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The relationship between internet addiction and mental health problems such as depression symptoms, anxiety and insomnia before and during Covid-19 pandemic

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ABSTRACT

Introduction: On the account of the Covid-19 pandemic, many governments around the world have imposed multiple restrictions on public life to prevent the spread of the coronavirus. Social disruption and forced isolation contributed to increased stress as well as increased use of the Internet.

Aim of the study: The aim of the study was to investigate the influence of the Covid-19 pandemic on mental health problems, including Internet addiction, and to link Internet addiction with mental health problems such as anxiety, depression symptoms and insomnia.

Material and methods: The data for the article was found using the PubMed and Google Scholar websites.

Description of the state of knowledge: Internet addiction (IA) is becoming an increasingly serious problem of the modern world. The problem of Internet abuse is associated with various risk factors that are dependent on gender or family relationships, as well as mental disorders.

Many studies have confirmed that the Covid-19 pandemic caused negative mental health effects, contributing to increased anxiety and depression symptoms. To reduce stress, people started using the internet more often. This compensatory mechanism can cause even more mental health problems by increasing anxiety, symptoms of depression and insomnia.

Summary: Research by many scientists shows that the Covid-19 pandemic is exacerbating the mental health problems associated with IA. Research shows that during the Covid-19

pandemic, it is especially important to be able to manage stress through non-internet-related activities to help prevent IA.

Key words: internet addiction; COVID-19 pandemic; depression symptoms; anxiety; insomnia.

Introduction

In connection with the Covid-19 pandemic, many governments around the world have decided to introduce many restrictions on public life to prevent the spread of the coronavirus. Precautions such as staying at home or keeping your distance have disrupted many people's social lives. Maintaining social contact was limited to distance communication, and people began to get entertainment mainly from virtual reality.

The forced isolation resulted in schools and colleges switching to remote education, and many companies to remote work or contributed to the loss of jobs, which led to an increase in unemployment. Over 50 million US residents lost their jobs during the Covid-19 pandemic [1].

The life change caused by the pandemic contributed to an increase in stress, increased loneliness, decreased self-satisfaction with life, and thus increased anxiety [2]. Mental health problems are also influenced by the fear of getting sick caused by the SARS-CoV-2 virus. Scientists have found that having relatives or friends with COVID-19 causes anxiety and sleep problems [3]. In addition, the level of stress increases the message from the media about new limitations, information about the daily number of infected and deaths [4].

To reduce anxiety, people turn to psychoactive drugs and spend more time in front of a computer or smartphone screen [5]. For example, at the beginning of the introduction of stay-at-home restrictions, US telecommunications service provider Verizon saw a 75% increase in online gaming activity. Italy saw a 70% increase in the use of online Fortnite games [6].

Playing games or using social media has become a way of coping with stress, avoiding problems or difficult thoughts [5]. Such compensatory behaviour contributes to the maintenance and further development of mental health problems and increases the risk of disorderly or addictive Internet use [7]. It is as a result of Internet addiction that problems such as depression symptoms, insomnia or increased anxiety may arise [8].

Internet addiction risk factors

Internet addiction (IA) or Problematic Internet Use (PIU), which is defined as the lack of control of Internet use, is becoming an increasingly serious problem of the modern world. Increasingly better access to the virtual world causes the occurrence of this pathology among a wide society from different age groups and different regions. It is estimated that in 2014 approximately 6% of the world's population was addicted to the Internet [9]. But what factors may contribute to the development of this disorder? A study by Kapus et al. She points out that the lack of one or both parents is a risk factor for the development of Internet addiction among adolescents. The incidence of IA increased significantly between adolescents raised by one parent or in an orphanage and those raised by both parents [10]. Similar results were obtained by Chinese researchers who pointed out that the relationship between children and parents and directly between parents has an impact on the occurrence of risky behaviours in children, including problematic Internet use. [11]. The authors also point to another social factor related to the abuse of the Internet by students of upper secondary schools, i.e. more than 5 people living in one household. Both of the above factors are related to the lack or lower parental support for adolescents, worse parent-child relationship, lack of emotions towards the child and worse communication, which may increase the risk of developing PIU [10]. This is also related to the hypothesis that the frequent occurrence of Internet abuse was

