

Daytime Sleepiness in University Students and Internet Addiction as the Determinant

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Abstract

Purpose: The aim of the study is to determine daytime sleepiness in university students and its relationship with internet addiction as the determinant.

Method: A descriptive cross-sectional design was used. Study population consisted of 1,150 first- and fourth-year students studying in some faculties at a university located in the Central Anatolia Region of Turkey.

Findings: In this study, it was determined that the students obtained a mean score of 5.9 ± 2.1 points from the daytime sleepiness scale and the rate of those with daytime sleepiness problem was 17.9%. Furthermore, 52.3% of the students had a sleep duration of 7–8 hours. An increase in internet addiction mean score increases the risk of daytime sleepiness approximately one time.

Conclusions: Increase of internet addiction score increases the risk of daytime sleepiness approximately one time.

Keywords: internet addiction, sleep, student

England (Niemz et al., 2005). Results of the study conducted in 2015 in Turkey revealed that, whereas the rates of computer and internet use were 64% and 65.8% in men in the age group of 16–74 years, respectively, these rates were 45.6% and 46.1% in women. Approximately 94.2% of the individuals who use the internet do so regularly (Turkish Statistical Institute, 2015). The rate of internet addiction was found to be 24.2% in a study conducted on high school students in Turkey in 2011 (Üneri & Tanıdır, 2011), 14% in a study conducted on young people whose ages ranged between 18 and 27 years (Durak Batgün & Hasta, 2010), and 18.89% in another study conducted on university students (Durak Batgün & Kılıç, 2011). There are differences in addiction rates in Turkey versus the rest of the world. The differences in these rates may be attributed to age groups, sample characteristics, differences in assessment instruments, properties of internet access, and years of the studies.

Although the internet is a useful and easily accessible technology, internet use may cause extensive negative outcomes in an individual's life. Research findings related to internet use indicated that study participants experienced adverse psychosocial development, excessive time for online activities, social withdrawal, nutrition problems, family problems, academic issues, increase in use of alcohol and smoking, depression, anxiety, obsessive-compulsive symptoms, and aggression (Davis, 2001; Ha et al., 2007; Odacı & Berber Çelik, 2011; Orsal et al., 2013; Şenormancı et al., 2014; Yen et al., 2014).

One of the most significant problems regarding compulsive internet use is sleep problems and sleep deprivation (Choi et al., 2009; Shi, 2015). Internet use causes an increase in daytime sleepiness and careless behaviors among adolescents (Nalwa & Anand, 2003; Şenol et al., 2012), leads them to procrastinate in carrying out their responsibilities (Nalwa & Anand, 2003) and have time management problems as well as difficulty with eating regular meals, and significantly affects their activities of daily living and school performance (Lin et al., 2013). Previous studies indicated that fatigue levels were increased in students and employees who spent extensive time on the internet (Caci et al., 2004; Choi et al., 2009; Lin et al., 2013). Sleep is considered as an important variable of health and affects life quality and well-being (Aysan et al., 2014). In addition, sleep is significant for not only regulation of emotions, attention, and behaviors but also learning and memory in particular (Ellis et al., 2014; Jung et al., 2011; Lara-Carrasco et al., 2009; Rasch & Born, 2013). Internet addiction among

INTRODUCTION

The most important technological advancement of our age is the internet. Because technology is relatively inexpensive and easily accessible, the internet has spawned another process addiction with its negative effects on individuals. Internet addiction is defined as excessive internet use by individuals (Yellowlees & Marks, 2007). Young people, in particular, increasingly use the internet as an entertainment, socialization, and information tool. The prevalence of internet use among young people varies considerably among countries. Young people were found to be addicted to the internet at the rate of 8.1% in China (Cao et al., 2011), 2.38%–36.89% in Korea (Lee et al., 2014), 21% in Iran (Mazhari, 2012), and 18.3% in

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adolescents is considered a public health problem in numerous countries.

The aim of the study is to determine daytime sleepiness in university students who are at risk of internet addiction and the relationship between daytime sleepiness and internet addiction as the determinant.

