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Problematic Internet Use and health behaviors in adolescent residents of urban and rural areas in Poland – a cross-sectional study

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Summary

The aim of the study: This paper attempts to assess Internet addiction and health behaviors in Polish adolescent residents of urban and rural areas.

Material and methods: 131 high school students, including 62 (47.3%) residents of rural and 69 (52.7%) residents of urban areas, completed the Polish adaptation of the Problematic Internet Use Test, the Health Behavior Inventory for children and adolescents, and a self-designed survey on the characteristics of Internet use.

Results: 28.2% of respondents used the Internet for over 6 hours on school days, compared to 45.8% on no-school days. In total, high and very high risk of Internet addiction was recorded in 7.7% of respondents. Significantly higher PIU scores were reported in the residents of rural areas ($p < 0.05$). Most respondents exhibited positive health behaviors. Higher index of general health behaviors correlated with a stronger declared willingness to reduce online activity in favor of spending time outside the house.

Discussion: Creating more opportunities for teenagers to spend time outdoors/away from home can contribute to their reduced online activity, and thus reduce the risk of PIU.

Conclusions: Young people devote much of their time to Internet use, which is associated with their lesser engagement in health behaviors.

problematic Internet use, Internet addiction, health behavior

INTRODUCTION

Dysfunctional Internet use refers to such online activity which instead of providing personal benefits, results in disturbed behavior. The ability to self-regulate individual involvement in certain Internet activities, which are not related to study or work, becomes disrupted, leading to psychological, social and health-related problems. The disorder is found under various names, including Internet Addiction Disorder, Pathological Internet Use, Compulsive Internet

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Use, or the increasingly used Problematic Internet Use (PIU) [1].

Different researchers describe various psychological and psychopathological aspects of excessive Internet use, ia. its links with depression [2-7], anxiety [2,3,5,7], social-isolation [2], stress [3], burnout syndrome [4], or impulsiveness [8]. Addictive Internet use manifests itself in the form of greater amount of time devoted to online activity, undertaken especially for entertainment purposes, in particular through social media and chatting [3]. Some studies indicate that boys are more susceptible to PIU [5], others fail to demonstrate such dependence [3,9].

Interestingly, there are various links between Internet addiction and lifestyle-related factors. PIU has been reported to correlate with such behaviors as skipping breakfast, having orthostatic dysregulation, sleepiness after the morning, less studying time [6], and also gambling, sedentary lifestyle [10], eating fast food [11], insufficient rest [2,6,12,13], abuse of other psychoactive substances [14,15], tobacco use [13], or low physical activity [13]. In the case of excessive body weight, there are conflicting research results [5, 10, 12, 16]. PIU-related unhealthy lifestyle may be due to the fact that Internet addicts have a problem with self-care and fulfilling their daily duties [9]. In addition, PIU is not always, but often associated with devoting more time to online activity [17-20]. This probably happens at the expense of observing the principles of a healthy lifestyle, such as engaging in physical activity, getting proper sleep, and regularly eating healthy meals.

The effect of Internet addiction on health behaviors is particularly significant in the population of children and adolescents, mostly due to the formation of health habits, but also potential negative consequences of an unhealthy lifestyle at a young age. Young people are the largest and the most active demographics known to be affected by problematic Internet use [1]. Among Polish teenagers aged 14-17, dysfunctional use of the Internet was found in 13.3% [21].

Young residents of rural areas are assumed to be more physically active, spend more time in the open air and lead a healthier lifestyle than their city-dwelling peers [22]. However, lesser availability of extracurricular activities may encourage rural youth to spend time on the Internet, also at the expense of other activities – and perhaps health behaviors. Given the importance of Internet abuse and effects of health behaviors in this demographics, we have decided to reflect upon the relationship between problematic Internet use and health behaviors in young people from rural and urban areas. The following hypotheses were adopted in the study:

1. Young residents of rural areas are more at risk of developing problematic Internet use than young people living in the city.
2. Students whose parents control the duration of their online activity are more at risk of PIU than young people who use the Internet without any control.
3. Longer online activity is associated with higher PIU and fewer health behaviors.
4. Higher PIU is associated with more negative health behaviors.