associated with a lower level of parents' education. It is suspected that it is related to worse social conditions and a dysfunctional environment in such families [17]. Time spent surfing the Internet by young people has also been shown to be important. Children who spend 6 or more hours online are more likely to develop IA than teenagers who spend less time online. Especially for people who use the Internet between 00:00 and 15:00 and between 21:00 and 12:00, this risk increases. Additionally, a correlation was demonstrated between the frequent use of alcohol and drugs and PIU. Moreover, disabilities and mental disorders in adolescents were also associated with frequent occurrence of Internet addiction [10]. who spend 6 hours or more a day online are more likely to develop IA compared to teenagers who spend less time online. Especially for people who use the Internet between 00:00 and 15:00 and between 21:00 and 12:00, this risk increases. Additionally, a correlation was demonstrated between the frequent use of alcohol and drugs and PIU. Moreover, disabilities and mental disorders in adolescents were also associated with frequent occurrence of Internet addiction [10]. who spend 6 or more hours online are more likely to develop IA compared to teens who spend less time online. Especially for people who use the Internet between 00:00 and 15:00 and between 21:00 and 12:00, this risk increases. Additionally, a correlation was demonstrated between the frequent use of alcohol and drugs and PIU. Moreover, disabilities and mental disorders in adolescents were also associated with frequent occurrence of Internet addiction [10].

It is worth noting that the problem of Internet abuse affects both genders, both boys and girls, but it prevails in the case of men (42.3% of boys vs. 18.5% of girls). This is also confirmed by the results of other studies [11, 12]. The difference between the sexes may be due to the purposes for which the internees are used. A Korean study of internet addiction risk factors and gender in adolescents found that games were the most common reason boys used the internet, while girls searched for information, played games, and chatted. However, the very development of PIU among both sexes was associated with playing in boys, which, as the authors suggest, allows them to search for new and exciting experiences. In turn, PIU girls were associated with chatting and using social media, which indicates a relationship between IA and social factors such as fewer friends [13]. Loneliness and problems with establishing interpersonal relationships were also indicated in various publications as risk factors of Internet addiction [14]. Among the risk factors, attention was also paid to psychological factors. In this study, attention was drawn to the correlation between the occurrence of depression and PIU among Korean adolescents. Virtual reality can act as a protective mechanism for teenagers experiencing depression, protecting them from stress, thereby enabling them to escape the difficulties of real life. Among boys, there was a relationship between such traits as avoidance of harm, self-transcendence, novelty-seeking and the occurrence of Internet abuse in them, however, in girls such a relationship has not been proven [13]. This correlation partially confirms the conclusions of earlier studies, in which these features were considered risk factors for Internet abuse, but the difference between the sexes was not taken into account [15]. However, both in the case of the male and female gender, it was noticed that the PIU risk factors also include difficulties in establishing social relations, caused by certain individual characteristics, such as addiction to rewards, cooperativeness and persistence, which characterize cynical and emotionally insensitive people. experiences and social situations [13]. but it did not take into account the difference between the sexes [15]. However, in the case of both male and female gender, it was noticed that the PIU risk factors also include difficulties in establishing social relationships, caused by certain individual characteristics, such as reward addiction, cooperativeness and persistence, which characterize cynical and emotionally insensitive people to positive social experiences and situations [13]. but it did not take into account the difference between the sexes [15]. However, both in the case of the male and the female gender, it was noticed that the PIU risk factors also include difficulties in establishing social relationships, caused by certain

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Internet addiction is also a problem in the group of young adults. Also in this case, the time people spend online may be a risk factor for PIU. The authors of the study point out an increased risk that correlated with surfing the web for more than 2 hours a day and 4 days a week. As in the aforementioned studies, this time was devoted to gaming and using social media. Chandrima et al. points out that there is also a relationship between lower academic performance and the presence of PIU. The exact relationship was not known yet, but the development of addiction may be due to the opportunities offered by the internet with which people can compensate for lack of success and failure in the real world [17]. These results are also confirmed by the studies by Malak et al., which highlights another important factor as risk factors for Internet addiction. People with mental disorders such as depression and anxiety are also at high risk of developing PIU. This is due to the possibility of forgetting the problem that affects them and finding a reality that suits their needs [16].