METHODS

Type and Place of the Study

This cross-sectional study was conducted at Ahi Evran University Campus in the spring term of the academic year of 2013–2014.

Sample Group of the Study

Study population consisted of 1,150 first- and fourth-year students studying in four faculties (faculty of education, faculty of science and literature, faculty of economics and administrative sciences, and faculty of agriculture) at a university located in the Central Anatolia Region of Turkey between 2013 and 2014. The rate of internet addiction in Turkey was determined to be 65%, and the sample size was determined to be 684 using the prepared charts of the World Health Organization, with a margin of error of 0.03 and 90% confidence interval (Lemeshow et al., 1990). Considering the data loss that may occur while administering questionnaires, the sample size, that is, the number of students who were administered the questionnaires (727), was above the recommended number. A systematic sampling method, which is random selection in which sample members are selected according to a random starting point but with a fixed, periodic interval, was used for sample selection (Sümbüloğlu & Sümbüloğlu, 2009). The study population comprised 727 students who were randomly selected by starting from the second student on the class list ($N/n: 1150/684 = 1.68 \approx 2$). Although two students were skipped, the selection was continued.

An identified limitation of the study was that all the participants were students from one university. A major strength is that this was the largest study examining internet addiction in Turkey.

Data Collection Method and Tools

There were three tools used in this study: a questionnaire prepared by the researchers to determine socioeconomic status and other individual characteristics of the students, Epworth Sleepiness Scale, and Internet Addiction Test. The study data were culled from student self-reports obtained between February 15 and May 15 under the supervision of the researchers.

Questionnaire

This section included questions about age, gender, residence place, perception of economic status, and smoking and alcohol use as well as questions about hours of sleeping on weekdays as well as weekends, duration of internet use, times and purpose of internet use, and delaying sleep.

Epworth Sleepiness Scale

The Epworth Sleepiness Scale is an eight-item scale that is user-friendly with proven validity and reliability for the evaluation of sleepiness in adults. The scale evaluates the likelihood of falling asleep or sleepiness in eight different daily life conditions. Each question is worth between 0 and 3 points and is answered by the patient. This survey assesses the possibility of falling asleep in certain circumstances on an ordinary day in which the patient is not extremely tired. Method of scoring is the same for all questions. If the possibility of falling asleep is never, the item is scored as 0 points; if the possibility is low, the item is scored as 1 point; if the possibility is moderate, the item is scored as 2 points; and if the possibility is high, the item is scored as 3 points. A total score of 10 points and above signifies the presence of extreme daytime sleepiness (İzci et al., 2008).

Internet Addiction Test

The Internet Addiction Test, which was developed by Young (1996) to determine internet addiction of primary school students and whose Turkish adaptation was conducted by Bayraktar (2001), was used in the study. Internet Addiction Test is a 5-point Likert scale consisting of 20 questions. Sample questions include “How often do you find that you stay online longer than you intended?”. The respondent is expected to select one of the options—“never,” “rarely,” “occasionally,” “frequently,” and “always”—for these questions. These options are scored as 0, 1, 2, 3, 4, and 5, respectively. Scores may range from 0 to 100 points. Scores obtained from the scale are divided into three groups: Those obtaining 80–100 points are defined as “Internet addict,” those obtaining 50–79 points are defined as “those indicating limited symptoms [signs],” and those obtaining 0–49 points are defined as “those indicating no symptom [sign].” Cronbach's alpha internal consistency reliability of the test was .91 (Bayraktar, 2001). For this study, Cronbach's alpha value was found as .925.

Preliminary Application

The questionnaire was given to 10 students by faculty to evaluate for comprehensibility and content validity. These data were excluded from the study data.

Statistical Analysis

In the data assessment, descriptive statistical methods (frequency distributions, mean, standard deviation) as well as Student *t* test and one-way analysis of variance for comparison of groups were used. In addition, logistic regression analysis was used. The results were evaluated at a significance level of $p < .05$. For statistical analysis of the data, a licensed SPSS 22 (IBM SPSS Inc.) package program was used.

