Factors Related to Internet Addiction in Serbian Adolescents: A Cross-Sectional Study

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Article

Factors Related to Internet Addiction in Serbian Adolescents: A Cross-Sectional Study

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Abstract: Exponential increase in the number of individuals using internet has been observed in last ten years. The term "internet addiction" (IA) describes a compulsive behavior associated with any online activity that disrupts everyday social interactions. Main aim of this research was to determine variables and development predictors of Internet addiction. A total of 1,669 respondents participated in this research; 1,040 of them (62.3%) were female, 590 (35.4%) were male, and 39 (2.3%) did not want to declare their gender. The average age of the respondents was 15.09±1.757. Data were collected using an online form consisted of demographic data, questions related to the use of the Internet, the Internet Addiction Scale, and the Temperament Evaluation of Memphis, Pisa, Paris, and San Diego-auto questionnaire version (TEMPS-A) for adolescents. According to the findings of the present study, the relationship between Internet addiction and age, addictive substance use frequency, purpose, time spent on the internet, and type of temperament has been proven. Analysis results indicate that the risk of developing internet addiction is higher if an adolescent spends 1-3 hours and more than 3 hours daily (2.8 and 8.2 times, respectively). Increasing age numbers for 1 unit (year), the risk of internet addiction developing is decreasing by 11.3%. Hyperthymic temperament type decreases the risk of 70.9% of internet addiction developing. It is important to highlight importance of our results since practitioners can utilize our findings to create targeted treatments and prevent internet addiction in adolescents.

Keywords: internet addiction; adolescents; temperament; online; IAT; TEMPS

Introduction

In recent years, the time spent on the Internet by adolescents has increased rapidly. Not only do schools and the educational system rely more and more on Internet activities, but the social lives of adolescents are increasingly conducted through activities on social networks and other online applications (Bickham, 2021). The activities of young people on the Internet during the COVID-19 pandemic have significantly intensified due to the transition of the educational system to online teaching (Lin, 2020). The term "internet addiction" (IA) describes a compulsive behavior that is associated with any online activity and that disrupts everyday life and social interactions. Tolerance, mobility symptoms, time spent online longer than expected, a persistent tendency to impulse control behavior, spending time on online activities, reduced social activity and employment, enjoyment of the effects of internet use, and continued use are among the seven diagnostic criteria (at least three criteria over a two-month period) that the American Psychiatric Association defines for IA (Fitzpatrick, 2008). Internet addiction occurs as a result of excessive use of the internet. As stated by Shek et al. (2013), "problematic internet use" is a synonym for internet addiction, which is defined as an individual's inability to maintain control over their internet use. It has become widely recognized as a serious health concern worldwide. One in eight Americans reports having trouble using the internet (Young & de Abreu, 2011), 2.4% of Chinese people (Cao & Su, 2007), 10.4% of Taiwanese people (Wu et al., 2015), 1.5% and 8.2% of Americans and Europeans (Weinstein & Lejoyeux, 2010), and 3.2% of UK citizens (Kuss et al., 2013) said they were addicted to the internet. According to previous research, the possible causes of excessive Internet use are dysfunctional family, degree of parental circumcision, parental control over the adolescent's free time, the adolescent's personality

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type (level of impulsivity, degree of self-control), aggressiveness, and neuroticism (Weinstein & Joyeux, 2010). It has also been proven that the effects of excessive use of the Internet on the central nervous system are very similar to the effects of drug addicts, i.e., the response of the brain is very similar and is reflected in the increased secretion of dopamine. Depression, anxiety, attention deficit hyperactivity disorder, and autism are cited as the main consequences of untreated Internet addiction in research, so treatment and therapy are usually reduced to cognitive behavioral therapy, pharmacological preparations, as well as group or family therapy (Kuss & Lopez-Fernandez, 2016). Adolescents are often shown to be the most vulnerable group in terms of developing internet addiction; therefore, it is invaluable to examine the predictors and factors that influence the appearance and outcomes of this "new" form of addiction that has a negative impact on health, especially mental health.

Purpose of the Present Study

In the present study internet addiction has been examined in adolescents in Serbia, and correlation to differences in sex, place of residence, parent's education, psychoactive substances use, as well as temperament type.

Methods

Sample

The sample of our research consisted of 1,669 adolescents aged 11 to 19 attending primary and secondary schools in Serbia. More detailed information on the sample structure will be provided in the Results section.