Depression symptoms and Internet addiction

Depression is defined as a specific type of disorder that includes both mood and emotions. It is a mental dysfunction that prevents proper functioning due to a reduced energy level, deteriorated mood and a sense of general malaise [18]. It is characterized by negative self-esteem, both cognitive - a pessimistic approach to current affairs, and emotional - resulting from negative self-esteem. The consequence of this condition may be health deterioration, increased morbidity and mortality. Depression is classified as a mental illness [19, 20].

Over 350 million people worldwide suffer from depression (according to the World Health Organization as of 2017), it is a common mental disorder. The disease is most often diagnosed in people between the ages of 20 and 40, and women are much more ill. Its incidence is increasing among the population of developed countries, especially in the elderly - over 65 years of age, which accounts for approximately 20% of all patients. The analyses show that in 2030 this percentage will amount to as much as 25% [18].

With the spread of the SARS-CoV-2 virus around the world, countries, depending on the epidemiological situation, introduced new restrictions to prevent the spread of the COVID-19 pandemic. Some of them decided to close - this forced people to change their current lifestyle and function in society [21]. It was connected with conducting remote work and minimizing social contacts. This had a negative impact on interpersonal relationships, which resulted in a pessimistic attitude, aroused anxiety, fear and in many cases contributed to the development of depression. The isolation of children and adolescents and the imposition

of remote learning resulted in a sudden increase in depressive states in young people due to the lack of contact with peers [22,23].
In the work of Jiawen Deng (31 studies were analysed) on the occurrence of dysfunction in the emotional sphere in patients with COVID-19, a significant increase in the symptoms of mental disorders was observed. On the example of the frequency of depression diagnosis - in hospitalized patients the incidence rate was 5-34%, while after the analysis of many studies it was found that during the coronavirus pandemic this value increased to 48% among hospitalized patients [22]. As for the direct relationship between depression and Internet addiction, in a study by Younes et al. among medical students before the pandemic, Covid-19 confirmed the existence of a relationship between the occurrence of depression symptoms and Internet addiction. These people have a high rate of personality disorders. After analysing the review works, it was proved that that excessive browsing of content on the Internet is manifested by a mood disorder, deterioration of sleep quality, low self-esteem and the appearance of suicidal thoughts. The presented symptoms are characteristic of people with developing depressive disease. For treatment, both Internet addiction and related aspects such as anxiety, sleep disorders and depression should be addressed [24].
In contrast, in a study by Dong et al. On Internet addiction and related psychological factors in China, the incidence of depression during the Covid-19 pandemic was 17.66% (n = 362), respectively. In contrast, the incidence of addictive Internet users (AIU) and problematic Internet users (PIU) among Chinese children and adolescents was relatively higher during the Covid-19 pandemic than before in China (2.2% / 17.1%). Binary logistic regression analysis shows that severe depression (OR = 3.672, p = 0.003), mild to moderate depression (OR = 2.881, p <0.001) were significantly associated with Internet addiction (AIU) and problematic Internet users (AIU) during the pandemic. PIU). Moreover, linear regression analysis shows that depression (β = 0.257, p <0, 001) was significantly correlated with the total IAT score (Chinese version of Young's Internet Addiction Test). A study by Dong et al. showed that many participants experienced significant depression during the epidemic. The study confirmed the role of depression in IA in response to the Covid-19 pandemic [25].

