The impact of internet dependence on human behaviour and well-being: A socio-psychological analysis

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Abstract In the present academic paper, we aimed to investigate the influence of Internet use by three different levels of users in relation to Internet addiction on behavior and health among students of Ivan Franko National University of Lviv. Seven hundred and ninety-four students completed an online survey, including a demographic questionnaire, a brief description of health anxiety, and an Internet addiction test. The results showed that Internet addicts have higher scores on overall behavioral risk and health anxiety factors. The present research provides knowledge for mental and physical health professionals about the connection between Internet addiction and health anxiety. Chi-square tests were conducted to compare differences in the distribution of Internet addiction by health literacy levels, as well as some social and demographic features. The data obtained can help the public and experts inform about one of the factors that are related to people's concerns.

Keywords: Internet addiction, computerization, addiction, physical health, mental health

1. Introduction

The modern world is the world of the information society, in which the use of computers and the Internet is growing very rapidly and becoming a necessary component of various aspects of human life, which is intended to facilitate the convenience and efficiency of work. A trend inherent in many countries around the world is the creation of nationwide high-speed information and communication networks and the spread of wireless local area networks—establishing a society where people can easily access the high-speed Internet regardless of time and place (Fernandes et al., 2019).

According to the Global Digital 2023 report (Digital, 2023), as of the beginning of 2023, the number of Internet users in the world increased to 5,16 billion people from 9,8 million in 1993 to 791 million in 2003 to 2,355 billion in 2013. It can be observed that from 1993 to 2003, the number of Internet users in the world grew extremely rapidly – almost 4000 times. Thereafter, growth also followed, but not so rapidly, which confirms the theory of exponential growth. It is worth noting that in 2022, the number of Internet users in the world grew by only 98 million people, not even by a full 2% in relative terms. Based on the above trend of growth in the number of Internet users, it is easy to calculate that at the beginning of 2023, 64.4% of the world's population had access to the Internet.

Thus, in addition to improving quality of life with the help of Internet technologies, the frenzial popularization of the Internet has another less attractive side – addiction. Internet addiction poses a challenge and problem for both the individual and society as a whole (Statista, 2023).

In this context, the following research aims were proposed: 1) to investigate the correlation between Internet addiction (dependence) and behavioral motives. 2) To explore the correlation between Internet addiction (dependence) and health.

2. Literature review

It is believed that usage of the term "Internet addiction" in the scientific community began in 1996 when Goldberg first used the term "Internet addiction disorder" in the field of psychiatry (Goldberg, 2023). As the scientific debate has evolved, no single approach to the interpretation of Internet addiction disorder (a pathological disorder of computer use) has been developed since the definition and included categories are not fully consistent, and there is disagreement on whether it should be classified as an independent disease (Goldberg, 2023). Although there is no consensus on the criteria that can be applied to unambiguously identify Internet addiction, it is believed that such behaviors may include online gaming, gambling, shopping,

viewing pornography, checking email, instant messaging, and using social media (Ioannidis et al, 2018; Kryshtanovych et al., 2022).

Some studies focus on the fact that Internet addiction is a type of behavioral addiction that can cause serious damage not only to psychological effects but also to actual areas of social life, such as work or academic activities (Jerusalem et al., 2001).

In their studies, scholars have identified a number of health disorders, including depression, attention deficit hyperactivity disorder (ADHD), psychoactive substance use, social anxiety disorder, aggressive behavior, and suicidal behavior, as comorbidities of Internet addiction (Kuss, Lopez-Fernandez, 2016; Popovych et al., 2022; Mizin et al., 2021). In addition, some demographic variables are also associated with Internet addiction, such as obesity, lower school grades, poor academic performance, engagement in risky behaviors, higher family income, and lower levels of parental attachment (Ioannidis et al, 2018). In April 2018, China's Ministry of Education issued an urgent notice to prevent elementary and middle school students from using the Internet (Xin et al., 2018; Bakhov et al., 2021). The COVID-19 pandemic has brought back and even expanded the opportunities and demand for the use of electronic devices by students, including the frequency and duration of Internet use for recreation and the percentage of Internet use over time (Internet use after 00:00), which has led to an increase in the number of Internet addictions (Wallace, 2014). Studying the variables associated with Internet addiction is crucial for implementing effective interventions to promote the healthy development of young people in the context of modern prevention and control of the epidemic and life under the conditions of martial law.