Instruments

For the purposes of this study, we created an online form that consisted of five parts. First part was related to the demographic data of the respondents (age, gender, class, level of professional education of the parents, success in the current and previous semester, use of psychoactive substances). Second part was related to the use of the Internet: from which device they connect to the Internet most often, how much time a day they spend on the Internet for school duties and extracurriculars, which group of applications they devote the most time to (social networks, games, viewing media (movies, music, etc.), whether their parents control them in this, and to what extent. Third part consisted of the Internet Addiction Scale, a scale validated on the Croatian adolescent population was used to diagnose Internet addiction, with the author's permission and consent (Černja et al., 2019). This scale consists of 20 questions, which can be answered with 5 answers: 0-never, 1-rarely, 2-occasionally, 3-often, 4-very-often, and 5-always. The test taker can score 0-100 points. The classification of the points obtained is as follows: 0–19 = no signs of Internet addiction; 20–39 = low level of addiction; 40–69 = medium level; and 70–100 = high level of signs—existence of Internet addiction. Fourth part of the questionnaire consisted of the Temperament Evaluation of Memphis, Pisa, Paris, and San Diego-auto questionnaire version (TEMPS-A) for adolescents (Akiskal et al., 2005) for personality assessment and as a predictor of pathological behavior and temperament. This scale consists of 41 questions with T (true) and N (not true) options. Constituent subscales and items were formulated based on diagnostic criteria for affective temperaments that distinguish five types: cyclothymic, depressed, irritable, hyperthymic, and anxious (Jović et al., 2019). Fifth part of the questionnaire for adolescents consisted of the Depression Anxiety Stress Scale - DASS 21 (Lovibond, 1995) for the assessment of mental health, but these indicators were not included in the current study.

Design and procedure

In this research, a cross-sectional epidemiological study was used. Schools were contacted randomly by emails and then, after principal approval, a form link was forwarded to students. For minors (below 18 years) parents signed informed consent, previously approved by University Ethics

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committee (approval number: 01-6816). Responses were instantly available after form completion and presented in an Excel spread sheet. Every response triggered a notification email in the researcher's mailbox. The protocols used in this study followed the guidelines of the Declaration of Helsinki (World Medical Association, 2013).

Statistical Analyses

Statistical data processing was performed using the standard SPSS software package, version 19.0. (The Statistical Package for Social Sciences software (SPSS Inc, version 19.0, Chicago, IL)). Descriptive statistics measures were used in this research: arithmetic mean, standard deviation, median, quartiles, frequencies, and percentages. The reliability of the measuring scales was tested using the Kronbach coefficient. The normal distribution of numerical variables was checked using the Shapiro-Vilk test and the Kolmogorov-Smirnov test. The correlation of category variables was examined using the Chi-square diagram for the contingent tables. Univariate and multivariate factors analysis was used for predicting internet addiction.

Results

A total of 1,669 respondents participated in this research; 1,040 of them (62.3%) were female, 590 (35.4%) were male, and 39 (2.3%) did not want to declare their gender. The average age of the respondents was 15.09±1.757, with the youngest respondent being 11 and the oldest being 19. Other sociodemographic data about the respondents can be found in Table 1.

Table 1. Sociodemographic characteristics.

Question	Categories	N (%)
Do you go to primary or secondary school?	Primary school	381(22.8)
	Secondary school	1288(77.2)
Do you have brother or sister from same parents?	No	285(17.1)
	Yes	1384(82.9)
Which city is your place of residence (or closest)?	Belgrade	670(40.1)
	Sombor	788(47.2)
	Kragujevac	22(1.3)
	Krusevac	82(4.9)
	Nis	37(2.2)
	Other	70(4.2)
Your parents are?	Divorced or separated	341(20.4)
	Married	1253(75.1)
	Live together	75(4.5)
Your mother's education?	Primary school	79(4.7)
	Secondary school	747(44.8)
	College	188(11.3)
	Faculty	655(39.2)
Your father's education?	Primary school	99(5.9)
	Secondary school	833(49.9)
	College	179(11.3)
	Faculty	548(32.8)
Your grades last school year were?	Acceptable (2, D)	22(1.3)
	Good (3, C)	193(11.6)

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	Very good (4, B)	555(33.3)
	Excellent (5, A)	899(53.9)
Do you use any of these substances?	No, nothing	1134(68.0)
	E- cigars, alcohol	217(13.0)
	tobacco	100(6.0)
	alcohol	198(11.9)
	Marihuana	4(0.2)
	Sleeping pills	13(0.8)
	other	2(0.1)
How often do you use above mentioned?	Never	1087(65.1)
	Rarely	176(10.5)
	Only when I go out with my friends	220(13.2)
	Every day	186(11.1)

Out of the total number of respondents, 1618 (96.9%) respondents use the Internet daily. The distribution of answers to questions related to Internet use is presented in Table 2.

