Original Research Article

Internet addiction, insomnia, and violence tendency in adolescents

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Abstract

Introduction: There is limited information on how the tendency to violence in adolescents is affected by internet addiction and insomnia. This study will contribute to the literature in revealing the effect of internet addiction on insomnia and violence tendency in adolescents.
Methods: The data were collected between 26/May/2021 and 06/July/2021. A total of 2,502 adolescents studying in 9th and 12th grades were included in the study. Data were collected with the adolescent information form, Internet Addiction Scale-Short Form, Bergen Insomnia Scale, and Violence Tendency Scale. Descriptive statistics, independent samples *t*-test, one-way analysis of variance, correlation, and simple linear regression analyzes were used in the analysis of data.
Results: Participants were 15.92 ± 1.19 years old and 70.80% were women. While internet addiction do not change according to gender, and violence tendency mean scores do not change according to having a device to use the internet, the study variable mean score changes according to all the other socio-demographic variables included in our study. There is a positive relationship between internet addiction, violence tendency, and insomnia. Furthermore, while internet addiction explained 22.1% of insomnia scores, 18.8% of the variance changes in the violence tendency scores, insomnia explained 11.8% of violence tendency scores.
Conclusion: Although the scale scores of the adolescents in our study were below the average, internet addiction is common problem necessitates working on the subject. In our study, there is a significant relationship between internet addiction, insomnia and tendency to violence, and internet addiction predicts other variables.

Keywords

Internet addiction, insomnia, violence tendency, adolescents

Introduction

Internet usage is increasing in Turkey as well as all over the world (Digital 2020 Global Overview Report, 2020; Turkish Statistical Institute, 2020). In 2020, the rate of internet usage in Turkey for individuals between the ages of 16 and 74 increased by 3.7% compared to the previous year and reached 79% (Turkish Statistical Institute, 2020). This increase in internet use in society has led to the formation of a risk factor such as internet addiction. The general prevalence rate of internet addiction varies between 0.03% and 38% and is more common in males and adolescent populations (Bozkurt et al., 2016).

Adolescents perform many useful activities such as communicating with people, doing research, and having fun while using the internet. On the contrary, it is known that with the prolongation of the time spent on the Internet, negative effects such as neglect of daily work, physical and mental problems, and Internet addiction occur (Baturay & Toker, 2019; Singh, 2019). In addition to these problems, the presence of adolescent deaths due to prolonged staying in front of the Internet without sleeping and the fact that internet gaming addiction is planned to be classified in the future in the appendix section of the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V), shows that the subject remains up-to-date (Bozkurt et al., 2016).

Violent behavior is another important issue that remains up-to-date for adolescents in the world and Turkey. It is

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reported that emotional and behavioral problems including substance use, delinquency, sexuality, and related antisocial features are the riskiest behaviors in adolescence, which is a maturation period. This period is mostly considered as a period associated with a tendency to emotional and physical violence (Çelik et al., 2016). Along with technological and digital developments, it is known that the most popular leisure-time activity in adolescents is the use of the internet and computer, and it is stated that the majority of the time spent on the computer consists of computer games (Durdu et al., 2005). It has been reported that internet games may contain elements of violence, which may adversely affect adolescents, and that extensive research should be conducted on this issue (İnal & Kiraz, 2008).

It is known that there is a relationship between internet use and sleep, and excessive internet use increases the probability of insomnia more than five times (Jain et al., 2020). In the study conducted by Shen et al. (2020), the insomnia rate of adolescents with internet addiction was determined as 54.86%. In addition to insomnia, problems related to daily life arise in individuals with internet addiction. It has been reported that the academic achievement of individuals with Internet addiction decreases (Marín Vila et al., 2018), and their feelings such as loneliness and anger increase (Zadra et al., 2016). It is also known that these individuals exhibit more behaviors such as distress, social withdrawal, loss of control, self-harm, and suicide attempts (Kawabe et al., 2016; Zadra et al., 2016). Such feelings and behaviors can increase the tendency of individuals to violence. Situations such as suicidal behavior, self-harm, or self-humiliation indicate that the individual is committing violence against himself (Krug et al., 2002). Violence, which includes aggression, includes anger, fear, and intolerance (Gözütok, 2008). Like internet addiction, violence is an important problem in adolescence and it is reported that adolescents have violent tendencies (Çelik, 2018). It is reported that the 15 to 17 age group is at risk in terms of tendency to violence, and the highest incidence of violence in Turkey is seen in the 15 to 16 age group (Ögel et al., 2006). Although the relationship between internet addiction and insomnia in adolescents is known, it is reported that studies on this subject are limited (Shen et al., 2020). Besides, the effect of internet addiction on the tendency to violence is not clear. In this study, it was aimed to reveal the effects of internet usage characteristics in adolescents and internet addiction on insomnia and violence tendency in adolescents. For this purpose, answers to the following questions were sought in this study.