In the study, the dependent variable was the level of problematic Internet use, while the place of residence (city vs country) was assumed to be the independent variable. The following were considered to moderate the development of PIU:

- duration of online activity (on school vs no-school days)
- parental control of online activity
- most common reasons for reducing time spent on the Internet (no such interest, parental control, lack of time, no access to the Internet / computer / phone / tablet, hanging out with friends, other hobbies)
- most common forms of access (computer, phone / tablet)
- purposes of online activity (communication, social networks, games, videos, studying/learning, hobby-related activity)
- consideration of excessive internet use as linked to potential threats.

In addition, we decided to investigate potential links between PIU and health behaviors. PIU and health behaviors were therefore assumed to be concomitant variables.

MATERIAL AND METHODS

Study sample included 131 high school students in a small Polish town (15 352 inhabitants) [23]. All participants were of Polish origin. Questionnaire sets were distributed in classroom settings. Participation was voluntary, anonymous and free. The study was approved by the Bioethics Committee of the Pomeranian Medical University in Szczecin. 76 males (58%) and 55 females (42%) aged between 15 and 20 were included in the study group. Almost half of the respondents, ie. 62 persons (47.3%), indicated the country as their place of residence, while the remaining 69 persons (52.7%) lived in the city. Sociodemographic characteristics of the study group are presented in Table 1.

Table 1. Sociodemographic characteristics of the sample

Sociodemographic variable		n	%
Sex	Female	55	42.0
	Male	76	58.0
Age (years)	15-17	96	73.3%
	18-20	35	26.7
Place of residence	country	62	47.3
	city	69	52.7
Total		131	100.0

In the research we uses the following three questionnaires:

1. The Problematic Internet Use Test – a modified version of the Internet Addiction Test by K. Young, in the Polish adaptation of R. Poprawa, Institute of Psychology, University of Wrocław. The tool is composed of 22 items rated on a 6-point scale: never, occasionally, rarely, sometimes, often, always. The score is the sum of 22 statements, ranging from 0 to 110 points. The higher the score, the stronger the compulsive Internet use. Raw scores are converted to sten scores according to the given standards [24]. We used the tool with the author's consent. In this study, PIU scores were analyzed in two ways: a) as the total score, indicating the severity of PIU symptoms; b) as a measure of Internet addiction risk categories (very low, low, average, high, very high).
2. The Health Behavior Inventory (IZZ) for children and adolescents by Z. Juczyński. The tool consists of 24 statements related to health behaviors, rated on a 4-point scale: never, rarely, sometimes, often. It includes four categories of health behaviors: eating habits, avoidance of harmful substances, health practices, and physical activity. Its use in this study was approved by its author [25]. IZZ total score is considered a measure of health behaviors as negative (lowest results), normal (average results), or positive (highest results). In this study, IZZ results were calculated to represent: a) health habit category (negative, normal, positive) for comparative purposes; b) health behavior total score (the higher the score, the more positive the health behaviors); c) health behavior subcategory score (separately for eating habits, avoidance of harmful substances, health practices, and physical activity).
3. A self-designed questionnaire consisting of 12 single-choice questions, collecting sociodemographic data and the methods and purposes of Internet use.

Collected data analysis was performed with the IBM SPSS Statistics. In the case of ratio variables, parametric tests were used. We used the following tests: (1) Student's t test for independent samples to check if there were significant differences between the two groups in terms of ratio variables. (2) Analysis of variance (ANOVA) to see if there were significant differences between more than two groups in terms of ratio variables. Tukey's multiple comparison test was used to determine which groups differed significantly. (3) Pearson's correlation coefficient to check whether there were statistically significant correlations between ratio variables. (4) Spearman's rho correlation coefficient to check whether there were significant correlations between ratio and ordinal variables. Statistical significance was set at: $p < 0.001$ ***, $p < 0.01$ **, $p < 0.05$ *.

RESULTS

Characteristics of Internet use

Particularly concerning is the fact that a significant percentage of the surveyed teenagers used the Internet for over 6 hours daily (28.2% on

school days and 45.8% on no-school days). In most cases, parents did not control how much time their children spent online. The main reasons to reduce the time devoted to Internet activity were school and home duties as well as meetings with friends. The most common device used to access the Internet was a phone / tablet, and the goal of online activity – to connect with friends. Few respondents indicated that they used the Internet mainly to search for information related to their schoolwork or hobbies/interests. A considerable part of respondents (44.3%) were aware of the threats linked to excessive Internet use. Importantly, as many as 75.6% said that they would limit their online activity if they had more diverse options to spend their free time (Table 2).

