

Pathological use of mobile phones by secondary school students

Katarzyna Warzecha, Adam Pawlak

Summary

Aims: In recent years the possession and use of a mobile phone has become more and more prevalent among adolescents. The dangers resulting from the dysfunctional use of mobile phones (addiction to phone calls, text messages and functions of the phone itself) are presented in this study. The main aim of the study was an exploration of addiction to mobile phones in secondary school students and of any differences in addiction to mobile phones in female and male students.

Methods: Overall, 470 Polish secondary school students from the region of Silesia took part in the study. They were asked to fill in a questionnaire concerning the types of online activity and the aims and intensity of use of modern means of communication (computers with Internet access and mobile phones). The questionnaire used was the Mobile Phone Addiction Assessment Questionnaire (Kwestionariusz do Badania Uzależnienia od Telefonu Komórkowego – KBUTK).

Results: Adolescents are ever better equipped with mobile phones. There are significant statistical differences between secondary school students correctly and pathologically using mobile phones overall and by gender. Around 35% of students fulfilled the criteria of being at risk of mobile phone addiction and around 4% were addicted to mobile phones. Analyzing the level of addiction to mobile phones by gender, more females than males fulfill the addiction criteria and the at risk criteria. The KBUTK questionnaire is a reliable tool which has adequate psychometric qualities and can be used to study various dimensions of mobile phone addiction (Cronbach's alpha = 0.93).

Conclusions: Problematic use of mobile phones by adolescents may cause health problems and social expense.

mobile phone / addiction to mobile phone / adolescents / gender

INTRODUCTION

The recent dynamic development of information and telecommunication technologies and rapid technological progress observed on the mobile

phones market has meant that a mobile phone or smartphone offers users a great variety of options (alarm clock, personal organizer, calculator, Dictaphone, radio, MP3 player, GPS location, video and photo camera, Internet access, games) which make those devices very attractive, perhaps especially to children and adolescents. Modern smartphones allow adolescents to browse web pages and their friends' profiles on social networking sites, establish new inter-

Katarzyna Warzecha¹, **Adam Pawlak**²: ¹Department of Econometrics, University of Economics, Katowice, Poland. ²Institute of Health and Nutrition Sciences, Częstochowa University of Technology, Częstochowa, Poland.

Correspondence address: warzecha@ue.katowice.pl

personal relations or play games in their spare time. Thanks to the common access and affordable prices, mobile phones became an indispensable accessory and a means of communication of the modern time. A mobile phone can give a person a sense of freedom, independence and safety, for example by enabling emergency calls or immediate contact with friends and family. However, not all young people are aware of the fact that improper use of such devices may be harmful to their health and may lead to addiction. So-called phonoholism manifests itself in overemphasizing the mobile phone itself and overusing it in everyday life [1].

Mobile phones first appeared in the 1970s. According to ITU information and communication technology statistics, in 2015 there were 97 mobile phones per 100 people worldwide and 120 mobile phones per 100 people in Europe. In Poland there were 157 mobile phones per 100 people in 2014, a huge increase on the 18 mobile phones per 100 people recorded in 2000 [2].

Aside from many advantages of a mobile phone, there are disadvantages too. The use of a mobile phone in inadequate way may lead to severe health consequences, namely addiction. Better and more affordable mobile phone models with numerous additional functions are increasingly attractive to children and adolescents, who are using them more frequently in their everyday lives. Normal use may sometimes transform into uncontrolled, time-consuming, expensive and even conflict-inducing habit, which may lead to addiction [3]. In 2014, 97% of adolescents in Switzerland had a smartphone [4].

Mobile phone addiction is not a homogeneous phenomenon. It may take on several forms [5]: addiction to text messaging, associated with a compulsion to send and receive text messages which consist of abbreviations and codes; addiction to having new mobile phone models with state-of-the-art functions; "mobile phone exhibitionism" – attaching significance to the color, design and functions of their phone and attracting the attention of other people by loud telephone conversations; addiction to playing games on the phone, which takes on the function of a games console, as people can play everywhere and in every spare moment; the "switched on phone" syndrome, where people are afraid that their phone may switch off, so they always carry

a spare battery or phone charger, and when their phone stops working for any reason they get into a bad mood, are anxious or start to panic.