Research questions

Question 1: Do the levels of internet addiction, violence tendency and insomnia change according to socio-demographic variables in adolescents?

Question 2: Is there a relationship between internet addiction, violence tendency, and insomnia in adolescents?

Question 3: Does internet addiction affect the level of insomnia in adolescents?

Question 4: Does internet addiction affect the level of violence tendency in adolescents?

Question 5: Does insomnia affect the level of violence tendency in adolescents?

Methods

The research was conducted to determine the characteristics of internet use in adolescents, the relationship between internet addiction, insomnia, and violence tendency, and the effects of these variables on each other. This research is a descriptive and relational study.

The population of the research consists of students studying at high schools in Kayseri province Kocasinan district under the responsibility of Kocasinan Guidance and Research Center. Sample selection was not made in the study, and the study was completed with 2,502 students studying in grades 9th to 12th, accepting to participate in the study and getting permission from their families. After the study, post-hoc power analysis was performed in the G-Power (Version 3.1.9.4) program for the adequacy of the sample, and it was found to be 99% (1−β) with an effect size of 0.187 and a confidence level of 0.95.

Ethical explanations

Ethical permission of the study approval from Erciyes University Social and Human Sciences Ethics Committee and written permission from the Provincial Directorate of National Education was taken. Consent to participate in the study was obtained from the adolescents and their families using an online informed consent form.

Data collection

In order to test the usability and comprehensibility of the forms uploaded to the online system before data collection began, a link was sent to 15 adolescents and they were asked to fill in. Opinions were taken in terms of usability and comprehensibility and the online forms were finalized. Fifteen adolescents with pre-treatment were not included in the study. Due to the coronavirus pandemic, data were collected online between 26/May/2021 and 06/July/2021. The link of the survey form was shared simultaneously with the student groups of all schools. The purpose of the research was explained to the adolescents, and it was explained that their names would be kept confidential and participation was on a voluntary basis. Moreover, giving a long period of 6 weeks to collect data allows adolescents to

choose the most appropriate time for themselves, without being influenced by anyone, and to answer the questions, while increasing the accuracy of the questionnaires. Thirty adolescents who filled in the form incompletely and entered repeatedly were excluded from the study.

Data collection tools

Adolescent Information Form, Short Form of Young's Internet Addiction Test, and Bergen Insomnia Scale and Violence Tendency Scale were used to collect data. Adolescent Information Form consists of 17 questions including age, gender, class of education, demographic data of parents, family-school-education characteristics, and internet usage characteristics.

Short Form of Young's Internet Addiction Test

The Turkish adaptation of the form, which was developed by Young (1998) and converted into a short form by Pawlikowski et al. (2013), was made by Kutlu et al. (2016). The form can be used by both adolescents and university students. This test is a self-report test and consists of 12 items and is in a 5-point Likert type. A score between 12 and 60 points is obtained from the scale. High scores from the scale indicate high internet addiction. The Cronbach's alpha coefficient of the scale was calculated as .86 in adolescents (Kutlu et al., 2016). In our study, this value was found to be .86. It was determined that the scale is a reliable and usable measurement tool.

Bergen Insomnia Scale

The Turkish adaptation of the scale developed by Pallesen et al. (2008) was made by Bay and Ergun (2018). The scale, which tests different symptoms of insomnia, consists of six questions and is an 8-point Likert type. The lowest score that can be obtained from the scale is 0, and the highest score is 42. High scores mean more insomnia problems. The Cronbach alpha reliability coefficient of the scale was found to be .72 for the total (Bay & Ergun, 2018). In our study, this value was determined as .78. It was determined that the scale is a reliable and usable measurement tool.

