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Use of mobile phones by youth regarding the potential health consequences – a survey study

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Abstract

Introduction and purpose of work: The widespread availability and multi-functionality of mobile phones among young people cause that these devices are used not only for communication, but also for entertainment, learning, and remote work. However, excessive and unconscious use of mobile phones can adversely affect health through addiction and the FOMO – fear of missing out syndrome, resulting in lower self-esteem, depression, learning difficulties, and sleep problems.

Material and method: The material was collected using the diagnostic survey method. The study involved 451 people aged 10-25, divided into three age groups: 10-15, 16-19, and 20-25. The results were compared with the literature from the last 5 years available on the PubMed database.

Results: Mobile phones are mainly used for communicating on social networks, listening to music, taking photos, education, and organizational matters. The majority (70.0%) of respondents admit using the telephone while eating alone, more than half (54.0%) at school or during university activities, and about one fifth (21.3%) of people while driving, cycling, riding scooter, or skateboarding. More than half of the users use the telephone in the toilet, 52.1% of which disinfect the telephone. The average time of using a mobile phone is 2-4 hours a day, but among people aged 16-19 and in the female group it is higher, over 4 hours a day. Since the beginning of the pandemic, almost three-quarters (73.3%) of respondents have been using phones more frequently. In addition, there is a significant relationship between longer telephone use and the occurrence of neck pain and problems with falling asleep.

Conclusions: Nowadays, mobile phones are a helpful and convenient tool for study, work, organization, or entertainment, especially among young people during COVID-19 pandemic. However, its excessive use may have a detrimental effect on sleep, while in situations requiring concentration such as learning or driving, it can result in distraction. Careful use of the mobile phone including limiting the time spent on phone applications is essential to prevent inappropriate habits and adolescents' addiction to phones.

Key words: mobile phone, addiction, mental health, youth

Introduction

In recent years, there have been a sharp increase in the development of telecommunication and the number of mobile phone users [1]. The latest phone models – smartphones are multifunctional and broadly available, making them a convenient tool for watching movies, listening to music, and quick communication [2]. They are used at school, at work, in a restaurant, and even in the toilet. Using mobile phones while working, as well as crossing the road or studying and driving a car, can be distracting. The increasing prevalence of smartphone addiction (SPA) can make it one of the most harmful habits that can contribute to mental, social, and physical damage [3, 4]. Other two phenomena related to the use of mobile phones are FOMO syndrome – fear of missing out and nomophobia. The first one is described as an anxious feeling of missing rewarding experiences that other people are having, connected to the social media usage. [4, 5, 6, 7]. Moreover, it is suspected that the excessive emission of blue light from mobile phones disturbs the balance of cortisol and melatonin secretion, circadian rhythm, and may negatively impact on sleep quality or immunity [8]. In connection with the current pandemic and increasing amount of time spent online and using mobile phones, it is important not to neglect interpersonal relationships and be aware of the side effects of excessive phone use. Teenagers are a group of people who use a lot of social media and are prone to addiction simultaneously, so they should be careful with using phones.

Purpose

The aim of the study was to analyze the use of mobile phones by youth, regarding the potential health consequences.

Material and methods

The material was collected using the diagnostic survey method. The data were gathered in October and November 2020 using the questionnaire distributed on social networks. Participation in the study was anonymous and voluntary. The survey contained 26 questions, including metric questions, both single and multiple-choice. A total of 451 responses were collected.

The study group consisted of the youth aged 10-25, 183 males (40.6%) and 268 females (59.4%). Among respondents, 30.6% were 10-15 years old, 31.0% 16-19, and 38.4% belonged to the age range of 20-25. Almost everyone – 99.8% of respondents had a mobile phone. A respondent without his telephone did not participate in the further part of the survey.

Data analysis was performed using Microsoft Excel and Statistica StatSoft software. Pearson’s chi-squared test was applied to analyze qualitative values and statistical significance was considered for $p < 0.05$. The obtained results were compared with the literature from the last 5 years available on the PubMed and GoogleScholar databases.