Considering the rapid development and widespread mobile phone use in everyday life (almost 24 hours a day), it is important to study the possible negative health effects [6]. A person addicted to a mobile phone is so absorbed in their phone that they are not able to function normally without it. Mobile phone and Internet overuse may be harmful to the young person's health, causing stress, depression, social anxiety, insomnia or hyperactivity [7–9]. Moreover, studies show that emotional and behavioral problems are more frequent among adolescents who use the Internet or a mobile phone problematically [9–12], with some of the most popular forms of mobile phone use being surfing the Internet, playing games online or sending text messages [13]. The problematic use of mobile phones is associated with young age, extraversion, low level of conciliating attitudes, high level of depression and low self-evaluation [14–16]. The individual's personality influences the kind of mobile phone chosen and how it is used [17].

On the basis of Pawłowska & Potembska's research [18,19] about 3% of Polish adolescents aged 13 to 24 (2.9% of females and 2.5% of males) fulfill the criteria of mobile phone addiction. Regarding other countries, pathological use of mobile phones was observed in 6.3% of Italian adolescents (6.5% of females and 6.1% of males) [20], 20% of Spanish adolescents aged 13 to 20 (26.1% of females and 13% of males) [21] and 10% of British adolescents aged 11 to 18 [22].

Aims

The aim of the study was an exploration of the phenomenon of addiction to mobile phones in secondary school students and investigating whether there are significant statistical differences in the level of addiction to mobile phones between secondary students in general and based on gender.

Material and Methods

The study was conducted in a group of Polish secondary schools in several cities in the Sile-

sia region (Chorzów, Sosnowiec, Zabrze, Jaworzno) in December 2013 and from January to May 2014. The aims and scope of the direct examination determined the choice of examination method, sample selection and data analysis. In order to select individuals to the sample group, quota sampling was applied. The quota sample in the study was an age structure of the tested sample that corresponded to the age structure of adolescents in Silesia. The sample was representative of adolescents in Silesia aged 16–19 based on the data from the Central Statistical Office of Poland (GUS) [23]. In 2013, the age structure of 16 – to 19-year-olds in Silesia was: 23.4% 16-year-olds, 24.5% 17-year-olds, 25.1% 18 year-olds and 27% 19-year-olds. The tested sample (after the rejection of incorrectly completed questionnaires) included 470 secondary school students, comprising 61.1% girls and 39.9% boys (N = 181). The respondents' age range was 16 to 20 years.

Method

The study used a self-administered survey (due to its high return rate, short time of measuring and high level of control) devised by the authors. It comprised questions related to: gender, age, place of living, parents' profession, family structure as well as questions about types of online activity and the aims and intensity of using modern means of communication, including computers with Internet access and mobile phones. We also used the Survey form and the Mobile Phone Addiction Assessment Questionnaire (KBUTK) [24]. KBUTK consists of 33 items and is used to study various dimensions of addiction to a mobile phone (the need for acceptance and closeness; addiction to functions of a mobile phone; addiction to sending text messages and making telephone calls; intermediary communication – preferring interpersonal contacts and expressing emotions through calls and text messaging). Reliability coefficients for the particular scales are high: acceptance and closeness scale Cronbach's alpha = 0.88, addiction to functions of a mobile phone scale $\alpha = 0.75$, addiction to sending text messages and making phone calls scale $\alpha = 0.87$, addiction to intermediary communication scale $\alpha = 0.84$. KBUTK is

a reliable tool with adequate psychometric qualities. The reliability coefficient for KBUTK total score is $\alpha = 0.93$. The lowest score is 0 and the highest score is 132 points. Mobile phone addiction is indicated by a score of 70 points or higher, and scores 31–69 indicated being at risk of addiction. Statistical analyses were based on Student's *t*-test for independent samples, Pearson's *r* correlation coefficient. The analyses were bilateral, with significance level set at 0.01 or 0.001, and calculations were made with SPSS version 22.0 for Windows.

Results

The study revealed that with age students are better equipped with mobile phones, and that a simple mobile phone has been replaced by a more modern and more functional version – smartphone. A small percentage of tested students (2.4%) declared that they had a mobile phone at preschool age (0–5 years old). Over half of the students (53.2%) had a mobile phone in primary school (age 6–12) and about 6% had a smartphone. Almost a fourth of students had a smartphone in middle school (age 13–15) and 2% of students owned their mobile phones. In secondary school (age 16–20) a quarter of students owned a smartphone.

The students received their first mobile phone at the age of 10 and it was worth around 100 PLN; a phone with Internet access was worth around 500 PLN and students received it mostly at the age of 15. A smartphone, worth 1000 PLN, was given to them at the age of 16. The more modern smartphone belonged to 61.5% of students (60% of females and 65% of males).