Violence Tendency Scale

The scale was developed by Haskan and Yıldırım (2012). The scale is a self-assessment scale and consists of 20 items and is a 3-point Likert type. A score between 20 and 60 can be obtained from the scale. High scores indicate that the individual's tendency to violence is high. The Cronbach's alpha reliability coefficient for the total scale is .87 (Haskan & Yıldırım, 2012). In our study, this value

was found to be .90. It was determined that the scale is a reliable and usable measurement tool.

Analysis of data

Features such as gender, age, class, time spent on the internet, who decides the time of internet use and the purpose of internet use were accepted as independent variables, while internet addiction, insomnia, and violence tendency scale scores were considered as dependent variables.

IBM SPSS Statistics Standard Concurrent User V 25 program was used in the statistical analysis of the data. Number (*n*), percentage (%), mean, and standard deviation (SD) were used as descriptive statistical methods. In data analysis, independent samples *t*-test, three and more groups one-way analysis of variance, and correlation coefficients were used to compare paired groups. Relational questions were analyzed by simple linear regression. Moreover, p < .05 was considered statistically significant in all comparisons.

Results

Table 1 shows the distribution of demographic variables of the participants such as gender, age, class, perceived income status and family attitude, family type, internet use purpose (Table 1). In Table 2, it is seen that the average age of the participants is 15.92 ± 1.19, and they spend an average of 5.72 ± 3.56 hours per day on the Internet. Furthermore, it was determined that the mean internet addiction score was 27.94 ± 9.07, the mean violence tendency score was 31.41 ± 7.54, and the mean insomnia score was 15.38 ± 10.23 (Table 2).

While the internet addiction mean scores of the adolescents participating in our study did not differ according to gender ($p > .05$), it was observed that the mean scores of violence tendencies were higher in men ($p < .001$), and the mean scores of insomnia in women ($p < .001$). It was determined that the mean scores of internet addiction, violence tendency, and insomnia of the adolescents who perceive their income as low were higher than the adolescents with the perception of middle and high income ($p < .01$). It was determined that the internet addiction, violence tendency and insomnia mean scores of the adolescents who decide on the duration of internet use themselves were higher than the adolescents whose internet use was controlled by their families ($p < .001$). While the mean scores of violence tendencies did not differ according to having a device for internet use ($p > .05$), it was observed that the mean scores of internet addiction and insomnia were higher in adolescents who had any device for internet use ($p < .05$). It is seen that adolescents who spend time on the Internet before bedtime had higher internet addiction, violence tendency, and insomnia mean scores than those who do not ($p < .001$). It was determined that as the adolescents' family and friend

Table 1. Distribution of the adolescents according to their descriptive characteristics.

Descriptive characteristics	Number	%
Gender		
Female	1,771	70.80
Male	731	29.20
Grade		
9th Grade	921	36.80
10th Grade	680	27.20
11th Grade	580	23.20
12th Grade	321	12.80
Perceived income status		
Low	356	14.20
Middle	1,896	75.80
High	250	10.00
Family type		
Nuclear family	1,958	78.30
Extended family	397	15.90
Fragmented family	147	5.90
Internet usage purpose		
Lesson	349	13.90
The game	179	7.20
Social media	738	29.50
Extracurricular news or research	88	3.50
All of them	1,045	41.80
Other	103	4.10
The Person who decides the duration of internet use		
The individual himself	2,268	90.60
Parents	234	9.40
The State of having a device for internet use		
Yes	2,318	92.60
No	184	7.40
Mother's education		
Literacy none	65	2.60
Literate	56	2.20
Primary school	844	33.70
Middle school	489	19.50
High school	567	22.70
University and above	481	19.30
Father's education		
Literacy none	25	1.00
Literate	35	1.40
Primary school	572	22.80
Middle school	427	17.10
High school	801	32.00
University and above	642	25.70
Smoking status		
Not smoking	2,113	84.50
Tried at least once	227	9.00
Smoking	162	6.50
Addictive substance use status		
Not using	2,311	92.40
Tried at least once	108	4.30
Uses	83	3.30

(Continued)

Table 1. (Continued)