Table 2. Distribution of responses related to internet usage.

Question	Categories	N (%)
Usually, I use? to go to internet	Computer	126(7.5)
	Smartphone	1511(90.5)
	Laptop	32(1.9)
Internet Content mostly visited?	Gaming	202(12.1)
	Social networks (Facebook, Instagram, Snapchat, Tik Tok...)	1060(63.5)
	Media content (YouTube, Spotify, Netflix, HBO…)	371(22.2)
	School activities	36(2.2)
Do you use internet every day?	No	51(3.1)
	Yes	1618(96.9)
If every day used, approximately how long?	max 1h	109(6.5)
	1h-3h	617(37.0)
	More than 3h	943(56.5)
Does your parents control time you spend on internet?	No	700(41.9)
	Sometimes	694(41.6)
	Yes	275(16.5)
Do you use internet for school activities?	Never	81(4.9)
	Sometimes	748(44.8)
	Often	840(50.3)

According to TEMPS-A scale all participants were categorized in one out of five temperament types, whereas majority of those 1018 (61.0%) was categorized as hyperthymic type. As for other temperament types, 518 (31.0%) of them was categorized as depressive, 98 (5.9%) as cyclothymic, 29

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(1.7%) as irritable, following with fewest participant categorized as anxious type - 6 (0.4%). After totaling/summing of single Internet Addiction scale questions, IAS score for each participant was obtained. Average value of Internet Addiction Score (IAS) was 28.90±15.210, where minimal score was 0 and maximum was 99. According to this IAS score, all participants were divided categories as follows: 514 (30.8%) with no signs of internet addiction, 773 (46.3%) low level of internet addiction, 361 (21.6%) medium level of internet addiction and 21 (1.3%) high level of internet addiction. Sex (Chi square=20.7. p= .002), attendance to primary or secondary school, (Chi square=21.4, p< .001) and city of residence (Chi square=33.3, p= .004) were sociodemographic characteristics which were significantly related to internet addiction level. Regarding mother's education, significantly more participants without internet addiction (39.3%), with low internet addiction signs (42.3%) and with medium internet addiction signs (34.8) had a mother with university education (high education level) in relation to the ones with high internet addiction signs (14.3%) (Chi square=20.7, p=0.014). Similar result was observed with relation to father's education- responders with high level of internet addiction had the least percentage of highly educated fathers comparing to other groups (23.8%) (Chi square=12.1, p= .028). Also, representation of students with excellent (A) grades was the least in the high internet addiction level group (33.3%) relating to other groups (Chi square=42.3, p< .001). Usage of psychoactive substances that may result in developing addiction (Chi square=85.7, p< .001) same as frequency of substances usage was significantly related to internet addiction level (Chi square=58.2, p< .001) as described in Table 3.

Table 3. Sociodemographic characteristics related to internet addiction presence.

Question		No signs	Low level	Medium level	High level	Chi – Square/p value
Sex	Female	299(58.2)	504(65.2)	227(62.9)	10(47.6)	**20.7/ .002**
	Male	204(39.7)	253(32.7)	125(34.6)	8(38.1)	
	Undeclared	11(2.1)	16(2.1)	9(2.5)	3(14.3)	
Do you attend primary or secondary school?	Primary	152(29.6)	152(19.7)	70(19.4)	7(33.3)	**21.4/< .001**
	Secondary	362(70.4)	621(80.3)	291(80.6)	14(66.7)	
Siblings from same parents?	No	91(17.7)	121(15.7)	69(19.1)	4(19.0)	2.4/ .500
	Yes	423(82.3)	652(84.3)	292(80.9)	17(81.0)	
Nearest city for residence?	Belgrade	184(35.8)	344(44.5)	138(38.2)	4(19.0)	**33.3/ .004**
	Sombor	265(51.6)	329(42.6)	180(49.9)	14(66.7)	
	Kragujevac	5(1.0)	15(1.9)	1(0.3)	1(4.8)	
	Krusevac	26(5.1)	34(4.4)	22(6.1)	0(0.0)	
	Nis	11(2.1)	18(2.3)	6(1.7)	2(9.5)	
	Other cities	23(4.5)	33(4.3)	14(3.9)	0(0.0)	
Your parents are?	Divorced or separated	91(17.7)	155(20.1)	90(24.9)	5(23.8)	9.6/ .143
	Married	403(78.4)	583(75.4)	253(70.1)	14(66.7)	
	Live together	20(3.9)	35(4.5)	18(5.0)	2(9.5)	
Mother's education?	Primary school	26(5.1)	32(4.1)	18(5.0)	3(14.3)	**20.7/ .014**