Students obtained on average 31 points on the KBUTK test (SD = 19), out of the maximum 132. As seen in Table 1, 40.85% of students (46.34% of female students and 32.24% of male students) fulfilled the criteria of being addicted or at risk of addiction to mobile phones. To analyze the differences in the general KBUTK scores and the results from particular KBUTK subscales between the addicted and at risk students (N = 192) and students not at risk of addiction (N = 278), we compared KBUTK results with the use of Student's *t*-test (Table 2). The analysis was also performed by gender (Table 3).

Table 1. Secondary school students and risk of mobile phone addiction by gender

Respondents	Not at risk of addiction		At risk of addiction		Addicted*		Total
	N	%	N	%	N	%	N
Students in total	278	59.15	174	37.02	18	3.83	470
Females	154	53.66	123	42.86	10	3.48	287
Males	124	67.76	51	27.87	8	4.37	183

*Respondents who were addicted to mobile phones constituted a small percentage of the tested students (3.83%, 10 females and 8 males). In the further course of the study, those students were put into the at risk group.

Table 2. Results of KBUTK subscales in students at risk and students not at risk of addiction to mobile phones

KBUTK subscales	Students not at risk of addiction		Students at risk of addiction		t	p
	Mean	SD ₁	Mean	SD ₂		
Need of acceptance and closeness	3.65	3.20	14.08	5.94	-22.22	.0001
Addiction to mobile phone functions	1.0.36	4.91	16.88	5.05	-13.96	.0001
Addiction to phone calls and text messaging	1.94	2.43	9.47	7.28	-13.80	.0001
Intermediary communication	1.69	2.04	7.75	5.01	-15.86	.0001
Total KBUTK scores	17.64	7.66	48.16	16.43	-24.00	.0001

Table 3. The comparison of mean results from KBUTK test in division into subscales and the groups of secondary school adolescents not being at risk and being at risk of addiction to mobile phones by gender

KBUTK subscales	Students not at risk		Students at risk		t	p
	Mean	SD	Mean	SD		
Female students						
Total KBUTK scores	19.32	7.02	46.69	14.09	-2.0.33	.0001
Need of acceptance and closeness	4.25	3.09	13.97	5.89	-17.11	.0001
Addiction to mobile phone functions	1.0.85	4.47	16.67	4.77	-1.0.66	.0001
Addiction to phone calls and text messaging	2.36	2.75	9.00	6.28	-11.29	.0001
Intermediary communication	1.86	2.12	7.05	4.28	-12.71	.0001
Male students						
Total KBUTK scores	15.56	7.93	51.47	2.0.53	-12.98	.0001
Need of acceptance and closeness	2.90	3.19	14.32	6.08	-13.57	.0001
Addiction to mobile phone functions	9.76	5.37	17.34	5.66	-8.77	.0001
Addiction to phone calls and text messaging	1.42	1.85	1.0.53	9.12	-7.60	.0001
Intermediary communication	1.48	1.93	9.31	6.11	-9.60	.0001

Table 2 includes the data obtained on the basis of Student's *t*-test for the independent samples and for the comparison of total results obtained in KBUTK test by the students addicted to and being at risk of addiction to mobile phones to the results obtained in KBUTK test by the students who are not at risk of addiction. As seen in Table 2, the difference between the KBUTK test results in the groups is statistically significant ($p < 0.05$).

The total result of KBUTK test obtained by students addicted to and at risk of addiction to mobile phones (mean 48.16; SD = 16.43) is statistically significantly higher than in students who are not at risk (Mean = 17.64; SD = 7.66).

The differences in KBUTK scores between male and female students at risk and not at risk of addiction are also statistically important (Table 3). Male students with mobile phone addic-

tion (Mean = 51.47; SD = 20.53) obtained lower KBUTK scores than female students with mobile phone addiction (Mean= 46.69; SD = 14.09).

The study showed statistically important differences in mean KBUTK scores for students addicted to and at risk of addiction to mobile phones and students not at risk of addiction on all of the test subscales (Figure 1, Tables 2 and 3).