The PIU scores ranged from 0 to 81 points, with the mean score of 24.56 (SD = 16.07), and the median of 22. The mean and median values indicate that the scores are in the average range, while the standard deviation suggests a large variation in the study group. In total, 7.7% of respondents obtained results indicating high and very high risk of Internet addiction (Table 2).

Table 2. Characteristics of Internet use in the sample

		n	%
Time spent online on a school day	1-2 h	23	17.6
	3-4 h	45	34.3
	5-6 h	26	19.9
	>6 h	37	28.2
Time spent online on a no-school day	1-2 h	10	7.6
	3-4 h	27	20.6
	5-6 h	34	26.0
	>6 h	60	45.8
Parental control of time spent online	yes/sometimes	55	41.9
	never	76	58.0
Most frequent reasons for reduced online activity	parents	3	2.3
	lack of time (due to eg. studying, homework, household chores)	49	37.4
	no internet access	6	4.6
	hanging out with friends	43	32.8
	hobbies	17	13.0
	lack of necessary equipment (computer, smartphone, tablet etc.)	2	1.5
	no interest/need to use the Internet	11	8.4
Most frequent form of Internet access	on a PC at home	50	38.2
	on a smartphone/tablet	80	61.1
	other	1	0.8
Internet use objectives	communication/contact with others	65	49.6
	social media	33	25.2
	gaming	10	7.6
	watching movies	8	6.1
	educational/school purposes	6	4.6
	hobby-related activities	5	3.8
	other	4	3.1

Views on whether excessive internet use may be linked to any kind of threat	definitely yes	24	18.3
	yes	34	26.0
	hard to say	42	32.1
	no	22	16.8
	definitely not	9	6.9
Declared willingness to reduce online activity in favor of other forms of spending free time out of the house	definitely yes	50	38.2
	yes	49	37.4
	hard to say	24	18.3
	no	6	4.6
	definitely not	2	1.5
PIU	very low	2	1.5
	low	24	18.3
	medium	95	72.5
	high	9	6.9
	very high	1	0.8

PIU – problematic Internet use

PIU, place of residence and characteristics of Internet use

Significantly higher PIU scores were recorded in residents of rural areas, compared to city residents ($p < 0.05$), and students whose parents controlled their time spent online, compared to those without such control ($p < 0.05$) (Table 3).

Table 3. Effect of place of residence (urban vs rural) and parental control on problematic Internet use

		PIU		Statistical analysis
		M	SD	
Place of residence	city	21.77	15,60	Student's t-test: t=2.123, p=0.036*
	country	27.66	16,15	
Parental control of Internet activity duration	yes/sometimes	28.27	15,77	Student's t-test: t=2.287, p=0.024*
	never	21.87	15,85	

PIU – problematic Internet use; p<0.001 ***, p<0.01 **, p<0.05 *.

In addition, PIU scores were positively correlated with the time devoted to Internet activity on school and no-school days. More time spent online translated, therefore, into higher PIU scores (more problematic Internet use). Still, the observed correlation was not strong correlation (Table 4).

Table 4. Problematic Internet use and length of online activity

	PIU	
	Rho	P
Duration of online activity on school days	0.186	0.034*
Duration of online activity on no-school days	0.243	0.005**

PIU – problematic Internet use; p<0.001 ***, p<0.01 **, p<0.05 *.

Health behaviors in the studied group

Table 5 presents descriptive statistics of health behaviors in the study sample. Both the mean and the median are indicative of very high intensity of reported health behaviors (sten score of 10) in the study group. The standard deviation suggests a moderate score variation (Table 5).

Table 5. Descriptive statistics of IZZ scores

IZZ	Min	Max	M	Me	SD
IZZ total score	42	81	64.56	65	8.05
Eating habits	9	24	16.60	17	3.22
Avoidance of harmful substances	8	20	16.47	17	2.69
Pro-health practices	9	24	18.66	19	2.64
Physical activity	5	20	12.83	13	3.54

The vast majority of respondents reported positive health behaviors. None of the respondents showed abnormal (negative) health behaviors (Table 6).