In the case of the study by Liang et al. on Internet addiction also showed a relationship between depression and Internet use disorders [26]. In times of social isolation due to a pandemic, people can increase their time spent on the Internet to reduce stress and alleviate mental problems such as depression, and this can exacerbate their depression levels. This suggests a vicious cycle in which depression and Internet addiction increase each other [27].

Anxiety and Internet Addiction

Anxiety is defined as an emotional state associated with the feeling of an unjustified threat from inside the body or from the external environment [28, 29]. From a psychopathological point of view, there are two main types of anxiety. Temporary anxiety is an emotional state that will pass over time (state anxiety). In the second case, trait anxiety, the so-called a condition in which there is a chronically increased readiness to respond to various stressful situations. It is important to be able to distinguish anxiety as a trait and emotional state [29].

There was a so-called global blockade during the COVID-19 pandemic. This forced people to work from home, and children and students to do remote work. Anxiety, fear, and a sense of insecurity accompanied every fear of the virus. The compulsion to sit at home with the family or alone generated negative emotions that everyone dealt with differently. Omnipresent fear for your own health and that of your loved ones. According to studies, in order to deal with the depressing emotions of a pandemic period, it is necessary to diversify the daily routine. It is recommended to perform activities for which there was no time in everyday life and which help to improve mood in these difficult times [21,30].

Many scientists have dedicated their research to changes in human physiology caused by coronavirus, while mental health issues have been pushed to the background. Activities such as quarantine or isolation of those infected with the virus can lead to episodes of depression, anxiety, and sleep disturbances. Using the example of the MERS epidemic in 2012, it was proved that almost 71% of respondents experienced psychological symptoms. According to researchers and analysts, the current COVID-19 pandemic will bring with it a much higher percentage of people with mental disorders [31].

Article written by Jiawen Deng analysed nearly 31 scientific papers on mental disorders in COVID-19 patients and proved that anxiety disorders were observed in nearly 47% of patients [31].

Regarding the relationship between anxiety and internet addiction, the literature documented prior to the pandemic that IA is associated with psychosocial problems as risk factors, in particular anxiety. Associations between IA and internalization problems such as anxiety have been associated with using the internet to improve mood and relieve stress. Interestingly, people who use the Internet have a highly depressed mood immediately after using the Internet [32].

In a study by Dong et al. On Internet addiction and related psychological factors in China, the prevalence of anxiety during the Covid-19 epidemic was 15.54% (n = 298), respectively. Binary logistic regression analysis shows that mild to moderate anxiety (OR = 1.831, p = 0.001) was significantly associated with AIU and PIU. There was no significant relationship between addictive, problematic Internet use and severe anxiety (p = 0.087). A study by Dong et al. showed that many participants experienced, in addition to depression, significant anxiety during the epidemic [25].

The results of other researchers show that the abuse of the Internet during the Covid-19 pandemic is related to the search for new information about the pandemic, and that the spread of disinformation causes unfounded concern. Abusing the internet to obtain information on COVID-19 can increase anxiety levels, exacerbate anxiety, and impair functioning. This can lead to additional media consumption and further anxiety, creating a cycle that can be difficult to break [33].

Insomnia and Internet addiction

Sleep disturbance is a very common symptom in adults. The most common type of disorder is insomnia. Physiological sleep enables a person to regain their full cognitive ability and visual vitality. According to the definition of the International Classification of Diseases and Health Problems (ICD-10), insomnia is a condition in which there is inadequate quality and duration of sleep in relation to the body's needs, with a frequency of at least 3 within a week. and fatigue, as well as irritability. Insomnia is one of the most common symptoms reported by patients to a doctor, which makes it possible to call it a lifestyle disease of the 21st century. This symptom is reported by 30-50% of adults. In diagnostics, it is important to identify the cause of the primary disorder [34].

Sleep problems are usually considered negative effects or complications of Internet addiction [35], but the opposite situation for insomnia to be the cause of Internet addiction is also possible, as sleep problems may contribute to spending more time on social networks among people [36].

