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ORIGINAL ARTICLE

Influence of internet addiction on academic, sportive, and recreative activities in adolescents

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Abstract

Purpose Internet addiction (IA) is an increasing health problem worldwide. This study aimed to investigate the impact of IA on male and female adolescents and on their academic, sports, and recreative activities.

Method The study was cross-sectional. Adolescents ($N = 1291$; mean = 16.2 ± 1.1 year) were questioned on the following factors: smart phone, iPad, and computer use; daily internet use time; academic success; success in sports activities.

Results The IA ratio of the whole group was 25.2%, but it was significantly higher in the female group (35.5%; $p = 0.00$).

When we divided the group according to gender, age ($p = 0.002$), smart phone use ($p = 0.045$), sports activity ($p = 0.000$), sports success ($p = 0.000$), and healthy eating ($p = 0.000$) were higher in males; duration of daily internet use ($p = 0.00$), recreative activity ($p = 0.021$), musculoskeletal pain ($p = 0.000$), morning stiffness ($p = 0.017$), difficulty concentrating ($p = 0.000$), headaches ($p = 0.000$), numbness in hands ($p = 0.011$), forgetfulness ($p = 0.000$), gastrointestinal problems ($p = 0.021$), dizziness/imbalance ($p = 0.001$), and IA ($p = 0.000$) were higher in females.

Conclusion Although the use of mobile phones was lower in the adolescent female group, daily smartphone use times, IA, IA scores, and somatoform symptoms were found to be higher, independent of body mass index. IA has adverse effects on mental and physical health in adolescents. It is necessary to raise awareness in this regard to ensure the transition into healthy adults.

Keywords Child and adolescent · Addiction · Internet addiction

Introduction

The prevalence of mental disorders among adolescents is an increasing global problem. Definitions and descriptions of adolescent mental health are beginning to be grounded in psychologists' empirical studies of a wide variety of patterns of adaptation to adolescence (Ally et al. 2018). Schools have been positioned at the forefront of promoting positive mental health and well-being by implementing evidence-based interventions (O'Reilly et al. 2018).

The use of electronic communication technologies has become a core method of adolescent communication (Kim et al. 2018). The extent to which internet use can be considered the focus of a disorder has been debated, with some contending that the internet may represent a vehicle for other illegal behaviors that constitute the true diagnostic focus (Petry and O'Brien 2013). Additionally, if considered a disorder, disaggrement exists regarding the extent to which internet use may represent an addiction or not. Internet addiction can be conceptualized as involving excessive or poorly controlled urges and behaviors relating to internet use that lead to subjective distress in and/or interference with major areas of life functioning (Banz et al. 2016).

Internet addiction is increasing worldwide. In adolescence, physical and emotional changes are very rapid and important considerations for a healthy transition into adulthood (Dalbudak et al. 2014). Within the field of current psychopathology, we frequently find problems related to the use and abuse of substances, particularly in adolescent therapy. Impulsivity, violence, marginalization, and primitive phantasies appear in the setting along with the functioning of the "addictive brain" (Ortiz-Frágola 2017). The physical and psychopathologic effects of internet addiction have been the subject of various studies. The present study investigated

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the impact of internet addiction on academic, sports, and creative activities of male and female adolescents.

Method

The present study was cross-sectional. All adolescents (N = 1291) were questioned on the following factors: age; height; weight; known chronic diseases (e.g., diabetes, asthma, allergies); smart-phone, iPad, and computer use; daily internet use time (0–1 h, 1–3 h, 3–6 h, 6 h, > 6 h); daily mobile phone conversation/messaging time (0–1 h, 1–3 h, 3–6 h, 6 h, > 6 h); night sleep duration (≤ 5 h, 5–6 h, 7–9 h, 10 h, > 10 h); academic success (very good, good, moderate, or poor); success in sports activities (very good, good, moderate, or poor); regular sports activity; recreative activities; chronic musculoskeletal pain; location of pain; duration and severity of pain; concentration difficulty; headache; numbness in the hands; forgetfulness; dizziness/loss of balance; difficulty falling asleep; and morning stiffness. Pain intensity was assessed using a visual analog scale (VAS).

Smartphone addiction scale

The short version of the smartphone addiction scale originally developed by Kwon et al. (2013) was used to evaluate the severity of IA. It consists of ten items and is assessed using a six-point Likert rating. The scale items are scored from 1 to 6, with the final scores ranging 10 to 60. As the score obtained from the test increases, the risk of addiction also increases. The scale has only one factor and no subscales. In the Korean sample, the cutoff score was 31 for males and 33 for females. The present study also used this cutoff score for internet addiction detection.