Results

Besides calling and sending messages, the most frequent purposes of using mobile phones by youth, are communicating via social media, listening to music, using the camera and alarm (Fig. 1). These preferences are confirmed by the most frequently used Internet portals – Facebook and Messenger application, Instagram, and Youtube (Fig. 2). These devices are also used for educational purposes – reading books, journalism, self-education, and for organizational purposes, such as checking the calendar and email. Nowadays, the phone is also an entertainment tool used to watch movies or series and play games. The use of smartphones is also common during exercise and doing household chores (Fig. 1).

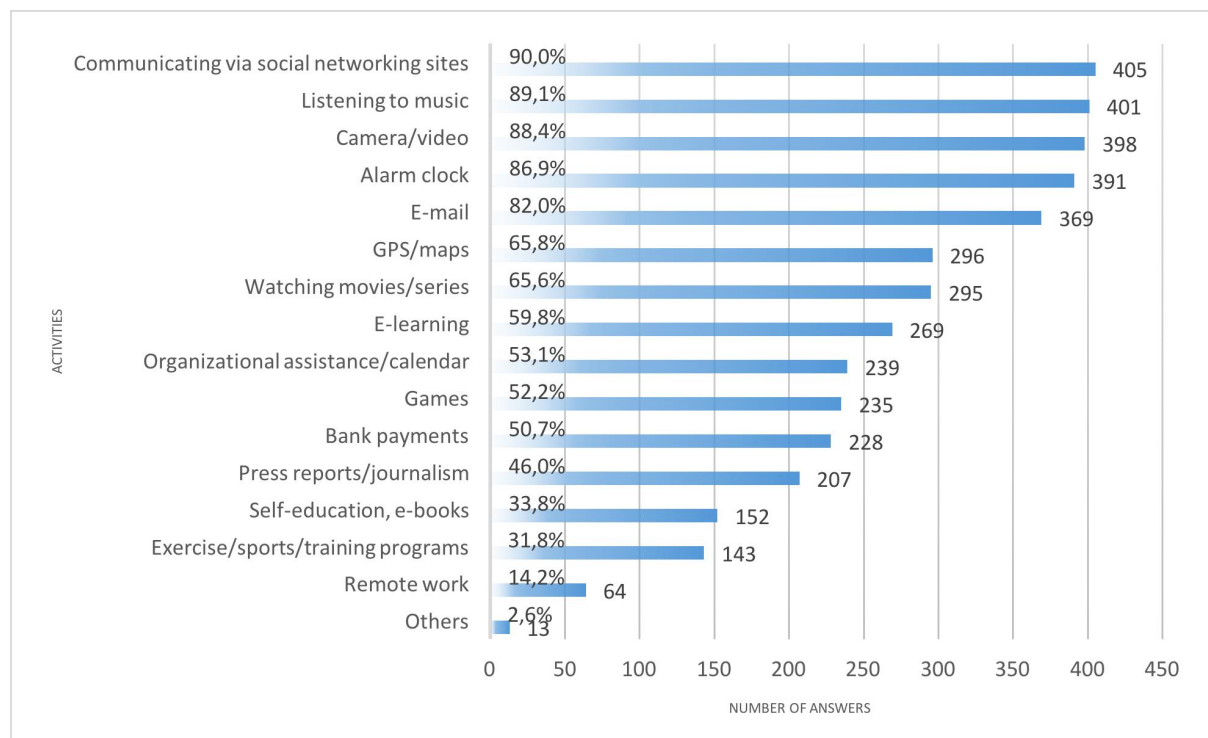


Fig. 1. The purpose of using a mobile phone indicated by the respondents

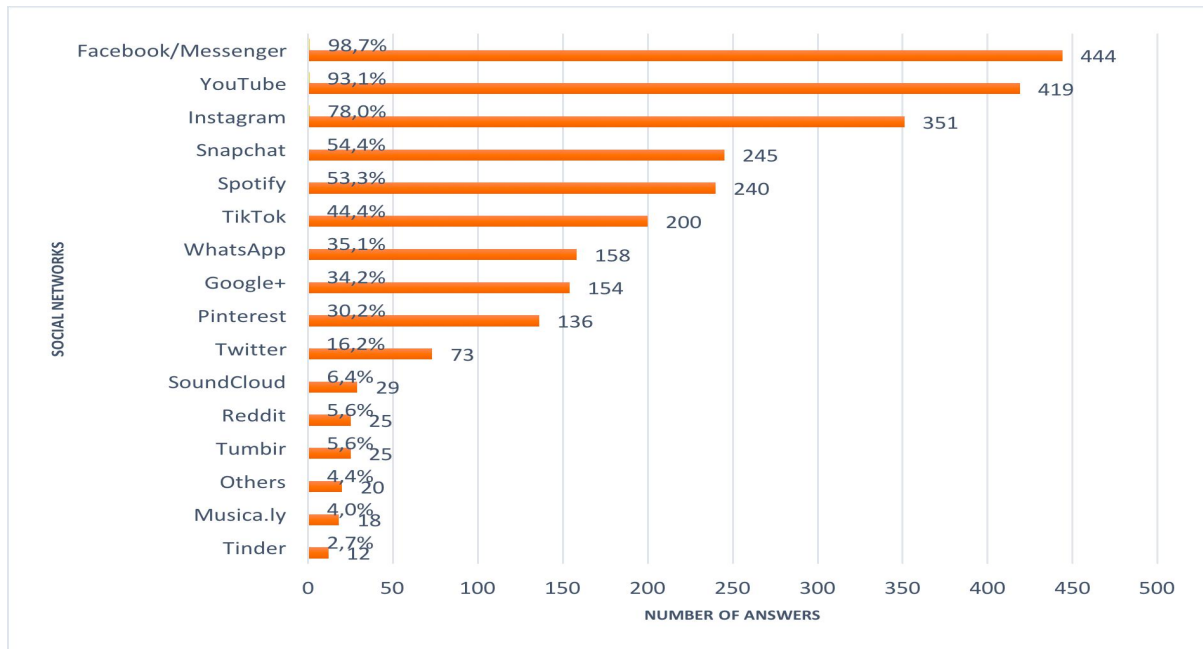


Fig. 2. Social networks indicated by respondents as those they use on a mobile phone

The majority (70.0%) of the respondents confirm using a mobile phone while eating alone (Fig. 3). People over 15 years old use the telephone more often while eating meals compared to the youngest group of people (70.6% vs. 41.6%). About one fifth (18.9%) of respondents admit using the mobile phone while meeting with friends. Fewer people use it when meeting family or colleagues – 7.6% and 5.6% of users, respectively. More than half of the respondents use the telephone during school or academic lessons and household chores. Also, more than half of the users use the telephone in the toilet, 52.1% of which disinfect the telephone. Among phone users who clean their cell phones, there are statistically fewer men than women ($p < 0.001$). The oldest group of the youth disinfects the mobile phone more frequently, compared to the younger participants in the study ($p = 0.025$).