3. Methods

In July 2013, we conducted a survey by random sampling (mechanical selection) among the student population of Ivan Franko National University of Lviv. The size of 5% of the sample of university students was 794 persons.

The questionnaire consisted of sections of basic information, a section for determining Internet addiction, and a section for determining health status. The basic block contains data on age, number of children in the family and relationships with peers.

The diagnostic questionnaire of Internet addiction of risky behavior for students' health is a standard questionnaire that includes 10 items; if a student meets the criteria for the first item (browsing the Internet for more than 4 hours a day within the last 7 days) and meets at least four of the other nine items, he or she is identified as having an Internet addiction (Liang et al., 2016). In the present research, Cronbach's α was 0.87. The validity and reliability of this instrument have been confirmed by several studies (Bakken et al., 2009). The questionnaire section for determining the level of health was developed on the basis of previous studies (Brand et al., 2011; Bujak et al., 2016; Serhieienkova et al., 2021). Within the framework of the present research, we have slightly improved this scale by adding some items to make it adaptable for students. This section of the questionnaire contains 12 factors in 4 dimensions, namely, a block of cardiovascular diseases, a block that helps determine the quality of sleep, and questions to determine problems with the musculoskeletal system and hearing. All items are rated on a five-point Likert scale (strongly disagree, disagree, not sure, agree, and strongly agree), and the test results range from {1, I don't know about this disease; 2, people of my age don't get it yet; 3, I don't think I have this problem; 4, sometimes I have symptoms; 5, I am undergoing medical examination}.

However, not all the students responded (response rate – 94%). In addition, after data cleaning, 734 questionnaires remained valid. Statistical analysis was performed using IBM SPSS Statistics 26. Frequencies and proportions for categorical variables were used to describe the characteristics of the students. Chi-square tests were used to examine whether Internet addicts and nonaddicts differed in terms of behavioral patterns and sociodemographic characteristics (gender, age, peer relationships) (Havrychenko et al., 2022). Cross-group comparisons were made using the chi-square test to determine the influence of Internet addiction on health factors.

4. Results

Females made up 53.5% of the sample (Figure 1). The average age of the surveyed participants was 19.4 ± 1.67 years.
First, let us examine the hypothesis about the influence of gender on the level of Internet addiction.
$H0_1$: There is no correlation between gender and Internet addiction variables;
$H1_1$: Gender and Internet addiction variables are interrelated.
The calculated value of the criterion is χ^2 =1,935. The value *of asymptotic significance (bilateral)* = 0,38, which is 0,05 at the significance level, makes it possible to accept the null hypothesis; that is, we can assume that there is no correlation between gender and Internet addiction.

The next step is to analyze the interrelation between Internet addiction and behavioral patterns: the ability to distance oneself, the level of self-control, the level of social support, the level of responsibility (according to subjective assessments), the level of escape from reality, the level of personal anxiety, the level of aggression, and the level of distrust. We will separately analyze the correlations between Internet addiction and several indicators of subjective health, including cardiovascular diseases, sleep disorders, musculoskeletal problems, and hearing impairment (Akimova et al., 2022).
$H0_1$: There is no correlation between the distancing level and Internet addiction variables;