Descriptive characteristics	Number	%
Internet usage status before sleeping		
Yes	2,046	81.80
No	456	18.20
Relationship status with family		
Very good	857	34.30
Good	886	35.40
Middle	606	24.20
Bad	108	4.30
Very bad	45	1.80
Relationship status with friends		
Very good	869	34.70
Good	975	39.00
Middle	496	19.80
Bad	98	3.90
Very bad	64	2.60
Perceived family attitude		
Oppressive	520	20.80
Protective	1,490	59.60
Democrat	285	11.40
Inconsistent	207	8.20

relationships worsened, their internet addiction, violence tendency, and insomnia mean scores increased significantly ($p < .001$). Internet addiction and insomnia mean scores of adolescents who perceive their family attitudes as oppressive and inconsistent differed from those who perceive their family attitudes as protective and democratic ($p < .001$). According to the family attitude, the mean scores of the tendency to violence differed between the groups. This difference was significant between those who perceive the family attitude as oppressive and inconsistent and those who perceive it as democratic and protective. Furthermore, the difference between the groups that perceive the family attitude as protective and democratic was also significant ($p < .001$) (Table 3).

There is a weak positive correlation between the time spent on the internet daily and internet addiction ($r = .343$, $p < .001$), insomnia ($r = .205$, $p < .001$), and violence tendency ($r = .201$, $p < .001$). It is seen that there is a moderate positive correlation between internet addiction and tendency to violence ($r = .424$, $p < .001$) and insomnia ($r = .470$, $p < .001$). Again, a weak positive correlation was determined between insomnia and a tendency to violence ($r = .332$, $p < .001$) (Table 4).

In Table 5, the predictive effect of internet addiction on insomnia and violence tendency and the predictive effect of insomnia on violence tendency are given. In Model 1, it was determined that internet addiction significantly predicted insomnia ($\beta = .470$, $t(1) = 26.617$, $p < .001$) and explained 22.1% of the variance changes in insomnia scores ($R^2 = .221$, $F(1, 2500) = 708.450$, $p < .001$). Model 2 shows that internet

Table 2. Age, Daily Internet Usage Time (DIUT), Internet Addiction Scale (IAS), Violence Tendency Scale (VTS), and Insomnia Scale (IS) averages of adolescents.

Variables	Mean ± SD	Min	Max	Cronbach's alpha
Age	15.92 ± 1.19	14.00	21.00	–
DIUT (hour)	5.72 ± 3.56	1.00	20.00	–
IAS	27.94 ± 9.07	12.00	60.00	.863
VTS	31.41 ± 7.54	20.00	60.00	.902
IS	15.38 ± 10.23	.00	42.00	.784

Table 3. The scale scores of the adolescents by their descriptive characteristics.