Figures for particular KBUTK test subscales were calculated together with suitable Pearson's *r* correlation coefficients (Tables 4–6). They confirm statistically significant differences in total mean results on the KBUTK test and on the individual subscales obtained by students not at risk of addiction and students at risk of addiction to mobile phones according to their gender: scores for male students with addiction on all KBUTK subscales were higher than scores for female students. The data included in Figure 1

and Table 3 show that male students at risk of addiction to mobile phones obtained considerably higher results in KBUTK subscales than female students. Particularly high results were obtained on the following subscales: addiction to mobile phone functions (psychological content of this subscale consists of behaviors such as: using the phone to listen to music, make videos, take pictures, play games and access the Internet, as well as the desire to possess the newest model of the mobile phone), need of acceptance and closeness, and addiction to phone calls and text messaging (psychological content of this subscale consists of behaviors such as: making unsuccessful efforts to reduce the number of phone calls made and text messages sent; reducing the time spent sleeping in order to make phone calls; paying large bills; underestimating the number of phone calls; having a spare mobile phone)

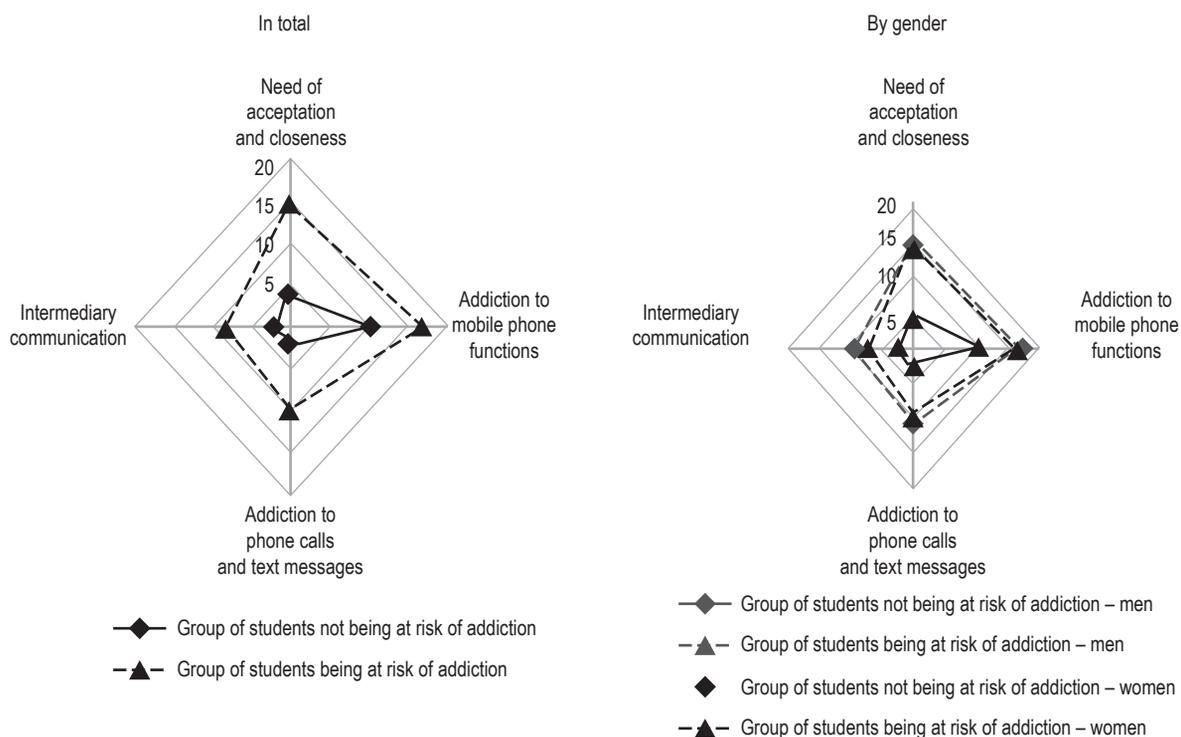


Fig. 1. Comparison of mean KBUTK results obtained by students at risk and those not at risk of addiction to mobile phones, with division into subscales

Table 4. The Pearson's *r* correlation coefficients between KBUTK test subscales for the secondary schools in total

	Need of acceptance and closeness	Addiction to mobile phone functions	Addiction to phone calls and text messaging	Intermediary communication
Need of acceptance and closeness	1	0.519**	0.588**	0.681**
Addiction to mobile phone functions	–	1	0.436**	0.383**
Addiction to phone calls and text messaging	–	–	1	0.688**
Intermediary communication	–	–	–	1

**Correlation significant at $p=0.01$ (bilateral).

Table 5. Pearson's *r* correlation coefficients for KBUTK test subscales in female secondary school students