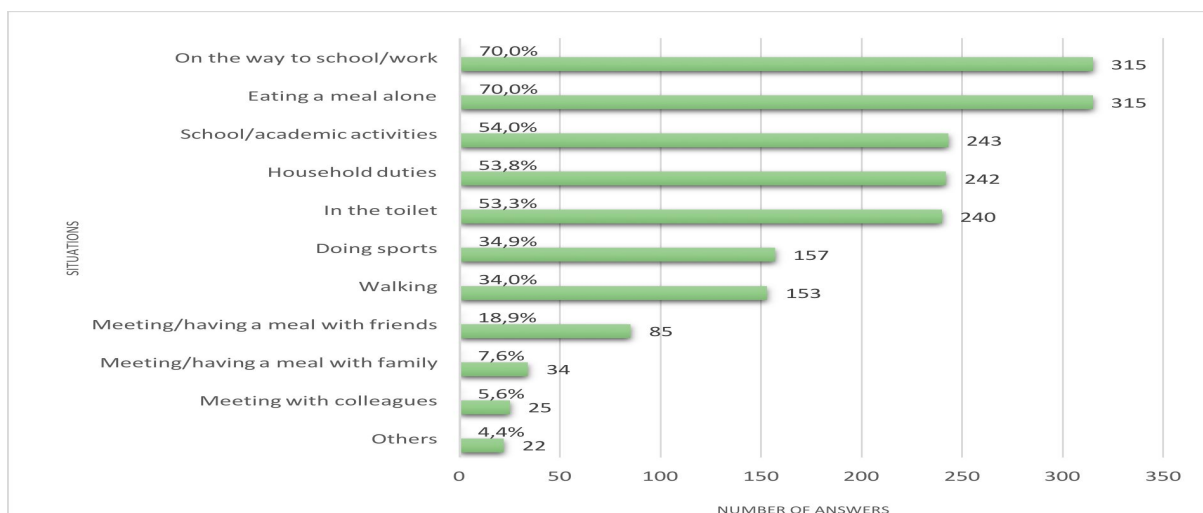


Fig. 3 Answers to the question regarding the situations in which the respondents use a mobile phone

In the context of proper or inappropriate telephone habits, about one-fifth (21.3%) of respondents report using a mobile phone while driving, cycling, riding a bike, scooter or skateboarding. Using the phone in the darkness and not reducing staring at its screen at least an hour before bedtime are confirmed by the majority of respondents (Table 1). Among 315 (59.4%) people who indicated using the phone while eating a meal, 60.0% disinfect this device.

Table 1. Respondents' answers to questions about good or bad habits related to the use of mobile phones

	yes (%)	no (%)
using mobile phone while driving a car/riding a bike/scooter/skateboarding	21.3	78.7
using the phone in the darkness	86.2	13.8
reducing staring at the phone screen for at least 1 hour before bedtime	24.2	75.8
using the phone during a meal	70.0	30.0
phone disinfection	11.6 – regularly 24.9 – sometimes 22.7 – rarely	40.9

After long-term use of the telephone, more than a quarter of respondents suffered from neck pain (29.1%). Similar values were obtained for fingers or hands pain (26.4%). Time spent on using the telephone is statistically significantly correlated with the occurrence of neck pain ($p = 0.001$). Dry eyes are also a common problem currently which is reported by 21.8% of people. However, time of using the phone did not statistically correlate with the occurrence of dry eyes ($p = 0.223$). The problems with falling asleep are more common among those who use the telephone longer ($p = 0.033$). Moreover, these disruptions in sleep are noted more often among women than men ($p = 0.019$) and in the oldest group of adolescents ($p = 0.007$). The time spent in front of the cell phone screen does not statistically correlate with the presence of defects of vision in respondents ($p = 0.123$).

Table 2. Respondents' answers to questions about health problems potentially related to excessive use of mobile phones

	yes (%)	no (%)
neck pain when using the phone for a long time	29.1	70.9
fingers or hand pain when using the phone for a long time	26.4	73.6
problems with appetite	6.9	93.1
defects of vision (farsightedness/myopia/astigmatism)	46.9	53.1
dry eyes	21.8	78.2
problems with falling asleep	8.7 – often 14.0 – sometimes 23.3 – rarely	54.0

The average time of daily use of the mobile phone for all respondents is 2-4 hours. However, in the age group of 16-19 years and among women this value is the highest and for 49% of respondents from both groups, it is more than 4 hours (Fig. 4).