Variables	IAS	VTS	IS
Gender	Mean ± SD	Mean ± SD	Mean ± SD
Female	28.04 ± 9.15	30.49 ± 7.49	16.24 ± 10.28
Male	27.70 ± 8.86	33.62 ± 7.18	13.29 ± 9.81
Test statistics; *df*; *p* value	$t = .864$; $df = 1402.8$; $p = .394$	$t = 9.787$; $df = 1,416.1$; $p < .001$	$t = 6.750$; $df = 1421,3$; $p < .001$
Perceived income status			
Low	30.24 ± 10.12[a]	32.92 ± 8.46[a]	17.06 ± 10.55[a]
Middle	27.49 ± 8.61[b]	31.06 ± 7.25[b]	15.23 ± 10.16[b]
High	28.08 ± 10.33[b]	31.85 ± 8.01[b]	14.14 ± 10.12[b]
Test statistics; *df*; *p* value	$F = 13.960$; $df = 2$; $2,499$; $p < .001$	$F = 9.621$; $df = 2$; 2499; $p < .002$	$F = 6.856$; $df = 2$; $2,499$; $p < .001$
Family type			
Nuclear family	27.64 ± 8.94[a]	31.17 ± 7.42[a]	15.26 ± 10.17[a]
Extended family	28.07 ± 9.14[a]	31.76 ± 7.82[a]	15.11 ± 10.23[a]
Fragmented family	31.57 ± 9.86[b]	33.63 ± 7.99[b]	17.71 ± 10.92[b]
Test statistics; *df*; *p* value	$F = 12.955$; $df = 2$; $2,499$; $p < .001$	$F = 7.826$; $df = 2$; $2,499$; $p < .001$	$F = 4.092$; $df = 2$; $2,499$; $p < .017$
Internet usage purpose			
Lesson	22.43 ± 6.97[a,e]	28.31 ± 6.90[a]	11.36 ± 9.00[a]
The game	30.55 ± 10.60[b,d]	34.54 ± 8.17[b,d]	15.58 ± 11.10[b,c]
Social media	30.74 ± 9.08[b,d]	32.06 ± 7.49[b,c]	17.65 ± 10.28[b,d]
Extracurricular news or research	24.32 ± 6.73[a,c,d,e]	30.61 ± 7.07[a,c]	14.13 ± 10.40[a,c]
All of them	27.76 ± 8.63[b,e]	31.41 ± 7.39[b,c]	15.19 ± 9.94[b,c]
Other	26.99 ± 8.51[b,c,e]	32.41 ± 7.25[b,c,d]	15.33 ± 10.75[b]
Test statistics; *df*; *p* value	$F = 50.381$; $df = 5$; $2,496$; $p < .001$	$F = 20.364$; $df = 5$; $2,496$; $p < .001$	$F = 18.962$; $df = 5$; $2,496$; $p < .001$
The Person who decides the duration of internet use			
The individual himself	28.20 ± 9.08	31.62 ± 7.49	15.73 ± 10.24
Parents	25.41 ± 8.59	29.36 ± 7.68	11.94 ± 9.52
Test statistics; *df*; *p* value	$t = 4.713$; $df = 289.3$; $p < .001$	$t = 4.288$; $df = 280.7$; $p < .001$	$t = 5.766$; $df = 291.5$; $p < .001$
The State of having a device for internet use			
Yes	28.09 ± 9.06	31.40 ± 7.48	15.50 ± 10.25
No	26.11 ± 8.96	31.52 ± 8.23	13.81 ± 9.92
Test statistics; *df*; *p* value	$t = 2.870$; $df = 213.8$; $p < .005$	$t = .209$; $df = 207.7$; $p = .848$	$t = 2.159$; $df = 215.2$; $p < .027$
Internet usage status before sleeping			
Yes	29.34 ± 8.94	32.07 ± 7.52	16.52 ± 10.27
No	21.68 ± 6.69	28.42 ± 6.86	10.24 ± 8.32
Test statistics; *df*; *p* value	$t = 20.651$; $df = 858.1$; $p < .001$	$t = 10.062$; $df = 719.6$; $p < .001$	$t = 13.914$; $df = 795.9$; $p < .001$
Relationship status with family			
Very good	24.38 ± 8.14[a]	29.36 ± 7.16[a]	11.91 ± 9.42[a]
Good	27.60 ± 7.93[b]	30.74 ± 6.68[b]	14.73 ± 9.39[b]
Middle	31.53 ± 8.82[c]	33.75 ± 7.48[c]	19.53 ± 10.02[c]
Bad	34.71 ± 10.26[d]	35.84 ± 7.89[c]	20.25 ± 10.68[c]
Very bad	37.73 ± 12.45[d]	41.26 ± 10.00[d]	26.51 ± 11.53[d]
Test statistics; *df*; *p* value	$F = 98.414$; $df = 4$; $2,497$; $p < .001$	$F = 67.096$; $df = 4$; $2,497$; $p < .001$	$F = 78.326$; $df = 4$; $2,497$; $p < .001$

(Continued)

Table 3. (Continued)

Variables	IAS	VTS	IS
Relationship status with friends			
Very good	26.20 ± 9.05^a	30.08 ± 7.54^a	12.98 ± 9.84^a
Good	27.66 ± 8.16^b	31.09 ± 7.02^b	15.54 ± 9.88^b
Middle	29.64 ± 9.19^c	32.77 ± 7.39^c	17.42 ± 10.36^c
Bad	33.50 ± 9.87^d	35.42 ± 7.56^d	$20.41 \pm 9.36^{c,d}$
Very bad	34.17 ± 11.91^d	37.43 ± 9.54^d	21.92 ± 11.87^d
Test statistics; *df*; *p* value	$F = 30.664; df = 4; 2,497; p < .001$	$F = 29.626; df = 4; 2,497; p < .001$	$F = 30.752; df = 4; 2,497; p < .001$
Perceived family attitude			
Oppressive	31.81 ± 9.80^a	34.48 ± 7.92^a	19.45 ± 10.86^a
Protective	26.38 ± 8.33^b	29.88 ± 6.89^b	13.83 ± 9.59^b
Democrat	26.57 ± 8.48^b	31.95 ± 7.84^c	19.89 ± 10.45^b
Inconsistent	31.38 ± 9.25^a	33.92 ± 7.54^a	18.36 ± 9.37^a
Test statistics; *df*; *p* value	$F = 62.728; df = 3; 2,498; p < .001$	$F = 61.460; df = 3; 2,498; p < .001$	$F = 49.486; df = 3; 2,498; p < .001$