Table 6. IZZ health behavior categories

IZZ health behaviors	n	%
Negative	0	0
Normal	8	6.1
Positive	123	93.9

IZZ – Health Behavior Inventory

Internet use and health behaviors

Less positive health behaviors correlated with more time spent online on school and no-school days. In addition, higher compliance with the statement that excessive Internet use may pose various threats was linked to more health behaviors. Similarly, a higher rate of general health behaviors correlated with a stronger declaration of limiting online activity in favor of spending free time outdoors/out of the house. Positive eating habits were negatively correlated with time spent on the Internet on school and no-school days. However, a positive correlation was found between greater compliance with the statement that excessive Internet use may be harmful. Health practices and physical activity negatively correlated with the time devoted to online activity on no-school days. Physical activity was positively correlated with declared willingness to limit time spent on the Internet if granted more opportunities to spend free time away from home. Avoidance of harmful substances was positively correlated with the views that excessive Internet use may be harmful and declared willingness to limit the time of its use when having more opportunities to spend free time out of the house (Table 7).

Table 7. Correlations between health behaviors and selected characteristics of Internet use

Characteristics of Internet use		IZZ health behaviors				
		IZZ total score	Eating habits	Avoidance of harmful substances	Health practices	Physical activity
Time spent online on school days	rho	-0.255	-0.203	-0.140	-0.162	-0.163
	P	0.003**	0.020*	0.111	0.065	0.063
Time spent online on no-school days	rho	-0.324	-0.296	-0.139	-0.257	-0.177
	P	0.000**	0.001**	0.112	0.003**	0.043*
Views on harmful effects of excessive Internet use	rho	0.233	0.208	0.319	0.059	0.066
	P	0.007**	0.017*	0.000***	0.502	0.453

Declared willingness to reduce online activity in favor of other forms of spending free time out of the house	rho	0.206	0.093	0.208	0.093	0.197
	P	0.018*	0.292	0.017*	0.290	0.024*

IZZ – Health Behavior Inventory; p<0.001 ***, p<0.01 **, p<0.05 *

Participants who limited their Internet use due to other duties, reported significantly more pro-health behaviors than those who limited it in favor of meetings with friends. As regards individual IZZ dimensions, the same was observed for eating habits and avoidance of harmful substances (Table 8).

Table 8. Health behaviors and reduced time of online activity

IZZ/Most frequent reasons for reduced online activity		M	SD	ANOVA
Eating habits	lack of time (responsibilities)	17.86	3.16	F=7.914 p=0.001** R.I.: 1/2
	meetings with friends	15.33	2.95	
	other	16.41	3.06	
Avoidance of harmful substances	lack of time (responsibilities)	17.08	2.39	F=4.625 p=0.012* R.I.: 1/2
	meetings with friends	15.49	3.00	
	other	16.77	2.43	
Health practices	lack of time (responsibilities)	18.94	2.58	F=0.440 p=0.645
	meetings with friends	18.44	2.32	
	other	18.56	3.07	
Physical activity	lack of time (responsibilities)	12.84	3.48	F=1.001 p=0.370
	meetings with friends	12.30	3.42	
	other	13.41	3.75	
Overall index of (pro-)health behaviors	lack of time (responsibilities)	66.71	7.49	F=5.160 p=0.007** R.I.: 1/2
	meetings with friends	61.56	7.90	
	other	65.15	8.09	

p<0.001 ***, p<0.01 **, p<0.05 *

We decided to check whether PIU is associated with reduced health behaviors, and found a significant, negative, though not very strong correlation between problematic Internet use and the general index of pro-health behaviors. This means that the higher the PIU score, the lower the overall pro-health behaviors. Similar correlations were observed for eating habits and health practices (Table 9).