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	Secondary school	240(46.7)	327(42.3)	169(46.8)	11(52.4)	
	College	46(8.9)	87(11.3)	51(14.1)	4(19.0)	
	University degree	202(39.3)	327(42.3)	123(34.9)	3(14.3)	
Father's education?		31(6.0)	39(5.0)	27(7.5)	2(9.5)	**12.1/ .028**
	Primary school					
	Secondary school	262(51.0)	344(47.1)	196(54.3)	11(52.4)	
	College	59(11.5)	92(11.9)	35(9.7)	3(14.3)	
	University degree	162(31.5)	278(36.0)	103(28.5)	5(23.8)	
School grades last year?	Acceptable (2, D)	4(0.8)	9(1.2)	7(1.9)	2(9.5)	**42.3/< .001**
	Good (3, C)	61(11.9)	70(9.1)	58(16.1)	4(19.0)	
	Very good (4, B)	161(31.3)	245(31.7)	141(39.1)	8(38.1)	
	Excellent (5, A)	288(56.0)	449(58.1)	155(42.9)	7(33.3)	
Do you use any of below mentioned substances?	No	392(76.3)	531(68.8)	197(54.6)	14(66.7)	**85.7/< .001**
	e-cigars, alcohol	39(7.6)	88(11.4)	85(23.5)	5(23.8)	
	tobacco	31(6.0)	40(5.2)	28(7.8)	1(4.8)	
	alcohol	49(9.5)	103(13.3)	46(2.7)	0(0.0)	
	Marihuana	2(0.4)	2(0.3)	0(0.0)	0(0.0)	
	Sleeping pills	1(0.2)	8(1.0)	3(0.8)	1(4.8)	
	Other drugs	0(0.0)	0(0.0)	2(0.6)	0(0.0)	
How often do you use above mentioned?	Never	383(74.5)	506(65.5)	187(51.8)	11(52.4)	**58.2/< .001**
	Rarely	45(8.8)	82(10.6)	48(13.3)	1(4.8)	
	Only when I go out with friends	43(8.4)	107(13.8)	67(18.6)	3(14.3)	
	Every day	43(8.4)	78(10.1)	59(16.3)	6(28.6)	

Significant relatedness/connection in all characteristics of internet use and internet addiction level sings, was observed (p< .001), as described in Table 4.

Table 4. Characteristics of internet usage associated with internet addiction.

Question		No signs	Low level	Medium level	High level	Chi – Square / p value
	Computer	43(8.4)	41(5.3)	40(11.1)	2(9.5)	**20.1/ .003**

