The Impact of Digitalisation on Slovenian Primary School Students in Eighth Grade

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THE IMPACT OF DIGITALISATION ON SLOVENIAN PRIMARY SCHOOL STUDENTS IN EIGHTH GRADE

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Abstract

Society is rapidly moving towards a digitalised future, encouraged by national and European guidelines and strategies. Use of computers, tablets and smartphones is not reserved only for adults: adolescents use them extensively for schoolwork and leisure activities. Although Internet use has many advantages, some students use it extensively in a way that harms them. The Problematic Internet Use Questionnaire used in a nationally representative sample of Slovenian primary school students in the eighth grade showed that one-quarter of them were problematic Internet users. Comparison of problematic and nonproblematic Internet users in the eighth grade showed different patterns of spending their free time: screen time prevailed in the first group. Problematic Internet users showed statistically significant lower levels of self-control in comparison with nonproblematic Internet users; they also reported a less favorable relationship with their parents. Evidence from abroad show that problematic Internet users among students are less successful at school. Career prospects of problematic Internet users are smaller, where discipline and self-control is expected. Adolescents need help in recognizing harmful effects of modern digital technologies and in learning to control their time spent on the Internet.

Keywords

problematic Internet Use • PIU • Internet addiction • adolescent sample • self-control • parent-child relationship

1. Introduction

Digitalisation is a strategic priority of European Union (EU) development. A European approach to digital transformation means empowering and including every citizen, strengthening the potential of every business, and meeting global challenges with our core values (EC 2020). Slovenia showed its readiness to follow this path by appointing Minister without Portfolio for Digital Transformation Mark Boris Adrijanič in July 2021. Nevertheless, the Covid-19 pandemic brought about a huge digital transformation in the everyday lives of adults and children: Internet use became much more prevalent. There are huge benefits in Internet use, but extensive Internet use can be harmful too. This article explores the impact of digitalisation on primary school children in the eighth grade before the Covid-19 pandemic and describes problematic Internet users.

2. Theoretical Background

The Internet is an integral part of our everyday life; it brings many benefits: it helps us get information faster,

it connects us to the rest of the world, it enables quicker and more transparent business processes, and much more, but it also brings negative consequences to some people who use it extensively. Internet use has been increasing worldwide: the number of Internet users has increased tenfold from 1999 to 2013, with the first billion users being reached in 2005 and the third billion in 2014 (ILS 2020a). Internet users (individuals who can access the Internet at home, via any device type and connection) distribution in the world is: Asia (53.4%), followed by Europe (14.3%), and Africa (11.5%). On the other hand, Internet access (penetration rate) is the highest in North America (90.3%), followed by Europe (87.2%), with Asia (58.8%) and Africa (42.2%) on the bottom of the list of regions (*Internet World Stats* 2021).

Internet use in Slovenia followed the same growth trend: statistics reveal that in 2000 only 15% of the people in Slovenia had access to the Internet, but in 2016, already 72% of Slovenians were Internet users (ILS 2020b). The Internet is most often used for searching information about goods and services, for reading online news, newspapers, or magazines, followed by social networking (46% of Slovenians aged 16–74 in 2017 participated in social networks, e.g., Facebook, Snapchat, Instagram, or in professional networks, e.g., LinkedIn); 39% used Internet banking, 37% telephoned

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or conducted video calls via webcam over the Internet, and 26% used storage space on the Internet to save private documents, e.g., pictures, music, video, or other files (in the cloud). Internet usage remains the lowest among the older generation in Slovenia (Republic of Slovenia, Statistical Office 2017).

Wide applicability of Internet use leads to excessive use by a minority of individuals, which affects their everyday lives in terms of neglecting important relationships (family, friends) and important tasks (school- or work-related). Already 25 years ago, Internet Addiction (IA) was mentioned as a serious problem by a few excessive Internet users. In 1995, Kimberly Young established the Centre for Internet Addiction (Net Addiction) and published her first book on Internet addiction in 1998 (Young 1998). In Europe, the roots of research into IA began with the publication of Griffiths' (1995) paper on "technological addictions" that prompted publications on both IA and specific online addictions such as Internet gambling addiction. In addition to the work of Young and Griffiths, the first empirical studies started to appear, including prevalence surveys with self-selected samples, case studies, explorations of psychosocial and psychiatric correlates of IA, and psychometric validation of instruments assessing IA (Griffiths et al., 2016).