H1$_1$: The distancing level and Internet addiction variables are interrelated.
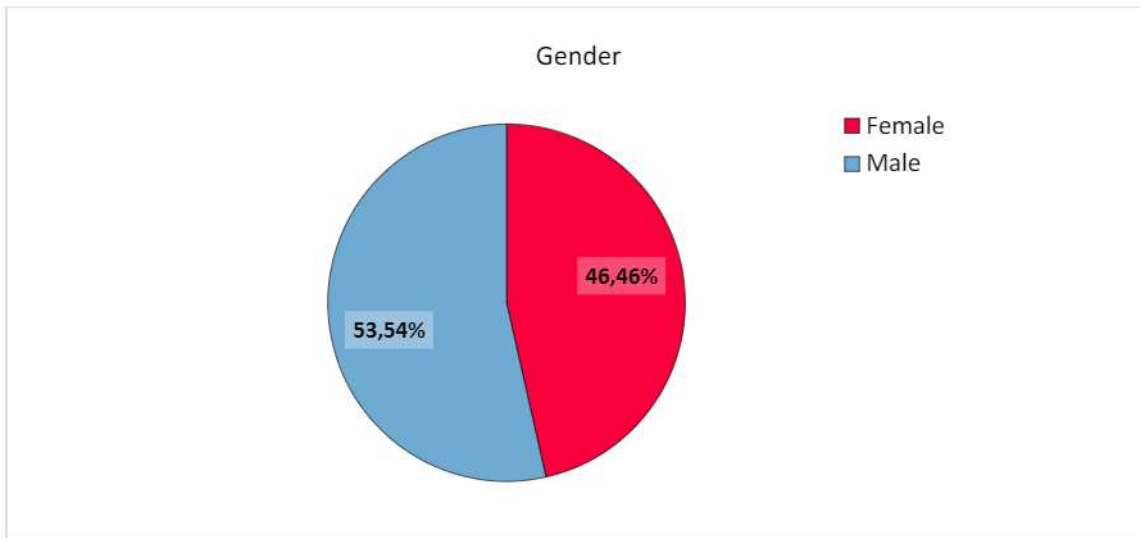

Figure 1 Distribution of respondents by gender. Source: compiled by the authors.

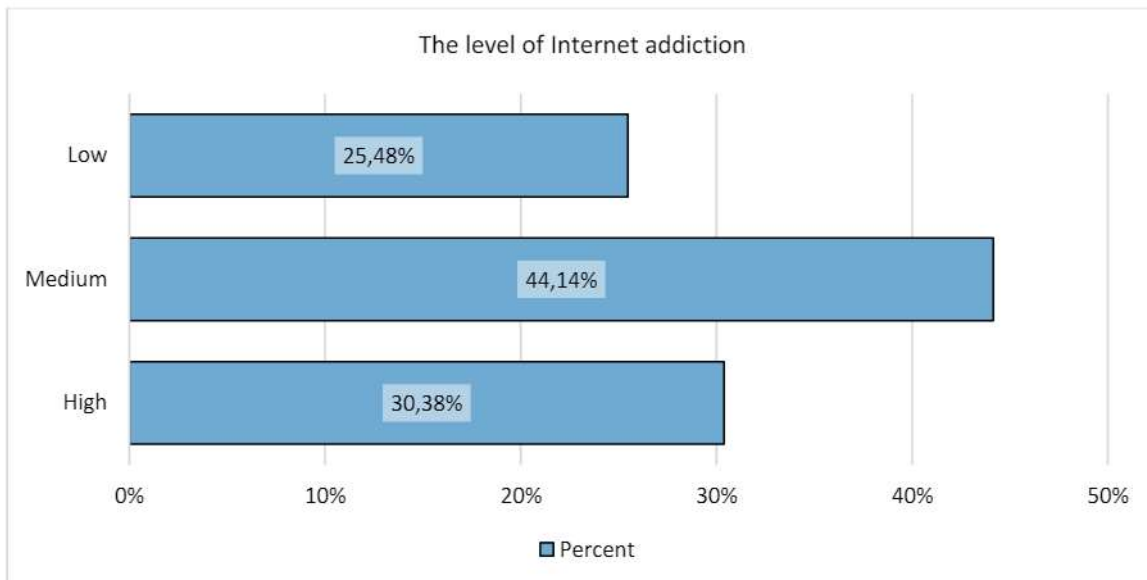The level of Internet dependence among respondents is visually represented in Figure 2.