Table 9. Correlations between problematic Internet use and health behaviors

PIU / IZZ	Problematic Internet Use	
	R	P
Eating habits	-0.251	0.004**
Avoidance of harmful substances	-0.085	0.335
Health practices	-0.244	0.005**
Physical activity	-0.137	0.119
General index of pro-health behaviors	-0.269	0.002**

p<0.001 ***, p<0.01 **, p<0.05 *

DISCUSSION

The study confirmed all our initial hypotheses. Our research into problematic Internet use demonstrates that 1% of the surveyed youth achieved very high (problematic users), and 7% high PIU scores (risk group). Other research on Internet abuse by young people in Poland and Europe, EU NET ADB, seems to suggest

the most similar pattern in Icelandic youth (0.8% of whom display symptoms of Internet abuse, 7.2% are at such risk) and German youth (where 0, 9% show symptoms of Internet abuse, and 9.7% are at risk thereof) [53]. Higher PIU rates were reported by Tateno et al. in Japanese youth, 3.7% of whom were found to be seriously addicted to the Internet, and 59.6% were at risk of developing such addiction [26]. Our research has shown that young people spend a considerable amount of their time on the Internet. Online activity of over 6 hours was reported by every third respondent on school days, and almost half of the respondents on no-school days. These results are much higher than those from another Polish survey from 2013 (where 13% of respondents indicated Internet use of 5 to 8 hours) [27], or Singapore research from 2008 (where online activity of over 5 hours was indicated by 17% of students) [28]. This study demonstrates that the more hours spent on the Internet, the more problematic its use, which is in line with other literature evidence [29, 30]. In addition, our results indicate that longer online activity correlates with lower intensity of pro-health behaviors. Also, more problematic Internet use was linked to lower general index of pro-health behaviors. Therefore, spending time on the Internet can be at the expense of proper nutrition, health practices (such as going to bed at the same time, personal hygiene, weight control) and physical activity, which is also reported in other studies [31-34].

Another significant factor is whether and for what reason one restricts the use of the Internet. Compared to those who limited their time online to hang out with friends, persons who limited it due to school and home duties reported more pro-health behaviors, including better eating habits and avoidance of harmful substances. Perhaps the latter are characterized by greater conscientiousness and therefore, on the one hand, they limit the time spent on the Internet, and on the other, adhere to the principles of a healthy lifestyle. This may also indicate that spending time with friends is associated with anti-health behaviors, such as the use of stimulants. Significantly higher PIU scores were observed in students whose parents controlled their time online, as opposed to those who did not report such control. Some parents, therefore, see that their child is overly involved in virtual reality. Nevertheless, parental interventions should not be limited to control only – as it is more important to focus their attention on their children and to spend quality time with them.

According to this research results, rural teens exhibit significantly more problematic Internet use. In their research on 1860 adolescents, Pawłowska et al. showed that more Internet addicts lived in the countryside, but the risk of addiction was higher among city dwellers [35]. However, such tendencies were not reported by Taranto et al., whose research on a group of 402 high school students in Italy did not show a significant correlation between Internet addiction and place of residence [14].

Our research has shown that greater compliance with the idea that excessive Internet use may have harmful effects was associated with higher overall index of pro-health behaviors. Similar correlations occurred in the case of eating habits and avoidance of harmful substances. Such a result may mean that those who are aware of the risks involved in excessive use of the Internet are also more aware of the principles of healthy lifestyle and thus manifest higher rates of pro-health behaviors. It should therefore become our goal to acquaint young people with the principles of a healthy lifestyle, as well as the dangers of excessive Internet use.

This research has shown that students are generally open to spending their free time in ways other than on the Internet. However, they also indicated that they would like to have more opportunities to do so. This means that neither young people nor their caretakers (parents, school) are able to organize their time in a way that they would find interesting. It therefore seems reasonable to support non-governmental organizations that work with the youth. Such organizations need leaders who would motivate young people to spend their free time more productively, searching for and developing their passions. Or – since their main motivation to spend time online is contact with peers – guarantee such contact in reality, not in the virtual world. Further research could explore what specific leisure activities outside the home would interest young people the most.

CONCLUSIONS

Teenagers from rural areas who spend more time on the Internet both on weekdays and weekends, and whose parents do not control the duration of their online activity are more at risk of developing PIU. In addition, more time spent on the Internet is associated with less positive health behaviors, while higher awareness of the risks associated with Internet use is linked with greater health behaviors. A higher PIU score is associated with poorer health behaviors (overall and in terms of eating habits and health practices).

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