Internet addiction or problematic Internet use has been widely researched in many countries, including Slovenia. National studies on IA started with Jeriček's (2001) study on IA among high school students of the third year in Ljubljana ($n=1194$). She adapted Young's questionnaire (i.e., the Internet Addiction Test) and found 3.7% of problematic Internet users among Ljubljana's high school students. Šimek et al. (2004) discovered 1.8% of problematic Internet users among Maribor's high school students ($n=662$). The first representative study on problematic Internet use was conducted in 2014 by the National Institute of Public Health (Macur et al. 2016): 3.1% of Slovenians aged 18–95 years ($n=6262$) were found to be problematic Internet users, with a higher share of problematic Internet users among the younger generation. A representative study among Slovenian high school students (Macur and Pontes 2018) showed 18.5% of problematic Internet users, who tend to be more passive in their free time, since they watch TV and play video games more than their peers, as well as chat on social media. Adolescents presenting high risk of IA displayed poorer levels of self-control in most cases and reported to be generally less satisfied with their lives in comparison to other adolescents.

The goal of this paper is to investigate problematic Internet users in a representative sample of Slovenian primary school students in the eighth grade in terms of free-time activities, parent-child relationships, self-control, and self-assessed mental health and satisfaction with life.

3. Research Design and Methodology

3.1. Participation and Procedure

The present study was part of the Slovenian project "Healthy lifestyle of children and youth through the empowerment of youth workers and the establishment of programs on a local level," which was supported by Norway Grants¹. Participants were recruited on a random probability sample selection, with all primary school classes (eighth grade²) in Slovenia serving as the primary sampling units. The stratification was based on twelve statistical regions of Slovenia according to the Nomenclature of Territorial Units for Statistics (i.e., NUTS 3) and population density. School principals of the randomly selected primary schools were contacted and invited to participate in the study. The questionnaires were administered by trained staff and completed by the students using desktop computers in the school setting in April–May 2015. Informed consent was obtained from parents/legal guardians and participating adolescents. In total, 1,095 questionnaires were obtained, and cases with severe missing values (i.e., $\geq 10\%$) were excluded from the study. After cleaning the data, the sample of 989 eighth graders was weighted according to twelve Slovenian statistical regions to represent the general population of eighth graders (Table 1). Participants' age ranged from 12 to 16 years ($M=13.43$

1 <http://eeagrants.org/project-portal/project/SI05-0007>.

2 There are nine grades of primary school in Slovenia. Children enter into the primary school at the age of 6; a cohort of children born in the same year enter the same class together. The field study took place in April–May 2015, so students in the eighth grade should have turned 14 that year. Most of them (87.7%) were born in 2001; at the time of the field study their average age was 13.43 ($SD=0.59$).

Table 1: Sample structure

		Frequency	Percent
GENDER	male	484	49.0
	female	504	51.0
REGION	Pomurska	56	56
	Podravska	151	151
	Koroška	38	38
	Savinjska	131	131
	Zasavska	27	27
	Spodnjeposavska	39	39
	Jugovzhodna	54	54
	Osrednjeslovenska	253	253
	Gorenjska	109	109
	Notranjska	24	24
	Goriška	60	60
	Obalno-kraška	46	46

years; S.D.= 0.59). Of those, 87.7% were born in 2001, and gender distribution was relatively even (i.e., 49% male).

3.2. Measures

Frequency of Internet use was measured by asking participants about their time spent on the Internet for leisure purposes on weekdays (Monday to Friday) and weekends (Saturdays and Sundays). Severity of Internet use was measured with the Problematic Internet Use Questionnaire short form (PIUQ-SF-6) (Demetrovics et al. 2008, Koronczai et al. 2011; Demetrovics et al. 2016). This research instrument has already been used in Hungarian sample of adolescents (Koronczai et al. 2011; Demetrovics et al., 2016) as well as adults (Demetrovics et al. 2008; Koronczai et al. 2011). PIUQ-SF-6 was also used in a Slovenian nationally representative adult sample (Macur et al. 2016; Macur 2017) and a representative adolescent sample of Slovenian final year high school students (Macur and Pontes 2018). A study on a representative sample of Slovenian adolescents in the eighth grade of primary school is presented in this article, which used the same PIUQ-SF-6 questionnaire. The PIUQ assesses three dimensions of problematic Internet use (i.e., obsession, neglect, and control disorder) each measured by two items. The six PIUQ items can be responded on a 5-point Likert scale (from 'never' to 'always/almost always') to estimate the severity of problematic Internet use with the following questions: "How often do you spend time online when you'd rather sleep?," "How often does it happen to you that you wish to decrease the amount of time spent online but you do not succeed?," "How often do you feel tense, irritated, or stressed if you cannot use the Internet for as long as you want to?," "How often do you try to conceal the amount of time spent online?," "How often does it happen to you that you feel depressed, moody, or nervous when you are not on the Internet and these feelings stop once you are back online?," "How often do people in your life complain about spending too much time online?" (Cronbach's α =0.837). Answers were summed up and those who scored 15 or more were considered problematic Internet users.