	Need of acceptance and closeness	Addiction to mobile phone functions	Addiction to phone calls and text messaging	Intermediary communication
Need of acceptance and closeness	1	0.501**	0.521**	0.666**
Addiction to mobile phone functions	–	1	0.414**	0.321**
Addiction to phone calls and text messaging	–	–	1	0.521**
Intermediary communication	–	–	–	1

**Correlation significant at $p=0.01$ (bilateral).

Table 6. Pearson's *r* correlation coefficients for KBUTK test subscales in male secondary school students

	Need of acceptance and closeness	Addiction to mobile phone functions	Addiction to phone calls and text messaging	Intermediary communication
Need of acceptance and closeness	1	0.528**	0.667**	0.716**
Addiction to mobile phone functions	–	1	0.448**	0.447**
Addiction to phone calls and text messaging	–	–	1	0.865**
Intermediary communication	–	–	–	1

**Correlation significant at $p=0.01$ (bilateral).

The data presented in Table 4 indicate significant, strong, positive dependencies between the subscales of KBUTK. The strongest dependencies occurred between intermediary communication of own opinions and addiction to calls and messages (r correlation coefficient = 0.69), and between intermediary communication of own opinions and fulfilling the need of acceptance and closeness (r correlation coefficient = 0.68).

Figure 2 shows the time spent on telephone calls during the week and at weekends is quite diverse in case of adolescents at risk of addiction and those addicted to mobile phones. Most students in both groups (40%) talk on the phone for a few minutes every day. About 13% of students at risk and those addicted to mobile phones talk on the phone for 1.5 to 2 hours a day during the week and 10% talk for 2.5 to 3 hours a day at weekends.

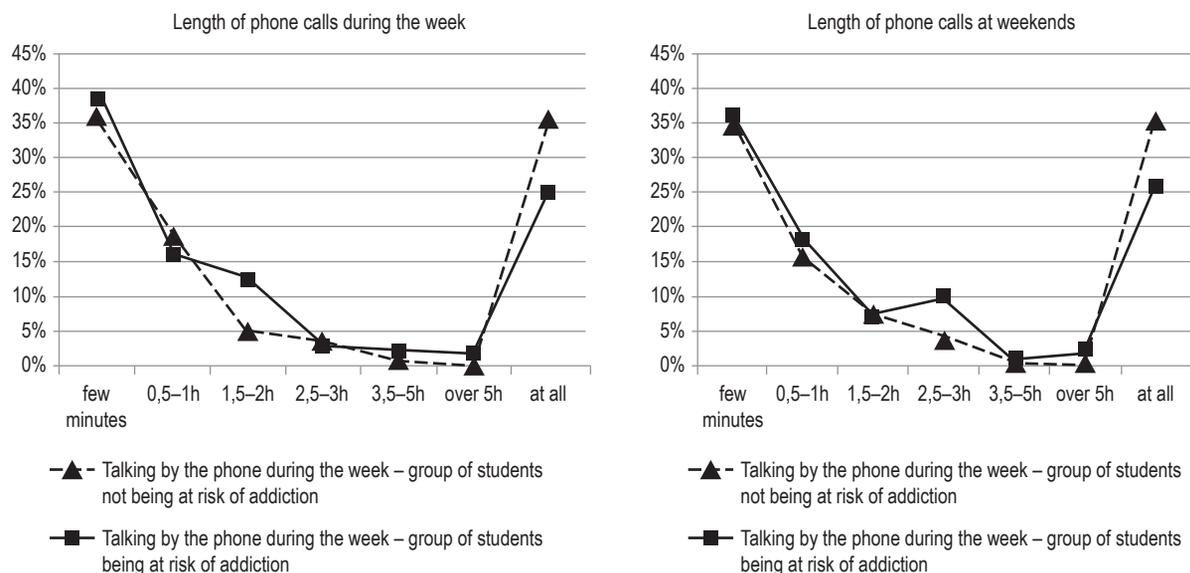


Fig. 2. Time spent talking on the phone during the week and at weekends

The alarming phenomenon found in the conducted study is the fact that every third student gave his number to a stranger met on the Internet at least once.

Time spent talking on the phone during the week and at weekends varies by gender. The majority of students (25%), both male and female, talk on the phone a few minutes every day. Female students tend to talk on the phone more than male students: 8% during the week and 10% at weekends, for 1.5 to 2 hours a day, compared with 5.5% and 8.5% of male students, respectively. Female students talk on the phone for over 5 hours a day more often than male students.