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Usually, I visit internet via?	Smart phone	457(88.9)	724(93.7)	311(86.1)	19(90.5)	
	Laptop	14(2.7)	8(1.0)	10(2.8)	0(0.0)	
Usual time spent on internet?	Gaming	58(11.3)	73(9.4)	65(18.0)	6(28.6)	**75.0/< .001**
	Social networking (Facebook, Instagram, Snapchat, Tik Tok...)	282(56.2)	510(66.0)	248(68.7)	13(61.9)	
	Media (YouTube, Spotify, Netflix, HBO…)	143(27.8)	180(23.3)	47(13.0)	1(4.8)	
	For school activities	24(4.7)	10(1.3)	1(0.3)	1(4.8)	
Do you use internet each day?	No	28(5.4)	18(2.3)	5(1.4)	0(0.0)	**15.4/ .002**
	Yes	486(94.6)	755(97.7)	356(98.6)	21(100.0)	
If used each day, what time approximately would that be?	1h max	76(14.8)	28(3.6)	5(1.4)	0(0.0)	**250.1/< .001**
	1h-3h	266(51.8)	288(37.3)	63(17.5)	0(0.0)	
	More than 3h	172(33.5)	457(59.1)	293(81.2)	21(100.0)	
Do your parents control the time you spend on internet? Do they warn you?	No	198(38.5)	327(42.3)	160(44.3)	15(71.4)	**14.9/ .021**
	Sometimes	214(41.6)	331(42.8)	145(40.2)	4(19.0)	
	Yes	102(19.8)	115(14.9)	56(15.5)	2(9.5)	
Do you use internet for school activities and learning?	Never	22(4.3)	31(4.0)	24(6.6)	4(19.0)	**29.9/< .001**
	Sometimes	206(40.1)	344(44.5)	187(51.8)	11(52.4)	
	Often	286(55.6)	398(51.5)	150(41.6)	6(28.6)	

All responders with high level of internet addiction signs declared to use internet each day (Chi square=15.4, p= .002), same as usage of internet more than 3 hours per day (Chi square=250.1, p< .001). 71.4% responders in total with high level of internet addiction signs stated that parents don't control the time they spend on internet, whereas other groups showed significantly low percentage (no signs 38.5%, low level of signs 42.3% and medium level of internet addiction signs 44.3%) (Chi square=14.9, p= .021). Temperament type was statistically significant associated to internet addiction level as described in Table 5. (Chi square=181.9, p< .001).

Table 5. Temperament type in association with internet addiction.

	No signs	Low level	Medium level	High level	Chi – Square / p value

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Temperament type	Depressive	74(14.4)	251(32.5)	181(50.1)	12(57.1)	181.9/<0.001
	Cyclothymic	16(3.1)	42(5.4)	37(10.2)	3(14.3)	
	Hyperthymic	410(79.8)	464(60.0)	138(38.2)	6(28.6)	
	Irritable	11(2.1)	13(1.7)	5(1.4)	0(0.0)	
	Anxious	3(0.6)	3(0.4)	0(0.0)	0(0.0)	

Responders without or with low level of internet addiction mostly showed as hyperthymic temperament type (79.8% и 60.0%, respectively). In participants with medium internet addiction level, the most represented temperament type was depressive one (50.1%), which was also the case with high level of internet addiction (57.1%).

According to level of internet addiction signs all responders were classified as follows: group without signs of internet addiction: 514 (30.8%) and group with signs of internet addiction signs (low, medium, and high level) 1155 (69.2%). After univariant logistic regression is done, all variables which showed significancy (p< .05) were integrated into multivariant model. This model clarifies 17.6-24.8% variance of dependent variable and has good predictive power according to results of Hosmer and Lemeshow test (p> .05). Accuracy of this model was 73.8%. Significant factors in this model were age, addictive substances use frequency, purpose and time spent on the internet and temperament type. (p< .05) (Table 6).

Table 6. Univariant and multivariant factor analysis for internet addiction prediction.

Variable		Univariant logistic regression		Multivariant logistic regression	
		Odds Ratio	p	Odds Ratio	p
Age	11-19 years	1.105(1.042-1.173)	**.001**	0.887(0.791-0.895)	**.040**
Sex	Female	1	ref	1	ref
	Male	0.764 (0.615-0.948)	**.015**	0.975(0.748-1.271)	.850
Primary or secondary school respondents?	Primary	1	ref	1	ref
	Secondary	1.698 (1.338-2.155)	**< .001**	1.501(0.980-2.300)	0.062
Parents relation?	Separated or divorced	1	ref	1	ref
	Married	0.768(0.587-0.965)	**.05**	0.899(0.665-1.215)	.487
City of residence?	Belgrade	1	ref	1	ref
	Sombor	0.747 (0.597-0.936)	**.011**	0.807(0.600-2.138)	.157
Addictive substances use?	None	1	ref	1	ref
	e-cigars, alcohol	2.411(1.670-3.482)	**< .001**	0.657(0.295-1.461)	.303
	Alcohol	1.606(1.138-2.269)	**.007**	0.607 0.267-1.379()	.233
	Never	1	ref	1	ref
	Rarely	1.584(1.104-2.272)	**.012**	2.087(0.941-4.628)	.070