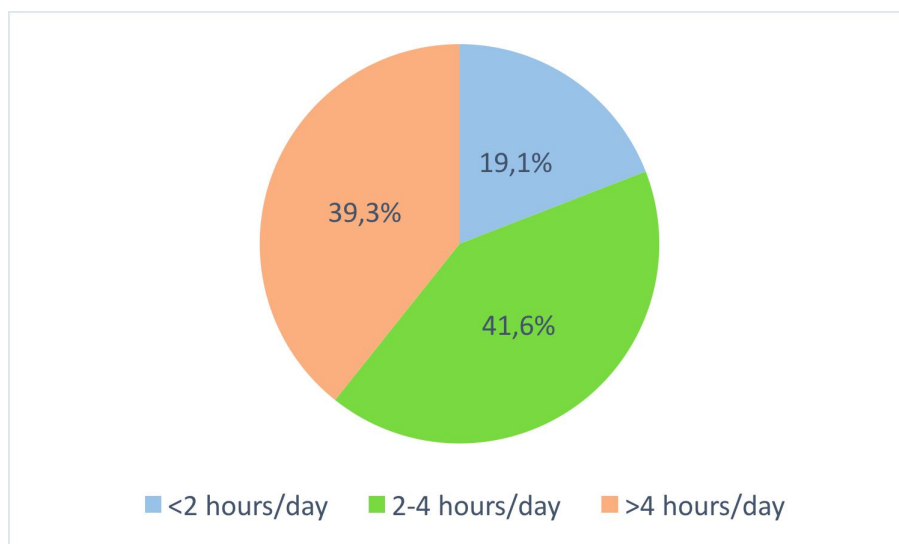


Fig. 4. The time of using the phone per day, indicated by the respondents

There is a significant relationship between longer time of using the telephone and the inability to use the telephone without the Internet ($p < 0.001$) as well as functioning without checking telephone notifications for more than 2 hours ($p < 0.001$) and the feeling of

discomfort due to the lack of access to the telephone ($p < 0.001$). More time spent using the telephone was also associated with neck pain and problems with falling asleep. Browsing social media and websites after waking up and regular review of notifications and posts in order to be up to date are daily habits of 68.7% and 65.6% of respondents, respectively. Only 31.6% of the subjects strongly believe that they would not feel discomfort or anxiety due to lack of access to a mobile phone 24 hours a day (Table 3).

Table 3. Respondents' answers to questions concerning possible psychological attachment to the phone

	yes (%)	no (%)
the possibility of using mobile phones without internet access	32.9	67.1
browsing social networks/information sites after waking up	68.7	31.3
checking phone's notifications and social media posts regularly to stay up to date	65.6	34.4
the way of making friends online – does the respondent prefer it than making friends in real life	8.7	91.3
the ability to study/work for more than 2 hours without checking notifications on the phone	65.6	34.4
feeling anxious or uncomfortable due to lack of access to a mobile phone 24 hours a day	30.9 37.6 – maybe	31.6

The majority (73.3%) of respondents admitted that they spent more time using the telephone since the beginning of the epidemic. The increase in use most often concerns people using the phone more than 2 hours a day ($p < 0.001$). More than half (59.8%) of the respondents use the telephone for e-learning and much less (14.2%) for remote work. Physical activity such as doing sports, dancing, and reading books are the most popular types of interests. Despite the widespread availability of telephones for young people, surfing the Internet and playing games on a mobile phone are forms of activities declared several times less frequently (Fig. 5).

