0.001
Delinquent behavior						
Physical harm from a friend[j]	431	10.3	183	23.1	100.20	<0.001
Physical fight within the last year[k]	1309	31.4	373	47.2	73.41	<0.001
To bear arms[l]	427	10.2	165	20.9	71.16	<0.001
Problem with the law[m]	348	8.4	144	18.2	72.17	<0.001
Mental health						
Considering mental health bad/very bad[n]	244	5.9	113	14.3	70.67	<0.001
Seek professional help[p]	686	16.5	212	26.8	47.87	<0.001
Self- destructive behavior						
Self harm[r]	523	12.6	190	24.0	70.97	<0.001
Suicidal thoughts or attempt[s]	479	11.5	181	22.9	74.65	<0.001
Psychological Screening Test for Adolescents	mean	SD	mean	SD	t	p
Depression	1.30	1.18	1.78	1.17	-10.37	<0.001
Anxiety	1.67	1.24	2.11	1.30	-8.95	<0.001
Attention deficit and hyperactivity	3.37	2.01	4.43	2.13	-13.47	<0.001
Anger	2.34	1.50	2.90	1.56	-9.62	<0.001
Lack of assertiveness	3.83	2.10	4.63	2.30	-9.04	<0.001
Sensation seeking	2.69	1.70	3.33	1.71	-9.62	<0.001

*When cigarette smoking and hookah use are evaluated together, **When substances other than tobacco and alcohol are evaluated together. Odds Ratio (95% Confidence Interval): [a] 2.74 (1.18-3.45), [b] 2.03 (1.64-2.50), [c] 2.50 (2.01-3.12), [d] 2.08 (1.78-2.44), [e] 2.37 (2.02-2.78), [f] 1.84 (1.58-2.15), [g] 2.02 (1.72-2.37), [h] 1.94 (1.67-2.27), [i] 2.40 (1.97-2.93), [j] 2.61 (2.15-3.11), [k] 1.95 (1.67-2.27), [l] 2.31 (1.89-2.82), [m] 2.44 (1.98-3.02), [n] 2.68 (2.11-3.40), [p] 1.86 (1.56-2.22), [r] 2.20 (1.83-2.66), [s] 2.28 (1.87-2.77)

Table 3. Predictors of higher risk of Internet addiction in logistic regression (Enter) analysis

	B	S.E.	Wald	df	p	Odds Ratio	95% C.I.	
							Lower	Upper
Male gender	-0.861	0.090	90.905	1	<0.001*	0.423	0.354	0.505
Tobacco	-0.222	0.094	5.593	1	0.018*	0.801	0.666	0.963
Alcohol	-0.281	0.090	9.718	1	0.002*	0.755	0.632	0.901
Drug	-0.295	0.119	6.173	1	0.013*	0.745	0.590	0.940
Self harming behavior	-0.095	0.116	0.664	1	0.415			
Suicidal thoughts or attempts	-0.238	0.119	4.000	1	0.046*	0.788	0.624	0.995
Depression	0.166	0.043	14.534	1	<0.001*	1.180	1.084	1.285
Anxiety	0.057	0.042	1.851	1	0.174			
Attention deficit and hyperactivity	0.160	0.022	50.819	1	<0.001*	1.173	1.123	1.226
Anger	-0.020	0.033	0.386	1	0.535			
Lack of assertiveness	0.086	0.021	16.738	1	<0.001*	1.089	1.046	1.135
Sensation seeking	0.042	0.027	2.342	1	0.126			

*Statistically significant, Independent variables: Gender, lifetime tobacco, alcohol and drug use, self-harm, suicidal thoughts or attempts, depression, anxiety, attention deficit and hyperactivity, anger, lack of assertiveness and sensation seeking

Logistic regression (Enter) analysis was conducted when the IA index (HRIA vs LRIA) was a dependent variable and gender, lifetime use of tobacco, alcohol and drug, self-harming behavior, suicidal thoughts or attempt, depression, anxiety, ADHS, anger, lack of assertiveness and sensation seeking were independent variables. In this model male gender, lifetime use of tobacco, alcohol and drug, self-harming behavior, suicidal thoughts or attempt, depression, ADHS and lack of assertiveness were predictors of HRIA (Table 3).

