

# Prevalence of problematic use of internet during recent years: a narrative review

## Probleminio naudojimosi internetu paplitimas pastaraisiais metais: literatūros apžvalga

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### SUMMARY

**Introduction.** Globally, the number of internet users increases every year. The COVID-19 pandemic has also contributed to the growing scale of PIU. As a result, the engagement with technologies and internet usage rises respectively. In that case, excessive use of internet has started to develop public health concern that requires deeper scientific understanding to offer solutions to the community. In this narrative review, we will review the PIU and internet addiction (IA) terminology, the prevalence of PIU estimates, PIU causes, risk factors, treatment, and prevention.

**Aim.** To review the most relevant studies based on the the PIU and IA terminology, the prevalence of PIU estimates, PIU causes, risk factors, treatment, and prevention.

**Methods.** Literature search was performed using OWID (ourworldindata.org) statistical database and selected overview of scientific publications on problematic internet use published on the international medical databases PubMed and ClinicalKey.

**Results.** Males than females are more prone to become addicted to the internet. During the past couple of years, studies revealed that prevalence of PIU was higher during the COVID-19 pandemic than reported before the pandemic. Inseparable part of PIU is neurobiological and psychological constitutions, moderators, such as coping styles and internet-related cognitive biases. The treatment of PIU has not yet been systematized. According to scientists, psychological and pharmacologic treatments have been found to be very promising in the treatment of PIU. Prevention of the PIU primarily should be introduced in schools, particularly elementary schools, considering that problematic use of internet strongly prevalent among children and adolescents and if not applied could lead one to serious health issues.

**Keywords:** Internet, internet usage, problematic use, addiction, excessive use, COVID-19, pandemic.

### SANTRAUKA

**Įvadas.** Interneto vartotojų skaičius pasaulyje didėja kasmet. COVID-19 pandemija taip pat prisidėjo prie didėjančio probleminio interneto naudojimo masto. Dėl šios priežasties, atitinkamai didėja ir išmaniųjų technologijų bei interneto ryšio naudojimas. Dažnas interneto naudojimas sukėlė susirūpinimą visuomenės sveikata, o norint problemą suvaldyti reikia atlikti nuodugnesnius tyrimus, kad būtų galima pasiūlyti atitinkamus šios problemos sprendimo būdus bendruomenei. Šioje literatūros apžvalgoje nagrinėsime probleminio interneto naudojimo bei priklausomybės terminologiją, paplitimą, problemos priežastis, rizikos veiksnius, gydymą ir prevenciją.

**Tikslas.** Apžvelgti aktualiausius tyrimus apie probleminio interneto naudojimo bei priklausomybės terminiją, paplitimą, problemos priežastis, rizikos veiksnius, gydymą ir prevencijos būdus.

**Metodai.** Literatūros apžvalga buvo atlikta naudojant duomenis pateiktus OWID (ourworldindata.org) statistikos duomenų bazėje ir pasirinkta mokslinių publikacijų apie probleminį interneto naudojimą apžvalga, publikuota tarptautinėse medicinos duomenų bazėse PubMed ir ClinicalKey.

**Rezultatai.** Vyrai labiau nei moterys yra linkę tapti priklausomais nuo interneto. Per pastaruosius porą metų atlikti tyrimai atskleidė, kad probleminio interneto naudojimo paplitimas COVID-19 pandemijos metu buvo didesnis nei prieš pandemiją. Neatskiriama probleminio interneto naudojimo dalis yra neurobiologiniai ir psichologiniai veiksniai, tokie kaip situacijų sprendimo metodai ir su internetu susiję polinkiai. Probleminio interneto naudojimosi gydymas dar nėra susistemintas. Pasak mokslininkų, psichologinis ir farmakologinis gydymas yra labai perspektyvūs gydant probleminį interneto naudojimą. Probleminio interneto naudojimo prevencija pirmiausia turėtų būti diegiama mokyklose, ypač pradinėse klasėse, atsižvelgiant į tai, kad probleminis naudojimas internetu yra labai paplitęs tarp vaikų ir paauglių bei gali sukelti rimtų sveikatos problemų.

**Raktiniai žodžiai:** Internetas, interneto naudojimas, probleminis naudojimas, priklausomybė, perteklinis naudojimas, COVID-19, pandemija.

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## INTRODUCTION

Problematic internet use (PIU) is described as the excessive and compulsive use of online activities and services that have addictive potential and are associated with significant functional impairment [1]. The PIU has gotten more attention throughout the decade in the popular media and among scholars, and this interest has correlated with the rise in computer use and internet access [2-4].

Data collected in recent years indicates that globally, the number of internet users increases every year [5]. In 2020, the share of German internet users aged 14–75 amounted to 88%, an increase compared to the previous year at 86% and 84% in 2018 [6]. Furthermore, similar trends in the growth of internet usage could be seen in Lithuania as well. In 2021, Department of Statistics revealed that 87% out of all people aged 16–74 was using the internet daily [7]. In comparison, in 2020–83% [8] and in 2019–82% were using internet daily [9].