Figure 2 Distribution of respondents by the level of Internet addiction. Source: compiled by the authors.

Table 1 Correlations between gender and Internet addiction.

The level of Internet addiction				
		Low	Medium	High	Total
Gender	Female	108	171	114	393
	Male	79	153	109	341
Total		187	324	223	734
Chi-square: criterion statistics				
		Value	df, degrees of freedom	Asymptotic significance (bilateral)
Pearson's Chi-square		1,935[a]	2	,380
Likelyhood ratio (LR)		1,941	2	,379
Chi-square: linear association		1,733	1	,188
N – number of valid values		734		
a. 0 squares (0.0%) have an expected number less than 5.				

Source: Author's calculations.

Table 2 Correlations between Internet addiction and distance distance.

	Distancing				
		Low	Medium	High	Total
The level of Internet addiction	Low	71	57	59	187
	Medium	109	114	101	324
	High	82	72	69	223
Total		262	243	229	734
Chi-square: criterion statistics					
		Value	df, degrees of freedom	Asymptotic significance (bilateral)	
Pearson's Chi-square		1,595[a]	4	,810	
Likelyhood ratio (LR)		1,599	4	,809	
Chi-square: linear association		,001	1	,970	
N – number of valid values		734			
a. 0 squares (0.0%) have an expected number less than 5.					

Source: Author's calculations.

The calculated value of the criterion is χ^2 =1,595. The value *asymptotic significance (bilateral)* = 0,81, which makes it possible to accept the null hypothesis at the level of significance of 0,05; that is, we can assume that there is no correlation between Internet addiction and the ability to distance.

$H0_2$: There is no correlation between the level of self-control and the Internet addiction variables;

$H1_2$: The variables of self-control and Internet addiction are interrelated.

Table 3 Correlation between Internet addiction and the level of self-control.

	Self-control				
		Low	Medium	High	Total
The level of Internet addiction	Low	35	56	96	187
	Medium	48	202	74	324
	High	143	71	9	223
Total		226	329	179	734
Chi-square: criterion statistics					
		Value	df, degrees of freedom	Asymptotic significance (bilateral)	
Pearson's Chi-square		249,891[a]	4	,000	
Likelyhood ratio (LR)		245,154	4	,000	
Chi-square: linear association		165,851	1	,000	
N – number of valid values		734			
a. 0 squares (0.0%) have an expected number less than 5.					

Source: Author's calculations.

The calculated value of the criterion is χ^2 = 249,89. The value *of asymptotic significance (bilateral)* = 0,000, which is significant at the 0.05 level, makes it possible to reject the null hypothesis; that is, with a probability of 95%, we can assume that there is a statistically significant correlation between Internet addiction and the level of self-control. This result is demonstrated in Figure 3.
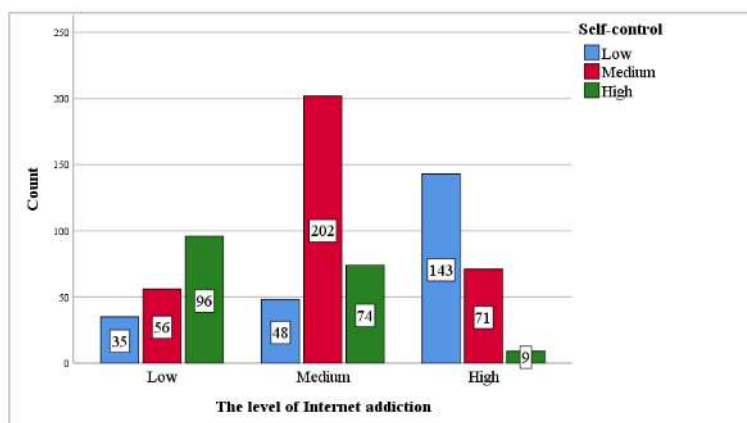

Figure 3 Distribution of respondents by the level of Internet addiction and the level of self-control. Source: compiled by the authors.