Self-control was measured by seven items reflecting the tendency of low self-control (Cho 2010; Rand, Stein, and Rand 1998):

- I wholeheartedly take part in exciting things even if I have to take an examination tomorrow.
- I abandon a task once it becomes hard and laborious.
- I am apt to enjoy risky activities.
- I enjoy teasing and harassing other people.
- I feel like I am a ticking time bomb.
- I lose my temper whenever I get angry.
- I habitually don't do my homework.

Responses were measured on a Likert scale from 1 (*Strongly agree*) to 5 (*Strongly disagree*). This scale has been shown to measure self-control in adolescents adequately in recent similar studies (i.e., Kim and Kim 2015), and the Slovenian version of this measure used in the present study was found to possess adequate levels of internal consistency (Cronbach's α = .827).

Participants were asked about their free-time activities (spending time with friends, watching television, playing video games, using online social networking sites, reading books, musical activities, and doing sports) on a 5-point Likert scale (1: *Never* to 5: *Always*).

The parent-child relationship was determined by a four items describing the affection between respondents and their parents. The scale comprised the following statements on shared activities and emotional closeness based on previous research using the same data (Kim and Kim 2015; Cho, 2010; Kong and Lim 2012):

- My parents and I try to spend much time together.
- My parents always treat me with love and affection.
- My parents and I have frequent conversations.
- My parents and I understand each other well.

Responses were based on a Likert scale ranging from 1 (*very untrue*) to 5 (*very true*). The Slovenian version of this measure used in the present study was found to possess adequate levels of internal consistency (Cronbach's α = 0.856).

Perceived life-satisfaction was measured by a single question asking participants to rate on a scale ranging from 1 (*Completely dissatisfied*) to 10 (*Totally satisfied*) how satisfied they were with their life. Self-assessment of mental health was measured with one question with a Likert scale from 1 (*Bad*) to 5 (*Excellent*).

4. Research Results and Discussion

The study identified 23.2% (n=230) of Slovenian eighth graders as problematic Internet users, labeled "at risk" and not being able to control the time spent on the Internet. This percentage is backed up with another representative Slovenian study that used the same measure (Macur et al. 2016) and showed that the percentage of problematic Internet users rises with age: in age group 18+, there were 3.1% of problematic Internet users; however, in age group 20–24 years, there were 11% of problematic Internet users; in age group 18–19 years, their share was 14.6% (Macur et al. 2016).

There were no gender differences in problematic Internet use in our sample. There was, however, a difference in time spent on the Internet for personal purposes: problematic Internet users on the average spent 3.9 hours on the Internet from Monday to Friday and 4.4 hours on Saturdays and Sundays. Their peers, i.e., nonproblematic Internet users, on the average spent 2.5 hours on the Internet from Monday to Friday and 3 hours on Saturdays and Sundays.

Comparison of at risk and nonproblematic Internet users concerning free-time activities (Table 2) shows that problematic Internet users spend their free time in front of a screen much more than their peers: they watch TV more ($t = -3.34$; $p = 0.001$); play more video games ($t = -4.97$; $p < 0.001$) and more frequently engage in social media ($t = -8.112$; $p < 0.001$). They also read fewer books ($t = 2.148$; $p = 0.032$) and engaged in sports activities less than nonproblematic Internet users ($t = 2.637$; $p = 0.009$).

An important solution to unhealthy Internet habits of children and teenagers is for parents to spend time in conversation and to spend time together with children in types of activities that do not involve screens. Understandably, students at risk describe the relationship with their parents as less favorable than nonproblematic Internet users. There is a

statistically significant difference between the two groups of students in all four dimensions: students at risk spend less time with their parents ($t = 4.518$; $p < 0.001$) than their peers; parents don't always treat them with love and affection ($t = 3.049$; $p = 0.002$); have less frequent conversations with their parents ($t = 3.682$; $p < 0.001$); and understanding with their parents is less favorable compared to nonproblematic Internet users ($t = 3.575$; $p < 0.001$) (Table 3). Also, foreign studies confirm the relationship between problematic Internet use and family difficulties (Fumero et al. 2018).

Problematic Internet use has been linked to depression and mental illnesses (Guo et al. 2020). Our study showed that self-assessment of mental health was significantly lower for students at risk (mean = 3.35³; SD = 1.160) than for nonproblematic Internet users (mean = 4.10; SD = 0.983): $t_{323.681} = 8.355$; $p < 0.001$. Life satisfaction is statistically different for nonproblematic Internet users (mean = 8.27⁴; SD = 1.910) and the ones at risk (mean = 7.18; SD = 2.428): $t_{304.786} = 5.91$; $p < 0.001$.