Online gaming disorder is widespread, especially among adolescents, and positively correlates with distress and sleep quality. Even before the pandemic period, it was observed that Internet Gaming Disorder (IGD) and social media addiction clearly correlate with sleep quality, and the impact of Social Media Addiction (SMA) is even more significant [37].

During the pandemic, the correlation between IGD, sleep disturbances and quality of life among Iranian youth was studied [38]. The study showed a moderate positive correlation

between insomnia and playing disorders ($p < 0.01$) and a moderate negative correlation between playing disorders and Quality of Life (QoL) reported by adolescents ($p < 0.01$). This suggests that, despite the benefits of online gaming as a social interaction and entertainment tool [39], it may be a contributing factor to health damage, especially in younger people. The COVID-19 pandemic has affected sleep disorders regardless of addiction or pathological Internet use. Comparing the month before the outbreak of the pandemic and the state of affairs at that time, it was observed that the main time of going to bed changed from 1 to 2 hours later [40].

Another difference was the increase in the reported time of falling asleep (from 2.8% to 16%, $p < 0.00001$), the increase in the number of night-time awakenings (from 40% to 75%, $p < 0.00001$) and the reporting of nightmares [40]. The COVID-19 pandemic has led to increased interest in the Internet and games. Verizon, one of the US mobile operators, saw a 75% increase in online activity [41], and Italy saw a 70% increase in internet gaming traffic for Fortnite [42]. In a study [43] on the Mexican population, the majority of participants (99.6%) were aware of the COVID-19 pandemic and its risks. In every third respondent, the fear associated with it caused a reduction in the quality of sleep - 13% had a shorter sleep time, and 20% had difficulty falling asleep. At the same time, more than half of the respondents had at least mild Internet addiction, and the prevalence of internet addiction has increased compared to the pre-pandemic population. Moreover, the prevalence of sleep disorders was higher among those with higher levels of addiction. In the study [44], sleep disturbances were observed in almost half of the respondents, with 12.13% meeting the criteria for clinical insomnia, and 31.97% meeting the criteria for subclinical insomnia. The analysis showed a significant relationship between Internet addiction and insomnia, accompanied by a significant amount of time spent online - over 6 hours for both sexes. 97% met the criteria for subclinical insomnia. The analysis showed a significant relationship between Internet addiction and insomnia, accompanied by a significant amount of time spent online - over 6 hours for both sexes. 97% met the criteria for subclinical insomnia. The analysis showed a significant relationship between Internet addiction and insomnia, accompanied by a significant amount of time spent online - over 6 hours for both sexes.

The worsening of insomnia is associated with a longing for online time and an increase in the amount of time planned for using the Internet. Another study [45] also found clinical insomnia in approximately 10% of participants and changes in sleep duration, with 16.1% of participants having shortened sleep and 18.1% prolonged sleep. Almost one in four participants reported a deterioration in sleep quality, but 8% indicated improvement. Escape to the internet is also a worrying sign, even though the individual is noticing negative health effects. This may affect up to 30% of users [46], and over 27% of network users believe that using the Internet may disrupt sleep.

Summary

Research by many scientists shows that during the Covid-19 pandemic, mental health issues such as insomnia, anxiety and depression symptoms contribute to Internet addiction, and Internet addiction can exacerbate these mental health problems. People use their computers and smartphones excessively to reduce the stress of a pandemic. It disrupts everyday life. Additionally, when browsing social media, they accidentally learn about the latest news about Covid-19, which adds to their anxiety [47].

The above results show that during the Covid-19 pandemic, the ability to reduce stress, regular physical activity and ensuring adequate sleep quality are of particular importance. The feeling of loneliness during physical distance should be reduced by maintaining contact, for example by phone, with friends. Additionally, it is worth using analogue technical tools (e.g. wristwatches, alarm clocks), instead of IT and telecommunication tools, to shorten the time of

working with a telephone or computer. If you have difficulty controlling your internet use or specific internet activities, you can contact your mental health professionals. Seeking help in the early stages can be particularly effective in relieving symptoms [5].

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