Ethical Considerations

The study was approved by the clinical trials ethics committee of the Ahi Evran University and performed in accordance with the Helsinki Declaration. Permission has been obtained from unit managers. Data were collected and recorded in a manner that protected the anonymity of the participants.

RESULTS

The average age of the study participants was 21.09 ± 2.3 years, and 61.6% of them were female students. Approximately 20.1% reported their economic status as low, 19.4% were smokers, and 14.7% used alcohol. In the study, it was determined that the students obtained a mean score of 5.9 ± 2.1 points from the daytime sleepiness scale and the rate of those with a daytime sleepiness problem was 17.9% ($n = 130$). When sociodemographic characteristics and daytime sleepiness of the students were compared (see Table 1), there was no difference except for perception of economic status. The rate of perceived low economic status in individuals with daytime sleepiness problem (37.7%) was higher than that of the group with no daytime sleepiness problem (16.2%; $p < .001$).

Average sleep duration of the students was 7.5 ± 17 hours, the rate of the students with a sleep duration of 6 hours and less was 21.6%, and the rate of those with a sleep duration of 9 hours and more was 21.6%. Furthermore, 52.3% of the students had a sleep duration of 7–8 hours. It was observed that the students obtained a mean score of 27.3 ± 19.9 points from the Internet Addiction Test and spent averagely 3.4 ± 0.8 hours on the internet. In addition, 71.1% of the students used the internet for game/social networking, and 41.7% stated that they delayed their night sleep to use the internet. Table 2

shows some characteristics about a daytime sleepiness problem. Sleep duration of the students with a daytime sleepiness problem was shorter, and their internet addiction score was higher compared with those without a daytime sleepiness problem ($p < .001$). Furthermore, the rate of the students delaying sleep to use the internet was higher in the group with daytime sleepiness. A difference between daily mean duration of internet use, time, and purpose of internet use and daytime sleepiness was not found.

Determinants of daytime sleepiness score were evaluated by using hierarchical multiple regression analysis. Indicators of sociodemographic variables were examined in Model 1, and the perception of low economic status ($\beta = 0.218$) was found to increase daytime sleepiness score. Sociodemographic variables accounted for daytime sleepiness score at the rate of 0.56%. According to Model 2, evaluation of economic status perception as low ($\beta = 0.207$) increased daytime sleepiness score and increasing sleep duration decreased this score ($\beta = -0.136$). Indicator rate of these variables was determined as 0.74%. According to Model 3, evaluation of economic status perception as low ($\beta = 0.198$), decreasing sleep duration ($\beta = -0.115$), delaying sleep for internet use ($\beta = 0.079$), and the increase of internet addiction score were found as determinants for daytime sleepiness. Indicator rate of the model increased from 0.74% to 13% (see Table 3).

TABLE 1 Distribution of Sociodemographic Characteristics on Daytime Sleepiness

	Daytime Sleepiness		Chi-Square and <i>p</i> Value
	No Rate (%)	Yes Rate (%)	
Age (years)			
19 and younger	147 (24.6)	31 (23.7)	$\chi^2 = 0.035$
Older than 19	450 (75.4)	99 (76.3)	$p = .852$
Gender			
Female	381 (63.8)	67 (51.5)	$\chi^2 = 6.808$
Male	216 (36.2)	63 (48.5)	$p = .009$
Economic status			
Good + medium	500 (83.8)	81 (62.3)	$\chi^2 = 30.588$
Low	97 (16.2)	49 (37.7)	$p = .000$
Residence			
Dormitory	373 (62.5)	81 (62.3)	$\chi^2 = 0.001$
House	224 (37.5)	49 (37.7)	$p = .971$
Use of alcohol			
Yes	83 (13.9)	24 (18.5)	$\chi^2 = 1.747$
No	513 (86.1)	106 (81.5)	$p = .186$
Smoking			
Yes	112 (18.8)	29 (22.3)	$\chi^2 = 0.859$
No	485 (81.2)	101 (77.7)	$p = .054$
Total	597	130	