HO3: There is no correlation between the level of social support and Internet addiction variables;

H13: The social support and Internet addiction variables are interrelated.

Table 4 Correlation between the level of Internet addiction and the level of social support.

		Social support			
		Low	Medium	High	Total
The level of Internet addiction	Low	58	100	96	225
	Medium	75	118	74	265
	High	54	106	9	244
Total		187	324	223	179
Chi-square: criterion statistics					
		Value	df, degrees of freedom	Asymptotic significance (bilateral)	
Pearson's Chi-square		4,191a	4	,381	
Likelyhood ratio (LR)		4,192	4	,381	
Chi-square: linear association		1,543	1	,214	
N – number of valid values		734			
a. 0 squares (0.0%) have an expected number less than 5.					

Source: Author's calculations.

The calculated value of the criterion is $\chi^2 = 4,191$. The *asymptotic significance (bilateral)* is 0.38, which is significant at the 0.05 level, making it possible to accept the null hypothesis; that is, we can assume that there is no correlation between Internet addiction and the level of social support.

HO4: there is no correlation between the level of responsibility and Internet addiction variables;

H14: the level of responsibility and Internet addiction variables are interrelated.

Table 5 Correlations between Internet addiction level and responsibility.

		Low	Medium	High	Total
The level of Internet addiction	Low	62	61	64	187
	Medium	100	121	103	324
	High	69	70	84	223
Total		231	252	251	734
Chi-square: criterion statistics					
		Value	df, degrees of freedom	Asymptotic significance (bilateral)	
Pearson's Chi-square		3,140a	4	,535	
Likelyhood ratio (LR)		3,121	4	,538	
Chi-square: linear association		,539	1	,463	
N – number of valid values		734			
a. 0 squares (0.0%) have an expected number less than 5.					

Source: Author's calculations.

The calculated value of the criterion is $\chi^2 = 3,14$. The *asymptotic significance (bilateral)* is 0.54, which is significant at the 0.05 level, making it possible to accept the null hypothesis; that is, we can assume that there is no correlation between Internet addiction and the level of responsibility.

HO5: there is no correlation between the escape (from reality) and Internet addiction variables;

H15: the level of escape (from reality) and the Internet addiction variables are interrelated.

The calculated value of the criterion is $\chi^2 = 407,337$. The value *of asymptotic significance (bilateral)* = 0,000, which is significant at the 0.05 level, makes it possible to reject the null hypothesis; that is, with a probability of 95%, we can assume that there is a statistically significant correlation between Internet addiction and the level of escape from reality. This result is demonstrated in Figure 4.

HO6: There is no correlation between personal anxiety and Internet addiction;

H16: Personal anxiety and Internet addiction variables are interrelated.

The calculated value of the criterion is $\chi^2 = 390.056$. The value *asymptotic significance (bilateral)* = 0,000, which at the level of significance of 0.05 makes it possible to reject the null hypothesis; that is, with a probability of 95%, we can assume that there is a statistically significant correlation between Internet addiction and the level of personal anxiety (for more details, see Figure 5).

Table 6 Correlations between Internet addiction and escape from reality.

Escape (from reality)		Low	Medium	High	Total
The level of Internet addiction	Low	131	52	4	187
	Medium	10	212	102	324
	High	18	82	123	223
Total		159	346	229	734
Chi-square: criterion statistics					
		Value	df, degrees of freedom	Asymptotic significance (bilateral)	
Pearson's Chi-square		407,337a	4	,000	
Likelihood ratio (LR)		396,977	4	,000	
Chi-square: linear association		245,995	1	,000	
N – number of valid values		734			
a. 0 squares (0.0%) have an expected number less than 5.					