DISCUSSION

Main finding of the present study is that male gender, lifetime use of tobacco, alcohol and/or drug, depressive symptoms, ADHS and lack of assertiveness were related with HRIA. Consistent with the findings of the present study HRIA has been associated with problems such as victimization by peers, anxiety, depression, poor school achievement, drug consumption, and general psychopathology (Ko et al. 2012, Durkee et al. 2012, Carli et al. 2013, Sung et al. 2013). Potential associations between Internet overuse and negative mental and physical health consequences include attention-deficit-hyperactivity disorder, depression, as well problematic alcohol use and self-harming behavior (Yoo et al. 2004, Ko et al. 2008, Choi et al. 2009, Ko et al. 2009a, 2009b, Lam et al. 2009a, 2009b).

Consistent with the present study (15.96%) in the previous studies the rate of IA among high school students was 11.6% (Canan et al. 2010) and the rate of moderate to high severe IA among university students was 12.2% in Turkey (Dalbudak et al. 2013a). Durkee et al. (2012) reported that epidemiological studies on PIU prevalence have reported large variations and the rate of PIU varies by country and gender. In Asia, studies indicated even higher rates of PIU among adolescents and young people, ranging from 2.4 to 37.9% (Durkee et al. 2012). On the other hand, research on similar age groups in Europe has shown that the rates of PIU ranged between 3.1 to 18.3% (Durkee et al. 2012). The variations in these results could be due to different methodologies, cultural reasons, sample or scale selection.

Adolescence is a critical period which is characterized by risk-taking behavior, increased levels of sensation seeking and exploration (Spear 2000). In particular, heavy use of the Internet may lead to adverse effects on psychosocial development for adolescents (Tahiroglu et al. 2008) which may result with depression (Cheung & Wong 2011) and attention-deficit hyperactivity disorder (Ko et al. 2009a). Thus, adolescence may represent a vulnerable period for the development of problematic behaviors including substance use and HRIA (Lee et al. 2013). These comorbidities may be suggestive of a bidirectional causality relationship (i.e. higher risk of IA is related with higher rates of substance use, whereas substance use may predict a high risk for IA) and similar etiology of vulnerable period of adolescence (Sung et al. 2013, Lee et al. 2013).

Although inconsistent results have appeared in the literature regarding gender differences in problematic Internet use, a majority of studies indicated that adolescent boys tend to be more addicted to the Internet than adolescent girls (Chou et al. 2005, Li et al. 2010, Lin & Tsai 2002). The present study revealed that male students spend more time on the Internet and this has effect on their life negatively. Although gender differences tend to disappear at the mild and moderate levels of Internet use (Jang et al. 2008), as with other addictions, male youth is at greater risk for developing possible and severe IA problems than female youth (Yen et al. 2007a, Turkish Statistical Institute 2012, Carli et al. 2013). Consistent with this, male gender predicted the HRIA in the present study. Weiser (2000) reported that males used the Internet mainly for purposes related to entertainment and leisure whereas women used it primarily for interpersonal communication and educational assistance. Consistent with the findings of the present study HRIA is related with negative consequences such as school success being lower, truancy, and absenteeism in high school students and gender differences are present (Austin & Totaro 2011). Nevertheless, among girls, as in boys the HRIA was associated with all of the problematic behavior variables (Kim et al. 2007).

Adolescence represents a vulnerable developmental period for the engagement in risk behaviors and development of both chemical and behavioral addictions (Chambers et al. 2003). Consistent with the present study, several studies have reported associations between substance abuse and HRIA among adolescents (Pallanti et al. 2006, Ko et al. 2008, Sung et al. 2013, Lee et al. 2013). Adolescents' use of the Internet might serve as a frequent channel to observe, learn about and imitate risky behaviors like tobacco, alcohol and drug use (Fischer et al. 2011). Research findings show that greater time spent on the Internet contributes to both problematic Internet use (Liu et al. 2011) and higher likelihood of cigarette (Carson et al. 2011, Huang et al. 2012) and alcohol use (Denniston et al. 2011, Epstein 2011). A recent study demonstrated that adolescent Internet use has a significant impact on future cigarette smoking and alcohol use, and time spent using the Internet is significantly related to alcohol use; greater use of the Internet is associated with higher levels of drinking (Chiao et al. 2014). Sung et al. (2013) has suggested that the association between IA and smoking, drinking, and drug abuse cannot be explained simply by environmental factors, social factors, and mental health status. In Taiwanese adolescents, those with IA and substance use experience shared similar family factors, which indicate that IA and substance use should be considered in the group of behavioral problem syndromes (Yen et al. 2007b). Nevertheless, causal