TABLE 2 Correlation of Sleep Duration and Internet Use Properties With Daytime Sleepiness

	Daytime Sleepiness		<i>t</i> Test	<i>p</i> Value
	No Mean ± <i>SD</i>	Yes Mean ± <i>SD</i>		
Average sleep duration	7.6 ± 1.6	7.0 ± 2.0	3.280	<i>p</i> = .001
Average time for internet use	3.9 ± 4.8	4.1 ± 4.3	−0.495	<i>p</i> = .646
Internet addiction mean score	26.00 ± 19.1	33.7 ± 22.1	−3.697	<i>p</i> ≤ .001
	No Rate (%)	Yes Rate (%)	Chi-Square	<i>p</i> Value
Time of internet use				
Morning/noon	513 (85.9)	106 (81.5)	$\chi^2 = 1.627$	<i>p</i> = .202
Evening/night	84 (14.1)	24 (18.5)		
Delaying sleep for internet use				
Yes	231 (38.7)	72 (55.4)	$\chi^2 = 12.235$	<i>p</i> ≤ .001
No	336 (61.3)	58 (44.6)		
Purpose of internet use				
Research/homework	173 (29.0)	37 (28.5)	$\chi^2 = 0.014$	<i>p</i> = .906
Game/social networking	424 (71.0)	93 (71.5)		

Risk factors for daytime sleepiness were evaluated via logistic regression analysis. According to this analysis, internet addiction (*OR* = 1.016, 95% *CI* [1.005, 1.027]) and sleep duration (*OR* = 0.828, 95% *CI* [0.731, 0.938]) were found to be important factors for daytime sleepiness. The other variables were not important risk factors (*p* > .05; see Table 4).

DISCUSSION

The internet has both positive and negative impacts on our lives. One of these potential adverse effects is addiction. Statistical analysis indicated that internet addiction harmed adolescents at levels that may require professional intervention. The students obtained a mean score of 27.3 ± 19.9 points from the internet addiction test—a symptom-free score range. In a study conducted on 475 students aged 15–19 years in Finland, 14.3% used the internet at a normal level; 61.5%, at a moderate level; and 24.2%, at moderate or serious level (Sinkkonen et al., 2014). Another study revealed an internet addiction in 3.7% of students (Kuss et al., 2013). Other studies identified adolescents as having an internet addiction at the rate of 8.1% (Cao et al., 2011), 11.6% (Liberatore et al., 2011), and 2.5%–53.7% (Kim, 2013). This study indicated that the students spent an average of 3.4 ± 0.8 hours per day on the internet. In an earlier study, whereas the weekly internet use among the addicted user group was 20.6 ± 10.2 hours, the weekly internet use among average users was 3.2 ± 2.6 hours (Canan et al., 2013). In a study conducted by Wang et al. (2011) of 14,296 students in China, they found that 9.9% of the students spent more than 8 hours on the internet; in a study conducted by Johansson

and Göttestam (2004) on adolescents in the age group of 12–18 years in Norway, it was determined that 49.6% used the internet frequently and these students spent an average of 4.3 hours on the internet weekly. The varying results of the studies were believed to be related to the differences in internet access as well as the studies' numerous geographical locations and different time zones. Those who scored less than 50 on the Internet Addiction Test are defined as “those who do not have the symptoms.” Considering the negative effects of excessive internet use on children and adolescents (Caci et al., 2004; Choi et al., 2009; Lin et al., 2013; Sinkkonen et al., 2014; Tonioni et al., 2012), the approximate results of the students (27.3 ± 19.9) are thought to be fairly benign.

The study's findings indicated that 71.1% of the students were using the internet for games/social networking. The students whose most common reasons for internet use were searching information, learning, and communication with classmates (Wang et al., 2011) or entertaining (Sinkkonen et al., 2014; Wang et al., 2011) were also reported to use the internet because of loneliness and for dating interests (Odaci & Kalkan, 2010). In another study, internet-addicted students were found to heavily use websites with social content and games. There was a significant difference between addicted student users and nonaddicted ones in terms of the rates of internet use, with addicted students using the internet mainly via mobile telephones and Wi-Fi (Kuss et al., 2013). Unlimited internet access and decreasing family control over adolescents' internet use are deemed the most important factors for increasing the risk of internet addiction.