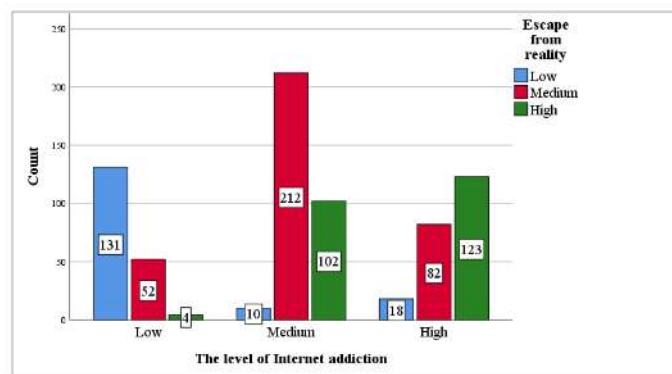Source: Author's calculations.

Figure 4 Distribution of respondents by level of Internet addiction and the level of escape from reality. Source: compiled by the authors.

Table 7 Correlation between Internet addiction and the level of personal anxiety.

| Personal anxiety		Low	Medium	High	Total
The level of Internet addiction	Low	123	58	6	187
	Medium	6	219	99	32
	High	18	85	120	223
Total		147	362	225	734
Chi-square: criterion statistics					
		Value	df, degrees of freedom	Asymptotic significance (bilateral)	
Pearson's Chi-square		390,056a	4	,000	
Likelihood ratio (LR)		379,034	4	,000	
Chi-square: linear association		228,570	1	,000	
N – number of valid values		734			
a. 0 squares (0.0%) have an expected number less than 5.					

Source: Author's calculations.
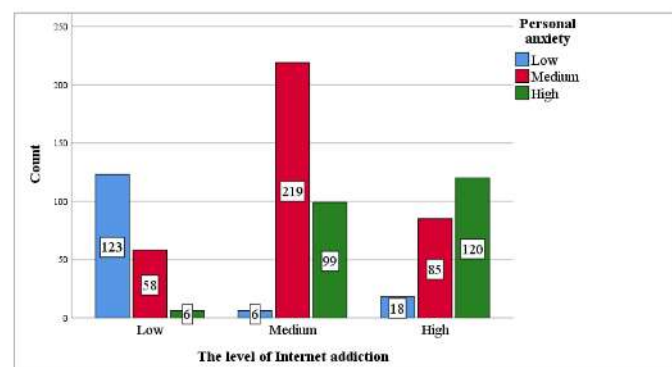
Figure 5 Distribution of respondents by the level of Internet addiction and the level of personal anxiety. Source: compiled by the authors.

HO7: there is no correlation between the level of aggression and Internet addiction variables;

H17: The levels of aggression and Internet addiction variables are interrelated.

Table 8 Correlations between Internet addiction and the level of aggression

Aggression		Low	Medium	High	Total
The level of Internet addiction	Low	56	73	58	187
	Medium	108	95	121	324
	High	65	77	81	223
Total		229	245	260	734
Chi-square: criterion statistics					
		Value	df, degrees of freedom	Asymptotic significance (bilateral)	
Pearson's Chi-square		5,763a	4	,218	
Likelyhood ratio (LR)		5,774	4	,217	
Chi-square: linear association		,573	1	,449	
N – number of valid values		734			
a. 0 squares (0.0%) have an expected number less than 5.					

Source: Author's calculations.

The calculated value of the criterion is χ^2 = 5,763. The value *of asymptotic significance (bilateral)* = 0,218, which is significant at the 0.05 level, makes it possible to accept the null hypothesis; that is, we can assume that there is no correlation between Internet addiction and the level of aggression.

HO8: There is no correlation between the level of distrust and Internet addiction variables;

H18: The variables of distrust and Internet addiction are interrelated.

Table 9 Correlation between Internet addiction and the level of distrust.

Distrust		Low	Medium	High	Total
The level of Internet addiction	Low	61	63	63	187
	Medium	101	116	107	324
	High	74	80	69	223
Total		236	259	239	734
Chi-square: criterion statistics					
		Value	df, degrees of freedom	Asymptotic significance (bilateral)	
Pearson's Chi-square		,639a	4	,959	
Likelyhood ratio (LR)		,643	4	,958	
Chi-square: linear association		,193	1	,660	
N – number of valid values		734			
a. 0 squares (0.0%) have an expected number less than 5.					