Note. IAS = Internet Addiction Scale; VTS = Violence Tendency Scale; IS = Insomnia Scale; a, b, c, d, e = Superscript shows the differences within the group. There is no difference in the measurement that takes place the same letters.

Table 4. Correlation among the Ages, Daily Internet Usage Time (DIUT) and scale scores of adolescents.

Scales		1.	2.	3.	4.	5.
1. Age	*r*	1.000				
	Sig. (2-tailed)	.				
2. DIUT	*r*	−.028	1.000			
	Sig. (2-tailed)	.163	−			
3. IAS	*r*	−.022	.343**	1.000		
	Sig. (2-tailed)	.263	**<.001**	−		
4. VTS	*r*	−.023	.201**	.424**	1.000	
	Sig. (2-tailed)	.241	**<.001**	**<.001**	−	
5. IS	*r*	.045*	.205**	.470**	.332**	1.000
	Sig. (2-tailed)	**<.05**	**<.001**	**<.001**	**<.001**	−

Note. IAS = Internet Addiction Scale; VTS = Violence Tendency Scale; IS = Insomnia Scale.
*$p < .05$. **$p < .001$.

Table 5. The results of the regression analysis regarding the effect of internet addiction on insomnia and violence tendency and insomnia on violence tendency.

Variables	Unstandardized coefficient		Standardized coefficient	*t*	*p*
	β	Std. Error	β		
Model 1 Insomnia					
	$F = 708.450, R = .470, R^2 = 0.221$, Adjusted $R^2 = .220, p < .001$				
Internet addiction	.530	0.020	.470	26.617	<.001
Model 2 Violence tendency					
	$F = 577.287, R = .433, R^2 = .188$, Adjusted $R^2 = .187, p < .001$				
Internet addiction	.360	0.015	.433	24.027	<.001
Model 3 Violence tendency					
	$F = 334.248, R = .343, R^2 = .118$, Adjusted $R^2 = .1118, p < .001$				
Insomnia	.253	0.014	.343	18.282	<.001

addiction has a significant predictive effect on violence tendency ($\beta = .433$, $t(1) = 24.027$, $p < .001$) and explains the variance changes in violence tendency scores (18.8%)

significantly ($R^2 = .188$, $F(1, 2500) = 577.287$, $p < .001$). In Model 3, insomnia significantly predicted the tendency to violence ($\beta = .343$, $t(1) = 18.282$, $p < .001$) and 11.8% of the

variance changes in violence tendency scores were explained by this model ($R^2 = .118$, $F(1, 2500) = 334.248$, $p < .001$).

Discussion

The internet, whose usage density is increasing day by day around the world, has now become an indispensable part of human life (Internet World Stats, 2021). Internet use has not only positive aspects but also risks such as addiction. Besides, it is known that internet use is gradually increasing among adolescents (Hao et al., 2020). It is seen that the levels of internet addiction (27.94 ± 9.07), violence tendency (31.41 ± 7.54), and insomnia (15.38 ± 10.23) of the adolescents participating in our study were below the average (Table 2). In the literature, it is reported that many mental problems such as internet addiction, violence tendency and sleep problems, anxiety, and depression increase in adolescents, especially during the pandemic process (Baltacı et al., 2021; Jiang, 2020). In our study, although the level of internet addiction of adolescents was below the average, it is known that adolescents are in the risk group for internet addiction and various socio-demographic variables such as gender, income status, time spent on the internet can make individuals vulnerable to this risk (Kuss et al., 2014). As a matter of fact, in our study, it is seen that internet addiction is affected by all socio-demographic variables except gender. Tendency to violence and insomnia were found to differ according to almost all socio-demographic variables (Table 3). It is known that during the pandemic process, in addition to internet addiction and some mental problems, violence behaviors both in the home and in the virtual environment increase (Han et al., 2021; Marques et al., 2020). This situation makes adolescents vulnerable to violence and may increase their tendency to violence even if it is to protect themselves.