Discussion

The study allowed us to assess the level of mobile phone addiction and in secondary school students in the Silesia region of Poland. The criteria of mobile phone addiction measured by KBUTK were met by 3.83% of adolescents (3.48% of females and 4.37% of males), while the criteria of being at risk of addiction were met by 37.02% of adolescents (42.86% of females and 27.87% of males). The KBUTK test is a reliable tool that identifies problematic use of a mobile phone in the conditions of populational research in a group of adolescents. The value obtained from Cronbach's alpha statistics was satisfactory (be-

tween 0.75 and 0.93 for the particular test subscales and for the whole test) and it was placed in the accepted interval of 0.7 – 0.9 [25].

The results proved our hypothesis which assumed that there are statistically significant differences between students who use mobile phones correctly and whose use puts them at risk of addiction, both overall and by gender.

On the basis of the data found in the source literature it would appear that fewer Silesian adolescents met the criteria of mobile phone addiction than in Spain (20% [21]), Italy (6,3% [20]), the UK (10% [22]), the USA (10–20% [28]) or Taiwan (16.5% [29]), which results from factors such as cultural, social (i.e. parental attitudes) and technological (i.e. technological advances in a given country).

The available literature regarding the problematic use of mobile phones by adolescents and young adults does not currently allow for consistent comparability of the results. Obtaining substantially different results in the percentages of people meeting mobile phone addiction criteria may be a result of differences in sample sizes, lack of a representative research sample, data gathering method (online survey or a classic "paper and pencil" questionnaire, clinical research or patient survey), various measurement tools and various methods of scoring, the use of shortened and modified research tools, adopting different definitions of addiction. Taking into account studies in other countries, it can be assumed that the fig-

ures obtained are either underestimated or overestimated. Moreover, in some studies it would be useful to assess the classification of symptoms of problematic mobile phone use, because people who use mobile phones in a dysfunctional way are not a homogeneous group (i.e. there are people addicted to sending text messages [30], people addicted to making telephone calls and the so-called "mobile phone exhibitionists", buying new and designer phones every now and again [5,31]; social media usage also contributes to the problematic use of mobile phones [32,33]), and various evaluation criteria and measurement tools may be required to study them.

However, the results of this study correspond to the data obtained by researchers elsewhere [18–22,26,27], also concerning gender, as similarly to Poland in general and to other countries, there are more female students than male students in Silesia who met the criteria of addiction or of being at risk of addiction to mobile phones (almost 50% of the female sample and 30% of the male sample). The results of the study are also consistent with parallel data obtained by researchers in other European studies, including Polish ones [19,33–36] regarding time spent on phone calls, which varies between the genders. Female students talk on the phone more often than male students, create interpersonal relations via text messages, use the mobile phone to sustain social contacts, and fulfill their need for closeness, acceptance and expressing emotions. Male students more often than female students express a desire to possess the newest mobile phone model which can be used to play games, access the Internet, listen to music, watch films and take photos.

Finally, the study had certain limitations, as it was conducted in a small number of secondary schools in selected cities of one region of Poland. Therefore, the results need a cautious interpretation and the percentage of people with problematic mobile phone usage may be underestimated. The results cannot be fully generalized to a broad population.

Conclusions

Adolescents in Polish secondary schools are very well equipped in modern mobile phones and smartphones.

The researchers, psychologists and addiction therapists indicate that mobile phone addiction among secondary school students is a significant health and social problem. The criteria of being at risk of addiction were met by about 37% of the tested students, and the criteria of mobile phone addiction were met by about 4% of the students. More female than male students met those criteria (almost every second female and every third male student).

Adolescence is a period with the highest distribution of a problematic use of mobile phones. Owing to this, it is important to study the adolescent population in order to estimate the scale of this phenomenon in this particular group, take up early diagnostics of addiction to mobile phones, initiate possible preventive actions and introduce effective methods of therapy and other relief in reference to people at risk.

The KBUTK questionnaire is a reliable tool with adequate psychometric qualities and it can be used to study various dimensions of addiction to mobile phones.

Due to the risks posed by dysfunctional usage of mobile phones, it is important to monitor the prevalence of this phenomenon, especially among young people, their parents and guardians (the family has the strongest influence on the young person's development and shaping their role models and attitudes from the youngest age), while acknowledging that mobile phones, especially those with Internet access, can fulfill a useful role, and the broadly accessible mobile phone applications can help widen the knowledge and facilitate the functioning of the adolescents in the contemporary world.

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