Source: Author's calculations.

The calculated value of the criterion is χ^2 = 5,763. The value *of asymptotic significance (bilateral)* = 0,218, which is significant at the 0.05 level, makes it possible to accept the null hypothesis; that is, we can assume that there is no correlation between Internet addiction and the level of distrust.

HO8: there is no correlation between cardiovascular disease and Internet addiction variables;

H18: Cardiovascular disease and Internet addiction variables are interrelated.

The calculated value of the criterion is χ^2 = 4,231. The value *of asymptotic significance (bilateral)* = 0,836, which is significant at the 0.05 level, makes it possible to accept the null hypothesis; that is, we can assume that there is no correlation between Internet addiction and the presence of cardiovascular diseases.

HO10: There is no correlation between sleep disorders and Internet addiction;

H110: sleep disorder and Internet addiction variables are interrelated.

The calculated value of the criterion is χ^2 = 12,271. The value *asymptotic significance (bilateral)* = 0,14, which, at the level of significance of 0,05, makes it possible to accept the null hypothesis; that is, we can assume that there is no correlation between Internet addiction and sleep disorders.

HO11: There is no correlation between musculoskeletal problems and Internet addiction variables;

H111: musculoskeletal problems and Internet addiction variables are interrelated.

Table 10 Correlations between Internet addiction and the presence of cardiovascular diseases (by self-assessment).

Count		I do not know about this disease	People of my age don't get it yet	I don't think I have this problem	Sometimes I have symptoms	I undergo a medical examination	Total
The level of Internet addiction	Low	40	27	43	44	33	187
	Medium	66	54	71	68	65	324
	High	51	42	48	38	44	223
Total		157	123	162	150	142	734

Chi-square: criterion statistics

	Value	df, degrees of freedom			Asymptotic significance (bilateral)
Pearson's Chi-square	4,231a	4			,959
Likelyhood ratio (LR)	4,278	4			,958
Chi-square: linear association	,532	1			,660
N – number of valid values	734				

a. 0 squares (0.0%) have an expected number less than 5.

Source: Author's calculations.

Table 11 Correlations between Internet addiction and sleep disorders (by self-assessment).

Sleep disorder		I do not know about this disease	People of my age don't get it yet	I don't think I have this problem	Sometimes I have symptoms	I undergo a medical examination	Total
The level of Internet addiction	Low	39	42	38	34	34	187
	Medium	64	54	77	53	76	324
	High	48	47	33	50	45	223
Total		151	143	148	137	155	734

Chi-square: criterion statistics

	Value	df, degrees of freedom			Asymptotic significance (bilateral)
Pearson's Chi-square	12,271a	8			,140
Likelyhood ratio (LR)	12,453	8			,132
Chi-square: linear association	,265	1			,607
N – number of valid values	734				

a. 0 squares (0.0%) have an expected number less than 5.

Source: Author's calculations.

Table 12 Correlations between Internet addiction and musculoskeletal problems (by self-assessment).

Musculoskeletal problems		I do not know about this disease	People of my age don't get it yet	I don't think I have this problem	Sometimes I have symptoms	I undergo a medical examination	Total
The level of Internet addiction	Low	31	51	34	32	39	187
	Medium	75	81	67	56	45	324
	High	50	41	41	44	47	223
Total		156	173	142	132	131	734

Chi-square: criterion statistics					
	Value	df, degrees of freedom			Asymptotic significance (bilateral)
Pearson's Chi-square	12,702a	8			,123
Likelyhood ratio (LR)	13,099	8			,108

Chi-square: linear association	,025	1				,875
N – number of valid values	734					

a. 0 squares (0.0%) have an expected number less than 5.

Source: Author's calculations.

The calculated value of the criterion is χ^2 = 12,702. The value *asymptotic significance (bilateral)* = 0,123, which, at the level of significance of 0,05, makes it possible to accept the null hypothesis; that is, we can assume that there is no correlation between Internet addiction and musculoskeletal problems.