Statistical analysis

All statistical analyses were performed using the IBM SPSS version 19 (IBM Corp., Armonk, NY, USA) statistical software. Descriptive data are presented as mean ± standard deviation (SD) or median scores according to their categories and distribution. The coherence of variables to normal distribution (normality) was analyzed using the Kolmogorov-Smirnov test because the number of patients in the study group was > 30. Spearman's correlation was used to analyze the level of correlation between the variables.

Categorical data are reported as percentages and were compared using the chi-square test. Continuous data are reported as mean ± standard deviation, or median with minimum and maximum, and were compared using parametric/non-parametric tests according to the normality of distribution. We also used a histogram for this purpose. $p < 0.05$ was considered statistically significant.

Results

A total of 488 female and 803 male adolescents were included in the study. The mean age of the participants was 16.2 ± 1.1 years. The internet addiction ratio was 25.2% in the entire group and was significantly higher among females (35.5%/IAS = 26.8 ± 11.3, $p = 0.00$). Sociodemographic and internet use data are summarized in Table 1.

The academic success of participants with internet addiction was at the medium-poor level ($p = 0.012$), they ate unhealthy food ($p = 0.00$), and their sports success was medium-poor ($p = 0.024$). Also, symptoms including morning stiffness ($p = 0.000$), headache ($p = 0.000$), numbness in the hands ($p = 0.000$), forgetfulness ($p = 0.00$), gastrointestinal problems ($p = 0.036$), and dizziness/loss of balance ($p = 0.036$) were higher. No significant difference was observed in body mass index (BMI) ($p = 0.13$) (Table 2). Musculoskeletal symptom severity was positively correlated with the duration of internet use (rho = 0.065; $p = 0.021$) but not with internet addiction (Table 3). When we divided the group according to BMI ≥ 25 kg/m^2, in the obese group academic success ($p = 0.018$) was lower; IA ($p = 0.021$) and IAS ($p = 0.004$) were higher.

Table 1 Characteristics of internet use and daily living according to internet addiction

	IA group	Non-IA group	p
Age* (years)	16 ± 1.1	16.2 ± 1.1	0.047
Gender* (F/M)	173/156	315/645	0.000
Chronic illness	108	45	0.20
BMI	21.2 ± 3.2	21.5 ± 3.5	0.13
Smartphone presence*	867	312	0.002
iPad/computer presence	713	244	0.98
IAS*	39.3 ± 6.4	19.7 ± 6.4	0.000
Duration of daily internet use in hours*			0.000
0–1	470	64	
1–3	420	131	
3–6	44	99	
> 6	21	32	
Duration of daily phone use in hours*			0.000
0–1	843	252	
1–3	71	52	
3–6	21	19	
> 6	6	6	
Duration of daily sleep in hours*			0.000
> 10	37	16	
7–9	510	160	
5–6	353	119	
< 5	53	34	
Healthy eating/yes*	106	489	0.000

IA: Internet addiction; IAS: internet addiction score; F: female, M: male.
*Statistically significant difference, $p < 0.05$

Table 2 Academic success and sports and creative activities according to internet addiction

	IA group	Non-IA group	*p*
Academic success*			0.012
Very good	39	157	
Good	160	502	
Moderate	121	261	
Poor	8	38	
Sporting success*			0.024
Very good	61	128	
Good	107	302	
Moderate	98	309	
Poor	62	215	
Sports activity presence	217	617	0.52
ReCreative activity presence	150	466	0.183

IA: Internet addiction; *statistically significant difference, $p < 0.05$

When we divided the group according to gender, age ($p = 0.002$), smart phone use ($p = 0.045$), sports activity ($p = 0.000$), sports success ($p = 0.000$), and healthy eating ($p = 0.000$) were higher in males; duration of daily internet use ($p = 0.00$), recreative activity ($p = 0.021$), musculoskeletal pain ($p = 0.000$), morning stiffness ($p = 0.017$), poor concentrating ($p = 0.000$), headaches ($p = 0.000$), numbness in hands ($p = 0.011$), forgetfulness ($p = 0.000$), gastrointestinal problems ($p = 0.021$), dizziness/imbalance ($p = 0.001$), and IA ($p = 0.000$) were higher in females (Fig. 1a,b).

Discussion

Adolescents show high sensitivity to social content, along with sociocultural and familial differences, because adolescent brains are in the developmental stage. Some adolescents are more susceptible to environmental influences because of endogenous or biologic factors (Schriber and Guyer 2016).

In the last decade, IA has become a serious behavioral problem that is increasing worldwide. People with IA also have high cyber-crime rates. The penetration of the internet into daily life has increased the number of pathologic internet users and the risk of IA and has negative consequences similar to various other addictive behaviors (Liu and Potenza 2007; Weinstein and Lejoyeux 2010). Children first encounter the internet at an average age of 9 years, and IA starts to pose a risk at 16 years on average. Depression, distress, and stress are the most common comorbidities seen in IA. Sleep disorders, academic failure, failure in sports and social activities, and poor concentration are the most commonly reported outcomes of IA (Young 2004; Spada 2014).