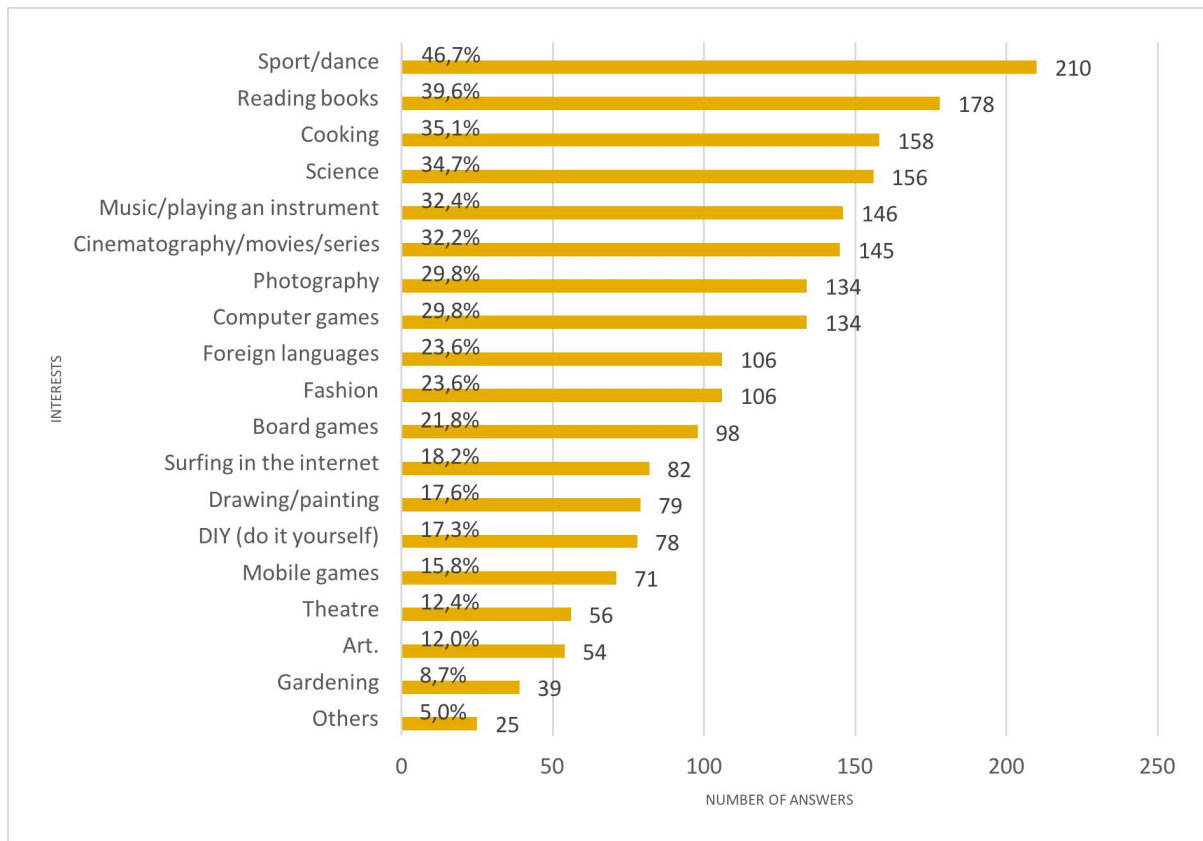


Fig. 5. Answers to the question about respondents' interests

Discussion

The development of the SARS-CoV-2 pandemic at the beginning of this year caused most of the school or academic activities, meetings, and training programs to take place online. This is confirmed by the increase in the use of phones since the beginning of the epidemic by over 70% of respondents. Nowadays, mobile phones are a popular tool for communication with others, but also for entertainment, less often for learning and reading books or journalistic articles. Using phones to communicate, by maintaining relationships, should improve your well-being and enhance mental health, but it can be harmful to physical health.

Using telephones during eating, meetings with others, lessons, cycling, skateboarding, or driving a car, and in the toilet may indicate excessive attachment to the telephone. The problem is not the use of the phone as a device itself, but the incorrect use of the applications and tools of that device [7]. Very frequent, regular screen refreshing, the need to check the news on the phone may be related to FOMO and uncontrolled use of the Internet or smartphones considered a risk factor for disturbances in everyday functioning, distraction, development of depression and insomnia [9]. Only 32% of respondents strongly believe that they would not feel discomfort or anxiety due to the lack of access to a mobile phone 24 hours a day. It has been noticed that the use of telephone is a way of coping with stress, anxiety, distraction, or boredom [7]. Worryingly, more than 60% of respondents regularly check their phone notifications to keep up to date with the latest news, and about a third of telephones' users can not study for more than two hours without looking at notifications on