$H0_{12}$: There was no correlation between hearing impairment and Internet addiction;

$H1_{12}$: The hearing impairment and Internet addiction variables are interrelated.

Table 13 Correlations between Internet addiction and hearing impairment (by self-assessment).

		Hearing impairment					
		I do not know about this disease	People of my age don't get it yet	I don't think I have this problem	Sometimes I have symptoms	I undergo a medical examination	Total
The level of Internet addiction	Low	37	40	44	38	28	187
	Medium	57	70	62	66	69	324
	High	33	46	41	62	41	223
Total		127	156	147	166	138	734
Chi-square: criterion statistics							
		Value	df, degrees of freedom				Asymptotic significance (bilateral)
Pearson's Chi-square		9,487a	8				,303
Likelyhood ratio (LR)		9,373	8				,312
Chi-square: linear association		3,308	1				,069
N – number of valid values		734					

a. 0 squares (0.0%) have an expected number less than 5.

Source: Author's calculations.

The calculated value of the criterion is χ^2 = 9,487. The value *of asymptotic significance (bilateral)* = 0,303, which is significant at the 0.05 level, allows us to accept the null hypothesis; that is, we can assume that there is no correlation between Internet addiction and hearing impairment.

5. Discussions

The survey and the processing of its results demonstrated that among the students of Ivan Franko National University of Lviv, 30.4% of the respondents identified themselves as having a high level of Internet addiction. Our research has shown that there are no differences in the level of Internet addiction by gender.

The etiology of IA is quite complex, and there are a number of possible risk factors that can influence the onset and development of the disease. Given that there are many suggested definitions, different conceptual frameworks have also been proposed as a theoretical basis for understanding the correlation between Internet addiction and behavioral patterns, especially among students (Huys et al., 2016). It has been suggested that stress or anxiety reduction is a possible explanation for Internet addiction (Kim et al., 2016; Kubitskyi et al., 2022; Krutsevich et al., 2021). According to this theory, the motivation for the behavioral support of Internet addiction by "excessive users" is that the Internet is used as a means to reduce stress or tension (Kim et al., 2016; Dutchak et al., 2022; Kotsur et al., 2021). We have shown the existence of a statistically significant correlation between Internet addiction and self-control (inverse relationship). We revealed a statistically significant inverse correlation between Internet addiction and 1) the level of escape from reality and 2) the level of personal anxiety.

In recent years, many scholars have focused on the mediating role of Internet addiction. Mlouki et al. found that Internet dependence mediates the correlation between Internet addiction and sleep disorders among adolescents. However, our research did not reveal such a statistically significant dependence among students. In addition, the correlations between Internet addiction and several indicators of subjective health, including cardiovascular disease, sleep disorders, musculoskeletal problems, and hearing impairment, were not statistically significant.

6. Conclusions

The present research revealed correlations between the social and psychological factors of students' behavior and Internet addiction and between health indicators and Internet addiction among students at Ivan Franko National University of Lviv. According to the data, a relatively high level of Internet addiction was subjectively recognized. IA was strongly related to critical, functional, and interactive literacy in the health care sphere but not to general literacy in health care (30.4%). The resulting health factors extend previous studies of variables associated with Internet addiction.

Turning to the psychological interpretation of the results, it is expedient to note that such differences in the intensity of the feeling of strong Internet addiction can be caused, for example, by the level of a person's self-control (if the level of self-control is adequate, then the feeling of Internet addiction can be caused by using the Internet for study purposes).

However, all of the aforementioned hypotheses, which did not reveal statistically significant correlations, are particularly insignificant. They suggest the presence of side variability in the experiment; however, additional studies are necessary to determine the exact nature of the possible side variable.

Ethical considerations

We confirm that we have obtained all consent required by the applicable law to publish any personal details of the research subjects. We agree to provide the Multidisciplinary Science Journal with copies of the consent or evidence that such consent has been obtained if requested.

Conflict of Interest

The authors declare no conflicts of interest.

Funding

This research did not receive any financial support.

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