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How often above mentioned?	Only when go out with friends	2.239(1.569-3.196)	**< .001**	2.490(1.106-5.605)	**.028**
	Each day	1.809(1.259-2.601)	**.001**	2.022(0.948-4.315)	.069
Internet content spending time often?	Games	1	ref	1	ref
	Media (YouTube, Spotify, Netflix, HBO…)	0.642(0.444-0.929)	**.019**	0.616(0.399-0.951)	**.029**
	School activities	0.201(0.094-0.429)	**< .001**	0.261(0.110-0.620)	**.002**
Do you use internet each day?	No	1	ref	1	ref
	Yes	2.836(1.617-4.973)	**< .001**	1.116(0.581-2.142)	.742
How much time do you spend on internet daily?	1h max	1	ref	1	ref
	1h-3h	3.039(1.960-4.712)	**< .001**	2.775(1.706-4.512)	**< .001**
	More than 3h	10.323(6.644-16.042)	**< .001**	8.205(4.962-13.568)	**< .001**
Does your parents control time you spend on internet?	No	1	ref	1	ref
	Yes	0.669(0.498-0.898)	**.008**	0.984(0.695-1.393)	.927
Temperament type	Depressive	1	ref	1	ref
	Hyperthymic	0.247(0.188-0.326)	**< .001**	0.291(0.216-0.392)	**< .001**
	Irritable	0.273(0.124-0.601)	**.001**	0.332(0.137-0.803)	**.014**
	Anxious	0.167(0.033-0.841)	**.030**	0.088(0.016-0.497)	**.006**

Other variables that were significant in univariable model, lost their significancy in multivariable model after impact assessment of other variables. Analysis results indicate that risk for internet addiction developing is higher if adolescent is spending 1-3h and more than 3h daily (2.8 and 8.2 times, respectively). Increasing age numbers for 1 unit (year), risk of internet addiction developing is decreased for 11.3%. Hyperthymic temperament type decrease risk for 70.9% from internet addiction developing sings rather than depressive temperament type. Other statistically significant variables are described in the Table 6.

Discussion

This study is focused on examining correlations of Internet addiction in a large sample of adolescents in Serbia, with sociodemographic variables and temperament type. The main aim is determining which variables included in the research have the greatest predictive power when it comes to the development of Internet addiction. The last ten years have seen an exponential increase in the number of individuals using and having access to internet, particularly young people, and adolescents. In this research, it was shown that 96.9% of the surveyed adolescents use the Internet daily, which is in line with previous research conducted around the world (Jhala & Sharma, 2016). Affective temperaments were classified by Akiskal into five categories: hyperthymic, cyclothymic,

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irritable, anxious, and depressive (Akiskal et al., 2005). In this research, the largest number of respondents belonged to the hyperthymic type (1018 or 61.0%) and to the depressive type of temperament (518 or 31.0%), which is in accordance with the results of the research conducted on a sample of students in Poland (Bartosik et al., 2023).

Based on the IAS score, adolescents in our research were divided into the following groups: 30.8% had no signs of Internet addiction, 46.3% had a low level of addiction, 21.6% had a moderate level of addiction, and 1.3% had a high level of signs of Internet addiction. These findings are consistent with those obtained on a population of 352 students in Croatia, where the results showed that 3.4% of high school students reported high levels of internet addiction, while 35.4% of respondents reported some signs of addiction. It is important to note that the identical instrument used in our study was used for the assessment (Černja et al., 2019).

Results for 31 nations were given in a meta-analysis of 164 independent samples (N = 89,281) by authors Cheng and Li (2014). According to the findings of their research, the Middle East has the highest incidence of high internet addiction (10.9%). The countries of North and West Europe have the lowest prevalence of internet addiction (2.6%), followed by Southeast European countries with a frequency of 6.1% (Cheng & Li, 2014).

Our findings are consistent with the results of a study conducted on a sample of 303 teenagers in Turkey, where it was shown that having a computer at home and using the Internet for more than two years is associated with higher scores on the IAS. A positive and highly significant correlation was found between the results of Internet addiction and the results of depressive, cyclothymic, hyperthymic, irritable, and anxious temperaments. Furthermore, it was found that the frequency of anxious temperament is significantly higher in students with Internet addiction than in those without. Furthermore, emotional, and behavioral problems are more common in adolescents with problematic Internet use (Ozturk et al., 2013).