TABLE 3 Determinants of Daytime Sleepiness Score			
	<i>B</i> Value	<i>T</i> Value	<i>P</i> Value
Model 1: sociodemographic variables		2.289	0.022
Age	0.045	1.216	0.225
Gender	0.064	1.650	0.099
Residence	0.020	.557	0.578
Economic status	0.218	6.015	0.000
Smoking	0.004	.109	0.913
Model 2: sociodemographic variables and sleep duration		3.755	0,000
Age	0.062	1.602	0.110
Gender	0.027	.747	0.455
Residence	0.207	5.757	0.000
Economic status	-0.0007	-.0170	0.865
Smoking	-0.136	-3.766	0.000
Sleep duration			
Model 3: sociodemographic variables, sleep duration, and internet use properties		1.987	0.047
Age	0.069	1.901	0.058
Gender	0.005	.141	0.888
Residence	0.025	.699	0.485
Economic status	0.198	5.643	0.000
Smoking	-0.009	-.0239	0.811
Sleep duration	-0.115	-3.245	0.001
Period of internet use	0.029	.779	0.436
Purpose of internet use	-0.028	-.771	0.441
Behavior of delaying night sleep for internet use	0.079	2.048	0.041
Internet addiction score	0.205	5.220	0.000
Model 1	$R = .237$	$R^2 = .056$	$F = 8.577$
Model 2	$R = .273$	$R^2 = .074$	$F = 9.642$
Model 3	$R = .365$	$R^2 = .133$	$F = 11.01$

TABLE 4 Risk Analysis for Daytime Sleepiness					
Variables	<i>B</i>	Wald	<i>OR</i>	95% Confidence Interval	<i>p</i>
Age	0.008	0.032	1.008	0.925, 1.099	.858
Gender	0.347	2.418	1.415	0.914, 2.190	.120
Residence	0.104	0.241	1.110	0.732, 1.684	.623
Economic status	1.066	2.528	2.904	1.888, 4.468	.000
Smoking	0.070	0.066	0.932	0.548, 1.587	.797
Sleep duration	-0.189	8.811	0.828	0.731, 0.938	.003
Period of internet use	-0.112	1.015	0.325	0.921, 1.016	.314
Purpose of internet use	-0.182	0.604	0.834	0.527, 1.319	.437
Behavior of delaying night sleep for internet use	0.369	2.673	1.446	0.929, 2.249	.102
Internet addiction score	0.016	8.456	1.016	1.005, 1.027	.004

Males and females use the internet differently. Males use the internet more frequently, for entertainment and in social cafes; females use the internet to gain information and access social websites as well as use the internet in the home (Adiele & Olatokun, 2014; Odacı & Berber Çelik, 2011; Servidio, 2014; Shek & Yu, 2016; Wang et al., 2011). The fact that males use the internet more than females can be explained by the fact that females adapt to technology later (Brooks, 2015) and males have higher levels of motivation for excitement and winning (like computer games). Females do not share the same freedom as males because of Turkish society's adherence to traditional gender roles. In addition, male students use internet cafes to be with friends and to avoid family supervision.

Technology can have numerous effects, both positive and negative, on students. These effects include excessive occupation of time; mental, social, and physical harm; and poor school attendance as well as entertainment value, information source, and means of communication (Shek & Yu, 2016; Sinkkonen et al., 2014). Internet addiction causes poor sleep, fatigue, nervousness, a decrease in social relationships, and indifference (Tonioni et al., 2012). In addition, there was a cyclical relationship found between loneliness and internet addiction (Yao & Zhong, 2014). In addition to these adverse effects, students using the internet for greater periods were observed to have increased fatigue and daytime sleepiness and decreased sleep (Choi et al., 2009).