The number of studies on the results of IA is constantly growing. Although the neurobiologic root of IA is unknown, it is increasingly being diagnosed as a mental disorder. IA is associated with various sociodemographic and psychosocial factors and internet access and is accompanied by a variety of symptoms and comorbid disorders (Li et al. 2015). Studies in the literature are mostly aimed at examining specific behaviors in small samples.

IA shows both similarities to and differences from other addictions (Kuss et al. 2014; Mak et al. 2014). A decrease in

Table 3 Musculoskeletal and somatoform symptoms according to internet addiction

	IA group	Non-IA group	*p*
Chronic musculoskeletal pain presence	147	60	0.31
Visuel analog scale (VAS) (cm)	4.6 ± 2.3	4.2 ± 2.1	0.22
Duration of pain in months			0.73
0–3	31	79	
3–6	20	36	
> 6	25	58	
Localization of the pain			0.37
Neck	79	46	
Low back	32	15	
Arms	18	10	
Difficulty in falling asleep	343	132	0.095
Morning stiffness*	696	297	0.000
Poor concentration*	510	237	0.000
Headaches*	401	182	0.000
Numbness in hands*	153	93	0.000
Gastrointestinal problems	67	134	0.078
Dizziness/imbalance*	112	178	0.036
Forgetfulness*	533	217	0.004