3 Self-assessment scale: from 1 (bad) to 5 (excellent)

4 Self-assessment scale: from 1 (completely dissatisfied) to 10 (completely satisfied)

Table 2. Free-time activities of at-risk and nonproblematic Internet users

	Internet users		T-test		
	Nonproblematic	At risk			
	Mean (SD)	Mean (SD)	t	df	P
Spend time with friends	3.83 (0.920)	3.87 (1.065)	-0.493	350.066	0.622
Watch TV	3.03 (0.964)	3.29 (1.032)	-3.340	373.791	0.001
Play video games on computer/tablet/phone	2.86 (1.132)	3.35 (1.313)	-4.970	347.245	0.000
Engage in social media	3.05 (1.252)	3.85 (1.29)	-8.112	841	0.000
Read books	2.45 (1.184)	2.25 (1.167)	2.148	834	0.032
Attend a music school or a choir	1.90 (1.469)	1.86 (1.457)	0.329	842	0.742
Sports activities	3.82 (1.165)	3.55 (1.328)	2.637	354.496	0.009

Legend: Scale of answers: from 1 (never) to 5 (almost always, always)

Table 3. Parent-child relationship of at risk and nonproblematic Internet students

	Internet Users		T-test		
	Nonproblematic	At risk			
	Mean (SD)	Mean (SD)	t	df	p
My parents and I try to spend much time together	3.88 (1.001)	3.50 (1.064)	4.518	353.092	0.000
My parents always treat me with love and affection	3.67 (1.147)	3.39 (1.183)	3.049	820	0.002
My parents and I have frequent conversations	4.07 (0.987)	3.76 (1.099)	3.682	340.700	0.000
My parents and I understand each other well	4.25 (0.955)	3.94 (1.125)	3.575	325.613	0.000

Legend: scale of answers: from 1 (very untrue) to 5 (very true)

Table 4. Self-control of at risk and nonproblematic Internet users

	Internet Users		T-test		
	Nonproblematic	At risk	t	df	p
	Mean (SD)	Mean (SD)			
I wholeheartedly take part in exciting things even if I have to take an examination tomorrow	2.89 (1.224)	2.64 (1.179)	2.588	819	0.010
I abandon a task once it becomes hard and laborious	3.39 (1.155)	2.85 (1.188)	5.845	815	0.000
I am apt to enjoy risky activities	3.00 (1.269)	2.67 (1.295)	3.239	814	0.001
I enjoy teasing and harassing other people	3.95 (1.263)	3.58 (1.376)	3.493	347.483	0.001
I feel like I am a ticking time bomb	3.87 (1.276)	3.27 (1.370)	5.532	352.498	0.000
I lose my temper whenever I get angry	3.31 (1.260)	2.59 (1.327)	7.070	817	0.000
I habitually do not do my homework	3.71 (1.337)	3.25 (1.365)	4.370	816	0.000

Legend: scale of answers: from 1 (strongly agree) to 5 (strongly disagree)

Problematic Internet users show attention deficit and hyperactivity disorder (Wang et al. 2017). In our study, self-control (Kim and Kim 2015) of the students was measured. In Table 4, nonproblematic Internet users were compared to students at risk, who showed a lower level of self-control in all seven dimensions: they wholeheartedly take part in exciting things even if they have an examination the following day ($t = 2.588$; $p = 0.010$); they abandon a task once it becomes hard and laborious ($t = 5.845$; $p < 0.001$); they are apt to enjoy risky activities ($t = 3.239$; $p = 0.001$); they enjoy teasing and harassing other people ($t = 3.493$; $p = 0.001$); they feel like they are a ticking time bomb ($t = 5.532$; $p < 0.001$); they lose their temper whenever they get angry ($t = 7.070$; $p < 0.001$); they habitually don't do their homework ($t = 4.370$; $p < 0.001$).

5. Conclusion

Digitalisation in schools in Slovenia has been very intense in the last couple of years. In 2020, online lectures became obligatory in primary and secondary schools because of the lockdown due to the Covid-19 pandemic. Adolescents soon adapted to the digitalised school system; however, the long lockdown showed its side effect: too much screen time negatively influenced the mental health of youth (Radulović 2021).

Our study was taken before the pandemic, and a quarter (26.5%) of primary school children in the eighth grade were found to be at risk of developing negative effects of too much Internet use. Problematic Internet users showed:

- lower assessment of their mental health;
- lower life satisfaction;
- engagement in different free-time activities than their peers: they played video games and engaged in social media more;

they also watched more TV, participated in fewer sports activities, and read less than nonproblematic Internet users; - a less favorable relationship with their parents; and - significantly lower levels of self-control than nonproblematic Internet users.

The Covid-19 pandemic pushed forward many new digital solutions. Online teaching and learning became everyday practice. Internet use by children and adolescents grew, as did mental health problems of the young. Recent developments show that too much screen time is not a solution, but a problem; therefore, another lockdown of schools is not planned in the future. Our research shows that one of the best prevention mechanisms against problematic Internet use is quality time with their parents. Nevertheless, more help (therapies, counseling, youth centers, NGO activities, etc.) should be offered to young problematic Internet users.

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