relationship between HRIA and substance use is still needed to be further evaluated in follow-up studies. Substance–induced state may actually trigger the Internet use and increase the risk of IA because of impaired judgment and fantasy stimulation, thus the association between substance use and heavy Internet use may reflect the disinhibiting role of substance (Hawton et al. 2004). Lastly, these two problematic behaviors may have a common motivation, such as maladaptive coping with life stressors, depression or anxiety (Gross et al. 2002, Selfhout et al. 2009). Nevertheless, because the students with HRIA have vulnerability for addictive behaviors, co-morbid substance abuse should be evaluated and, if found, treated in adolescents with HRIA. Consistent with these findings, other maladaptive coping efforts may be self-harming and suicidal behaviors, which may interact with HRIA in two ways. Findings show that online interactions clearly provide essential social support for otherwise isolated adolescents with lack of assertiveness, but they may also normalize and encourage self-harming and suicidal behaviors and add potentially lethal behaviors to the repertoire of those with these kinds of behaviors (Whitlock et al. 2006).

Consistent with the present study, some of the common indicators that have been found to be associated with HRIA in adolescents include troubled relationships with peers and family, poor school and academic performance, self-harming and suicidal behaviors, and psychosocial and behavioral problems (Lin & Tsai 2002, Whitlock et al. 2006, Kim et al. 2006, Kim et al. 2010, Ko et al. 2012, Durkee et al. 2012, Sung et al. 2013), anxiety, depression (Yang et al. 2005, Carli et al. 2013, Yang & Tung 2007), aggressiveness (Yang et al. 2005, Ko at al. 2012), and other behavioral problems (Sung et al. 2013). Therefore, it is urgent to protect adolescents, particularly those with HRIA, from addiction to internet use. For those with behavioral inhibition problems, the Internet may serve as an area in which individuals can receive short-term rewards through gaming, surfing or social networking, and be reinforced by immediate gratification (Hall & Parsons 2001). Our results also clearly demonstrate that a greater amount of internalizing problems like anxiety and depressive symptoms, as well as externalizing problems like impulsive, delinquent and aggressive behavior are closely related to HRIA.

Methodology is the strongest point of the present study, as it employs adequate sample size and proper sampling method. Nevertheless, since analyses showed differences between those excluded from the study (mean age and male ratio were higher) and those included for the variables related with Internet and substance use (Li et al. 2010, Fisoun et al. 2012) the sample may not be representative for subjects of interest anymore after these exclusions. The main limitation is that although BAPINT-SV is a validated instrument among adolescents (Ogel et al. 2012b) and the coefficient of internal consistency was found to be high in the present study, results should be considered with caution since it is a screener with mere 2 questions. Another important limitation was the cross-sectional nature of the study; hence, we were only able to report associations rather than definitive temporal or causal relationships. Also, the analyses were based on self-reported data, which may yield conservative estimates as a result of underreporting. Our sample was only representative for high schools in Istanbul, which limits the generalizability of our results to Turkey. Finally, certain Internet habits, such as excessive online time, accessing the Internet in an Internet bar, and using the Internet for catharsis, are related to poor lifestyle habits in adolescents; however, using the Internet for purposes such as gaining knowledge and finding information positively predicts healthy lifestyles in adolescents (Wanga et al. 2012). Unfortunately, types and reasons of Internet use were not considered in the present study, which may be considered a limitation.

CONCLUSION

Overall, the results of this study support the view that higher risk of Internet addiction (HRIA) can be linked to psychological, behavioral and social problems in adolescents. The high prevalence rate of HRIA as well as its strong link to substance use, self-harming, suicidal, impulsive, hyperactive, delinquent, and aggressive behavioral problems may serve as a forewarning to school counselors and public health authorities. Former studies provided strong evidence that despite the high prevalence of mental health problems and problems related with HRIA, adolescents tend not to seek professional help (Rickwood et al. 2007). Since adolescents with HRIA are progressively active online, they may use the Internet to seek help for substance use and mental health issues (Monaghan & Wood 2010, Heffner et al. 2013). Internet-based information and interventions should be used to engage young people in the help-seeking process (Rickwood et al. 2007). The association of HRIA with psychological and behavioral factors found in the present study suggests that the high prevalence of HRIA in students cannot be prevented without attending to all these related areas. The results of this survey highlight the importance of being aware of HRIA for the prevention and management of IA as well as important problems among students, such as substance use, delinquent, aggressive and self-destructive behavior.

Acknowledgements

This study was part of a Project titled Youth Observation Study (GENCIZ) in Turkey, which through its web site allows surveys for high school and university students from different cities.

Conflict of interest: None to declare.

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