IA: Internet addiction; *statistically significant difference, $p < 0.05$

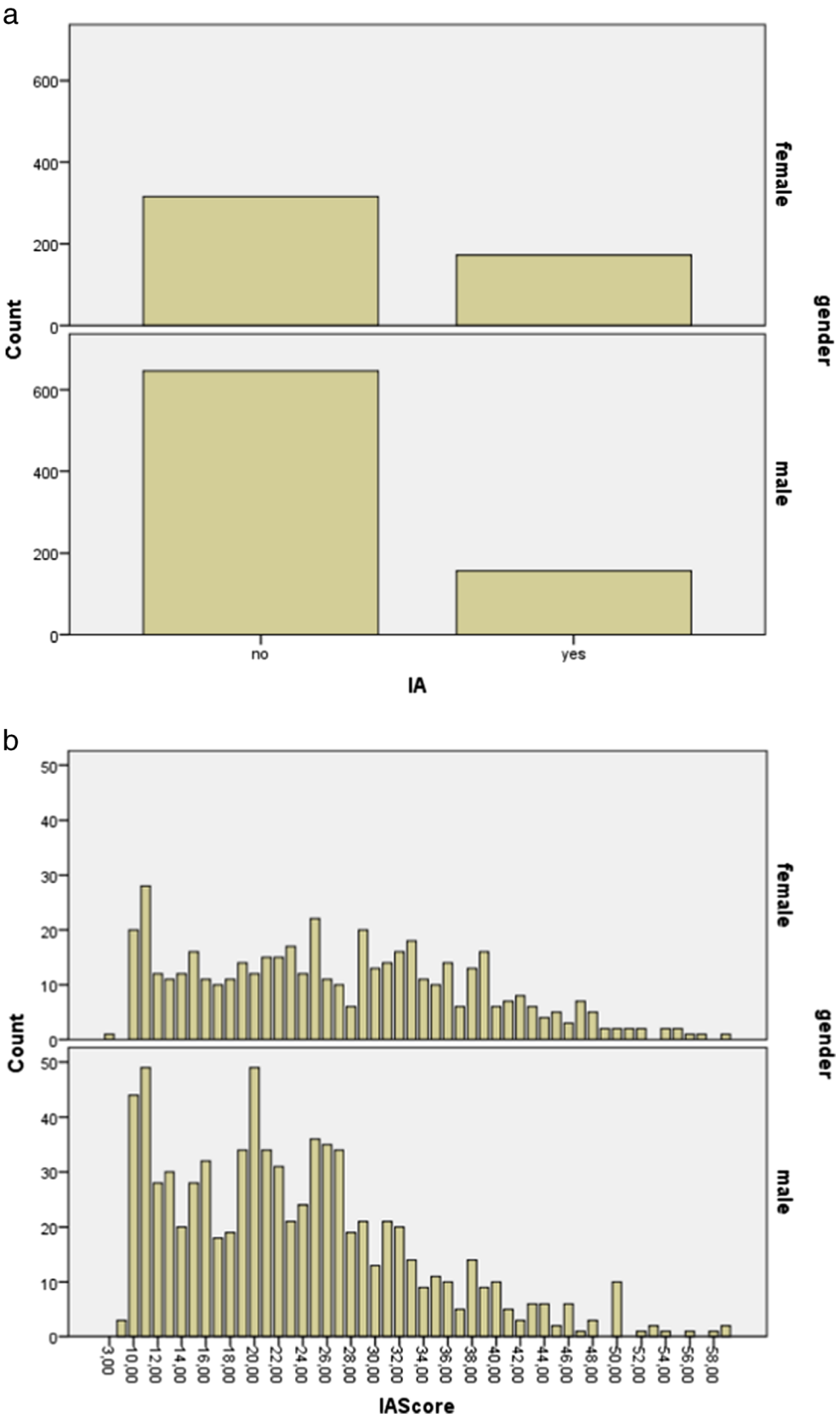

Fig. 1 Distribution of internet addiction (IA) presence (a) and IAS (b) by gender

orbitofrontal cortex thickness was found in both drug and behavioral addictions. Similar findings were obtained in adolescents with IA (Hong et al. 2013a, b). A decrease in functional connections in the cortico-striatal circuits (prefrontal and parietal cortex) was observed (Spada 2014).

Addictions include excessive consumption of time and losing control of daily life behaviors (e.g., exercise, food, work, and internet use) and the undesirable adverse effects associated with these behaviors. Today, many forms of behavior can be regarded as addictions. These outcomes affect the life roles of a person, such as work, social activities, and hobbies, and can also disturb social relationships or lead to criminal activity (Canan et al. 2014; Jonas and Gold 1986; Gold et al. 1997; Volkow and Wise 2005; Wang et al. 2004; Lee and Gibbs 2013).

Obesity and addiction share similar transmission patterns involving genetic predisposition, environmental risk factors, and common neurobiologic pathways in the brain (Volkow and Wise 2005; Sussman and Moran 2013; Ong and Tan 2014). In a study by Canan et al., IA, eating disorders, and BMI were found to be positively correlated. In the present study, IA was only significantly associated with BMI in the male group. We found that IA was not associated with healthy eating habits. Also, physical and cognitive symptoms were more frequent in overweight/obese adolescents who were failing in academic and social activities.

Diverse tools and cutoff values have been used for IA classification in studies performed in various countries. Significant differences have been found in IA prevalence according to the scales and cutoff values. For example, in Italy, it was 0.8%; in Hong Kong, it was 26.7%; in China, it was 62%. Gold standard diagnostic and evaluation scales are needed in this field (Kuss 2014; Mak 2014). The IA ratio in the present study was 25.2%.

IA is associated with psychosomatic symptoms such as anxiety, depression, communication disorders, and attention deficit hyperactivity disorder (ADHD) (Ong 2014). Dalbudak et al. (2013) found that childhood trauma and emotional abuse were the major determinants of IA. Borderline personality disorder, emotional abuse, depression, and anxiety were found to contribute to the severity of addiction. In a study by Öztürk et al. (2015), the scores of extraversion and openness of non-IA adolescents were significantly higher. Yen et al. (2014) found high ADHD, depression, anxiety and low self esteem results inchildren with IA. Kawabe et al. (2016) found that general health scores were high, especially in the ADHD subgroup of children with IA. In the present study, headaches, morning stiffness, forgetfulness, dizziness/loss of balance, and gastrointestinal problems were significantly higher in the IA group. Academic success and participation and success in sports activities were significantly lower.

The long-term use of smartphones can also cause a variety of postural problems and musculoskeletal pain. There are insufficient data on musculoskeletal problems caused by IA in the literature. Tonga et al. (2017) determined that the most frequent symptoms related to the use of smartphones were pain in the neck, shoulder, and back and that the duration of use and dependence were related to the psychologic stress caused by abnormal posture. The present study found a high symptom rate for neck pain in the female group, regardless of IA. It was observed that the severity of these symptoms increased on a daily basis according to internet use.

The treatment of IA includes individual and group therapy, cognitive behavioral therapy, family therapy, and psychotropic drugs. Reducing IA and the negative psychosocial and social influences on individuals and their families should be topics of future research (Wen 2015; Mak 2014).

Study limitations

The limitations of this study include the small sample size, single site location of the investigation, and exploratory nature of the findings. All these factors may limit the generalizability of the results. Academic and sports success data were evaluated subjectively by individual answers.

Conclusion

Although the use of smart phones was lower in the adolescent female group, IA, IA scores, and somatoform symptoms were higher and were also independent of BMI. IA was higher in the male adolescent overweight/obese group. We found high levels of unhealthy eating habits, mental dysfunction, and physical symptoms and low success rates in sport and academic activities in the IA group.

Compliance with ethical standards

Conflicts of interest None.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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