In the study, average sleep duration of the students was 7.5 ± 17 hours. The rate of the students with a sleep duration of 6 hours and less was 21.6%, and the rate of those with a sleep duration of 9 hours and more was 21.6%. Furthermore, 52.3% of the students had a sleep duration of 7–8 hours; 41.7% of the students stated that they delayed night sleep because of internet use. Sleep duration of the students with daytime sleepiness was shorter, and their internet addiction score was higher compared with those without daytime sleepiness. Furthermore, the rate of the students delaying night sleep for using the internet was higher in the group with daytime sleepiness.

In a study evaluating internet addiction and sleep disorder in teenagers, it was determined that daily mean sleep duration was 7.8 ± 1.5 in those using internet at a moderate level, 7.3 ± 1.3 in those with problematic use, and 6.9 ± 1.5 in addicted ones. Waking early in the morning and waking during the night were found to be higher in addicted internet users compared with others (Canan et al., 2013). It was found that, in 13- to 18-year-old teenagers in South Korea, there was an indirect correlation between decreased hours of sleep and excessive internet use, excessive internet use had direct health effects, and these effects affected sleep time (Do et al., 2013). In a Chinese study, 17.2% of students were addicted to the internet and 51.7% had sleeplessness. Those who are addicted to the internet were found to sleep less than 7 hours, and a significant difference existed between those who are addicted to the internet and nonaddicts in terms of habitual sleep efficiency, daytime sleepiness, sleep quality, and sleep duration. The results of this study show that students spend most of

their time using the internet and many students are online immediately before going to sleep at night. These findings possibly suggest that students do not limit their usage of the internet and they postpone night sleep.

Whereas a perceived low economic status was associated with an increased daytime sleepiness score, increasing sleep duration decreased daytime sleepiness score ($\beta = -0.136$). In a study by Choi et al. (2009) in South Korea, students who perceived their economic status as low had increased rates of internet addiction. Furthermore, daytime sleepiness was higher in students with internet addiction, and the rates of insomnia, snoring, apnea, teeth grinding, and nightmares were higher in internet-addicted students. Studies indicated that internet-addicted adolescents were of low socioeconomic status (Leung & Lee, 2012; Orsal et al., 2013; Shek & Yu, 2016). It was believed in the past that people with a high income were more at risk of internet addiction because of the ability to afford internet access; however, because of more accessibility in schools and the workplace, this is no longer believed to be true. In addition, high internet addiction in students with low socioeconomic status could be explained by the fact that these students did not participate in social activities (going to the cinema) and, consequently, they use the internet for social support and entertainment purposes.

According to Model 3, perceived low economic status, decreased hours of sleep, delaying sleep for internet use, and increased internet addiction scores were found to be determinants for daytime sleepiness, and these variables increased daytime sleepiness. The indicator rate increased from 0.74% to 13% in the model including internet use properties.

In their study, Kapahi et al. (2013) determined that those using the internet until the middle of the night had sleep problems. In a study conducted by Kubey et al. (2001), university students frequently stayed up late because of internet use. In a study conducted by Cheung and Wong (2011) with 572 adolescents, 17.2% of them were addicted to the internet and 51.7% of this group had a sleeplessness problem. In another study, those with an advanced internet addiction went to bed later at night, needed more time to fall asleep, woke up more frequently, and had difficulty in awakening compared with those with a low internet addiction. Those with an advanced addiction were generally found to have bad sleep quality (Ekinici et al., 2014). These studies indicate that there is a strong correlation between internet addiction and daytime sleepiness.

The study indicated that risk factors of daytime sleepiness were economic status, sleep duration, and internet addiction score. It is important to regulate sleeping hours to control daytime sleepiness.

CONCLUSION

This study determined that low economic status, decrease in sleep duration, delay of night sleep for internet use, and an increase in internet addiction scores were found to be determinants of increased daytime sleepiness. According to logistic regression analysis, an increase in sleep duration was a protective

factor and internet addiction was a risk factor for daytime sleepiness. An increase in internet addiction scores increases the risk of daytime sleepiness approximately one time.

The results of this study suggest that an educational program may help to decrease internet addiction. A gender-responsive approach can be recommended for preventing internet addiction.

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