Studies present different data on the incidence of internet addiction according to gender. While it has been reported in some studies that internet addiction is high in men (Mo et al., 2020; Reiner et al., 2017), it is seen that it is higher in women in the study of Malak et al. (2017). However, there are also studies reporting that the level of internet addiction does not differ according to gender (Karimy et al., 2020; Şimşek et al., 2019). In our study, it was determined that internet addiction scores did not differ according to gender. In our study, it is seen that the mean scores of male adolescents' tendency to violence were higher than female adolescents in accordance with the literature (Göldağ, 2020; Kılıçarslan & Parmaksız, 2020). This situation can be interpreted as a tendency toward violence due to the rebellious behaviors inherent in adolescence, but women suppress these behaviors due to social attitudes. Besides, men may be more exposed to environmental risk factors as well as biological differences and the tendency to violence in men may have increased due to the sensitivity of the central nervous system to this situation

(Yalçın & Erdoğan, 2013). When we look at the distribution of insomnia scores by gender, it is seen that female adolescents participating in our study had higher insomnia scores than male adolescents. It is known that insomnia is a serious problem in adolescence and has a high prevalence in women (de Zambotti et al., 2018). This may be due to the fluctuation of sex steroids (estrogen, etc.) in women in addition to the changes in adolescence. As a matter of fact, the relationship between sex steroids and sleep regulation was determined in women (Polo-Kantola et al., 1998). Besides, it may be due to the fact that women experience more mood changes and somatic symptoms (Gallo et al., 2018).

In our study, it was determined that low-income perception is a risk factor for internet addiction, violence tendency, and insomnia. While there are studies (Aslan & Dinç, 2022; Şahin, 2014) reporting that low-income level is a risk factor for violence and insomnia, Korkmaz Aslan et al. (2020) reported that insomnia is not affected by income status. In the literature, there are different results regarding income status and internet addiction. While some studies report that addiction is low in those with low income (Gupta et al., 2018; Şahin, 2014), some studies report that income does not affect internet addiction (Kargın et al., 2020). Today, it is known that individuals and families with low-income levels also have high internet access. The high level of internet addiction in individuals with low-income levels in our study may be due to the limited budget to be allocated to various social activities and the fact that these individuals meet their needs through the relatively cheaper internet. As a matter of fact, while internet use for social networking and entertainment (such as gaming) predicts internet addiction (Gümüş et al., 2015; Şimşek et al., 2019; Turan et al., 2020), it is stated that it does not predict the tendency to violence (Gümüş et al., 2015).

Although it has been stated in some studies that family control in internet use has a protective effect against internet addiction (Ünver & Koç, 2017), it was reported that the internet addiction scores of adolescents who control internet use themselves were lower in the study conducted by Şimşek et al. (2019). In the study by Şimşek et al. (2019), it was reported that the internet addiction scores of adolescents who control their internet use themselves were lower. In our study, all scale scores of those who decided on the duration of internet use were found to be higher than those followed by their families. The use of external inhibitors is a recommended method in the treatment of internet addiction. The low level of addiction in those followed by their families suggests that families may act as an external inhibitor in protection from addiction.

It is stated that the negative relationships of adolescents with their family and friends negatively affect internet addiction (Altunkürek & Özçoban, 2020; Kaya & Dalgiç, 2021), a tendency to violence (Avcı & Yıldırım, 2014) and

insomnia (Demirer & Erol, 2020). It is known that negative family attitudes negatively affect internet addiction (Karababa, 2020) and violence tendency (Kulakci-Altintas & Ayaz-Alkaya, 2019). In our study, similar to the literature, adolescents who reported poor friendships and described their families as oppressive and inconsistent had high internet addiction and violence tendency scores. This finding suggests that adolescents, who cannot experience the interpersonal relationships they desire in real life, tend to prefer the Internet.