In this study, a significant correlation was observed in all characteristics of Internet use with the degree of Internet addiction, because all respondents with a high level of signs of Internet addiction stated that they use the Internet every day or use the Internet for more than 3 hours a day, while 71.4% of respondents with a high level of signs of Internet addiction stated that their parents do not control the time they spend on the Internet. Our findings are consistent with research conducted on a sample of 426 students in Saudi Arabia. The same instrument as in our study (20-item IAT) was used to measure Internet addiction, and it was shown that 40.8% of respondents used the Internet 5-7 hours a day, mainly for social networking (88.5%) and to download media files. Approximately 6% were classified as Internet addicts, and 42% had occasional problems. Internet addiction was significantly higher in those who used the Internet for more than 10 hours a day (Kolaib et al., 2020). Also, in a sample of Turkish adolescents, it was shown that having a computer at home and using the Internet for more than two years is associated with higher scores on the IAS (Ozturk et al., 2013).

In our research, after conducting univariate logistic regression, the following were identified as significant factors predicting addiction to the Internet: age, frequency of use of addictive substances, purpose of spending time on the Internet, time spent on the Internet, and type of temperament, which is in agreement with the results of other research (Ozturk et al., 2013; Karacic & Oreskovic, 2017). The connection between Internet addiction and the frequency of use of addictive substances is expected because the characteristic features of both physical and psychological addictions, including mental rumination, fluctuating emotions, tolerance, withdrawal, interpersonal conflict, and relapse, are evident in behavioral addictions (Alavi et al, 2011; Jorgenson et al., 2016). The "self-medication hypothesis" states that patients typically utilize drugs to manage their cognitive deficiencies, lessen excruciating anxiety, and alter undesirable temperamental positions (Durkee et al., 2012). This may be seen in Internet addiction, which is a behavioral addiction, as well as in other behavioral issues that young people face, such as substance abuse.

The previously discussed variables that showed significance in the univariable model lost it in the multivariable model after assessing the influence of other variables, and in the final addiction prediction model, the results of the analysis showed that the risk of developing addiction to the Internet is greater if the child spends more than 1-3 hours and more than 3 hours a day (2.8 and 8.2

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times, respectively), that with an increase in the number of years by 1, the risk of Internet addiction decreases by 11.3%, and that the hyperthymic type of temperament decreases the risk of Internet addiction by 70.9% compared to the depressive type of temperament. These findings are expected and in accordance with the research conducted by Kolaib et al. (2020) and Rathi et al. (2022). It has long been known that there is a significant positive correlation between depression and time spent using the Internet. Adolescents with depression and low self-esteem, consequently, may not be able to control their online activity, as it is an escape into an online fantasy and a way of creating an ideal persona that results in more Internet use (Rathi et al., 2022). The preventative efforts ought to center on helping adolescents make good use of their own leisure time. The areas of emotional and social competence, responsible use of media content, and current technology should be the focus of prevention initiatives as well as treatment for youth with high levels of internet dependence. Early program interventions on appropriate and safe internet use are essential to lower the likelihood of high levels of internet addiction during the adolescent years.

Limitation and Future Directions

The limitation of this study is its cross-sectional design, which limits its ability to establish a cause-effect relationship between the outcome and the independent variables. Despite this, it is important to note that our results are invaluable because practitioners can utilize our findings to create targeted treatments and avoid internet addiction in adolescents. It would be interesting to investigate the relationship between the prevalence of internet addiction and the emergence of other problematic behaviors in young people, such as problematic behavior and other behavioral issues common in the youth population using prospective and longitudinal follow-up studies.

Conclusion

Girls, adolescents surfing on internet via smartphones, the ones from larger cities will develop internet addiction more likely. Adolescents with internet addiction will have decreased grades in school more likely. Use of psychoactive substances was not significant predictor of developing Internet addiction, but temperament type was observed as significant Internet addiction predictor.

According to the findings of the present study, the relationship between Internet addiction and age, addictive substance use frequency, purpose, time spent on the internet, and type of temperament has been proven. Addiction to the Internet is a relatively common phenomenon among adolescents, and in our research, the largest number of respondents had a moderate addiction to the Internet. That's why those who show indicators of mild internet addiction are a population that requires extra attention in terms of prevention. More research in this area should be conducted using a systematic, multivariate, psycho-social conceptual framework.

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