the screen. Using the telephone is a frequent activity during the meal, both alone and with other people – friends (18.9%) or family (7.6%). Staring at the smartphone screen can disrupt social relationships, although telephones should be a medium for bonding. At the same time, young people pay attention to new virtual reality authorities, whose posts are often sponsored advertisements for products to persuade as many customers as possible to buy them. More than half of the respondents admitted using the telephone during school or academic lessons, which is officially not allowed and is associated with less concentration of young people at school and university. Paying attention to applications on the phone while driving, cycling, or skateboarding causes distraction and can lead to a road accident. Touching a cell phone in a toilet that is full of faecal bacteria increases the risk of faecal-oral infection. Contaminated surfaces and equipment, including cell phones, are a source of pathogenic microorganisms, often antibiotic-resistant bacteria, causing diseases in the social environment and in healthcare facilities [10, 11]. The percentage of phones contaminated with potentially pathogenic organisms ranges from 9% to 90%, on average 68%. Decontamination of the phone surface with 70% ethyl or isopropyl alcohol should be systematic, because it reduces the number of pathogens on the surface of the phone. Although over 40% (43.1%) of the respondents admitted using a mobile phone both while eating and in the toilet, only 52.6% of them disinfected the device.

In people with addiction to cell phones, MRI revealed the lower volume of gray matter in the insula and temporal cortex [3]. Despite the fact that the exact influence of phones on the brain and the human body has not been determined, as The International Agency for Research on Cancer (IARC) claims, electromagnetic radiation is a possible carcinogen – grade 2B [1]. Electromagnetic waves are absorbed by the skin and increase the temperature of the tissues – especially organs such as the eye and testes can be at risk with prolonged exposure to the phone. Some researchers believe that this radiation, through oxidative stress, apoptosis can damage sperm DNA, their morphology, and mobility [5]. It can disrupt spermatogenesis and infertility while its pathogenesis is currently a major diagnostic and therapeutic problem. Studies concerning gonadal harm and stimulation of carcinogenesis require verification. However, it may be beneficial for people of reproductive age to carry the mobile phones less often in bags close to the genitals or in pockets in order to limit the absorption of radiation emitted by telephones.

Continuous exposure to light emitted from smartphone screens, by delaying the secretion of melatonin, may disturb the circadian rhythm and the sleep-wake cycle [12]. Currently, there is insufficient evidence for the effects of electromagnetic waves from a telephone on long-term sleep quality. On the other hand, sleep can be negatively affected by stress, also related to news in mobile phones, cognitive and emotional stimulation, or exposure to blue light before bedtime. Using the telephone at night may negatively affect attention, verbal memory, and learning efficiency [13]. Late bedtime and poor sleep contribute to problems with getting up and sleepiness during the day.

Physical effects of overuse of cell phones include stiffness, muscle pain, fatigue, eye discomfort – dry eyes, blurred vision, irritation, or redness of the eyes. Furthermore, excessive use of the phone can cause pain and weakness in the thumbs and wrists, which increases the risk of de Quervain's tenosynovitis.

Preventing addiction to cell phones and the negative effects of their use is possible by controlling the number of applications and time spent on the phone. People with a basic level of education often do not notice the abuse of a mobile phone, while the youth uses it all too often [7]. A good solution is spending free time developing interests – sports, playing an instrument, or cooking instead of using the phone. To maintain the correct circadian rhythm, staring at the phone screen, checking new notifications especially during bedtime and immediately after waking up should be limited. The “night mode” in smartphones and applications reducing the number of notifications are proper options to limit excessive stimulation of the brain and tiredness due to constant use of the phone.

Conclusions

Among respondents, some of the possible health consequences and elements of behavioral attachment were noted due to excessive cell phone use. In connection with many beneficial functions of mobile phones, which are a helpful tool for contact, study, work, entertainment, especially during the pandemic, they accompany them almost everywhere and at any time.

Smartphones are very widespread among young people who may become addicted to them and this can result in disturbance of interpersonal relationships, depression, deterioration of sleep quality, and academic performance. Due to the probable harmful influence of electromagnetic waves on human sleep and fertility, it is important to recommend the principles of safe and healthy use of cell phones. It is possible by choosing active forms of entertainment instead of looking at the screen, limiting the time spent on the phone, particularly during bedtime, or using the smartphone's night mode.

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