Consistent with previous studies, in our study, it is seen that internet addiction is closely related to violence tendency and internet addiction predicts violence tendency (Agbaria, 2021; Gümüş et al., 2015; Tables 4 and 5). This can be explained by the fact that adolescents play violent games on the Internet and that these online games have a reward and repetition mechanism. As a matter of fact, this mechanism stimulates dopamine release and causes addiction-like symptoms in individuals (Gümüş et al., 2015). In addition, it is known that with the restrictive measures taken during the pandemic process, adolescents experience more loneliness and turn to the internet more. This situation is associated with violent tendencies (cyber bullying, etc.) (Han et al., 2021; Loades et al., 2020). In line with our findings and literature, it can be said that the pandemic poses a risk for internet addiction and violence tendency.

It is known that individuals with Internet addiction are five times more likely to have insomnia (Jain et al., 2020), and sleep disorders increase as the time spent on the Internet increase (Thomée et al., 2007). In many studies conducted during the pandemic process, it has been reported that the sleep quality of adolescents with high problematic internet use is low (Fernandes et al., 2020; Priego-Parra et al., 2020). In our study as in literature, it has been determined that the insomnia level of adolescents increase as the internet addiction increase. It is also stated that internet addiction is associated with insomnia and internet addiction predicts insomnia (Cheung & Wong, 2011; Jain et al., 2020). Our study findings are similar to the literature (Tables 4 and 5). Insomnia can have many physical, psychological, and social causes. It is stated that internet addicts have problems in falling asleep, sleep efficiency, and quality decrease, and consequently, they experience more sleep disorders, and they tend to use sleeping pills (Cheung & Wong, 2011). It is also known that anxiety about Covid 19 is associated with poor sleep quality in adolescents (Fernandes et al., 2020). It is seen that the majority of adolescents (81.80%) who participated in our study (Table 1) spend time on the Internet before going to bed. This may be a cause of insomnia. Because the light emitted from electronic devices (computer, smartphone, etc.), especially blue light, suppresses the level of melatonin, which has an important role in regulating sleep in individuals (Petit et al., 2016). It is also known that internet addiction is closely related to mental disorders and mental state

negatively affects sleep status (Cheung & Wong, 2011; Gupta et al., 2018; Kawabe et al., 2016).

Moreover, in our study, similar to the literature (Krizan & Herlache, 2016; Sexton et al., 2021), it was determined that there is a relationship between insomnia and violence tendency and that insomnia predicts violence tendency (Tables 4 and 5). In the study of Pompili et al. (2013), it was reported that insomnia predicts suicidal behaviors and individuals with insomnia use more violent methods in their suicide actions. Furthermore, individuals with sleep disorders are more likely to show verbal or physical violence once provoked. The reason for this is stated that the prefrontal cortex activity, where the executive and inhibitory processing takes place, and the functional connection with the amygdala, where emotional responses to threat are shown, decrease in insomnia. Accordingly, it has been reported that sleep-deprived individuals may have tended to violence more uncontrollably and reactively under threat (Krizan & Herlache, 2016).

Limitations

This study is limited to high school students who are responsible for Kocasinan Guidance and Research Center. Therefore, the results cannot be generalized to all adolescents. The majority of the volunteers participating in the study are women. This is another limitation of our study. The study results are limited to the answers given to the measurement tools. The study findings reflect the current situation in the pandemic process for adolescents. It may be useful to conduct studies comparing before and after the pandemic in order to reveal the effect of the pandemic in this process more clearly.

Conclusion and recommendations

It is pleasing that the scale scores of the adolescents in our study were below the average. However, the fact that internet addiction is a growing problem makes it necessary to work on the subject. In our study, it is seen that there was a significant relationship between internet addiction, insomnia, and violence tendency. Furthermore, it was determined that negative family and friend relationships of adolescents are an important risk for addiction. Accordingly, it can be recommended to encourage adolescents to participate in activities that will improve peer interactions at school. Internet use and possible harm to families, the importance of monitoring their children's Internet use, and counseling on activities to improve family relationships are also activities that can be recommended based on our study results. It is thought that conducting experimental and qualitative studies investigating the effects of family support programs on problems such as internet addiction, violence tendency, and insomnia in adolescents will make important contributions to the literature.

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