During the past couple of years, studies reveal that prevalence of PIU was higher during the COVID-19 pandemic [10] than reported before the pandemic [11]. A lot of countries, as recommended by the World Health Organization (WHO), have introduced the virus containment measures, including social distancing, quarantine, and isolation [12]. As a result, the engagement with technologies and internet usage increased due to activities, such as, studying at school or university, and office work being shifted online [13]. The lockdown has resulted in most people taking to the internet and internet-based services to communicate, interact, and continue with their job or schooling responsibilities from home daily. Compared to pre-lockdown levels, video-conferencing services like Zoom have seen ten times increase in usage during the beginning of the pandemic [14].

As a result, so called internet addiction (IA) has become developing public health concern that requires deeper scientific understanding to offer solutions to the community. PIU is linked to several elements, including sociodemographic features of internet use and psychological behaviours [15]. Studies have found that PIU has various negative effects on mental health, including attention deficit hyperactivity disorder (ADHD), depression, aggression, and low self-esteem [4, 16, 17].

In this narrative review, we will review the PIU and IA terminology, the prevalence of PIU estimates, PIU causes, risk factors, treatment, and prevention. The present study is based on reviewed national and international literature.

## METHODS

This narrative review was performed using search criteria including keywords and their combinations in the international medical databases PubMed, ClinicalKey, as well as Our World In Data (OWID) statistical database [5]. This study was conducted to learn more about the problematic internet use (PIU) and internet addiction (IA) terminology, the prevalence of PIU estimates, PIU causes, risk factors, treatment, and prevention. 198 articles written in English were selected based on the search criteria using keywords presented. This review included a total of 72 articles and provides a selected

overview of scientific publications on PIU.

## RESULTS

### Terminology

Recent studies state that the term “internet addiction (IA)” and the notion that goes with it are inadequate [18]. According to a widely used definition, IA is defined as excessive or poorly controlled preoccupations, desires, or behaviours related to computer use and internet access that cause impairment or suffering [19]. Excessive use of the internet does not always imply hazardous behaviour or addiction. [20]. Excessiveness is also difficult to measure because vast segments of the population are continually connected to the internet via smartphones that they carry with them.

Initially, addiction may only be a correct term for those who satisfy the general criteria for addiction; most people labelled as individuals with PIU may not have an addiction disease. Second, although the internet as a medium may play an essential role in making some behaviours addictive, there is no evidence that addiction to the internet as such exists. Third, internet addiction should be substituted with addictions to specific behaviours, i.e., pornography and the sexual behaviours that go along with it, gambling, social networking, video games, shopping, or just surfing the Web. In that case, when referring to online activities, the phrase “addiction” should be used cautiously and preferably changed to “dysfunctional use” or “problematic use” or “disorder”. The term “internet” should be replaced with the specific behaviours as well [21].

### Prevalence of PIU estimates

The increased internet use had drastically altered our lives. Although the technological revolution has improved many aspects of our life and it is now an important part of everyday routine, including work, private life, and social functioning, many authors have observed internet misuse (PIU, IA), as summarized in a recent meta-analysis of 113 epidemiologic studies covering 693,306 subjects in the population aged 7–60 years [22].

The COVID-19 pandemic has also contributed to the growing scale of PIU. The World Health Organization (WHO) has cautioned that screen use may grow during the pandemic. As a result, there is a greater chance of PIU [23]. Young people have showed the increased internet use [24], presumably as a result of pandemic-related lifestyle adjustments such as staying at home, lockdowns, shuttered workplaces, and schools [25]. Despite government and institutional efforts to avoid and reduce PIU, it has evolved into a major issue [26]. Several opinion papers stated that the increased severity of PIU during a pandemic may linger after it has passed, resulting in a worsening of people’s quality of life and a significant economic burden on society [25, 27]. During the pandemic, young people are especially vulnerable to internet-related issues and psychological anguish [28, 29]. The person with PIU may be unaware of it, and the symptoms may go unnoticed by even his or her family, friends, and co-workers [30].

Researchers reported that sleep deprivation or disturbance

appears to be one of the known health concerns associated with the PIU [31, 32]. In Taiwan, 2016 longitudinal study discovered that disrupted circadian rhythm was related to PIU in a progressive manner [33]. Furthermore, excessive daytime sleepiness was shown to be common in 37,7% of high school students with PIU in a South Korean study, compared to 13,9 % and 7,4% in potential individuals with PIU and the ones with no risk of PIU, correspondingly. In people with PIU, the prevalence of sleeplessness, snoring, apnoea, teeth grinding, and nightmares was also higher than in potential population with PIU and the ones with no possibility of PIU [34]. According to studies, PIU has also been linked to increased psychiatric symptoms [35], later bedtimes [36], obesity [37], and low academic achievement among adolescents [38].

Thus, it is evident that excessive internet usage has risen in recent years, and the pandemic could have made a significant influence on people's lives, including the prevalence of PIU estimates, and some of those changes could have dangerous impact on internet-related health hazards long-term.

### Causes and risk factors of PIU

According to studies, males are more prone to become addicted to the internet than females [39-41]. The ones with PIU may spend long periods of time on the internet, isolating themselves from other types of social contact and focusing almost solely on the internet rather than broader life events [3]. Frequent internet users are more likely to adopt dysfunctional coping methods and have poorer interpersonal relationships than the ones who do not have that problem [42, 43].

The I-PACE model (Interaction of Person-Affect-Cognition-Execution) is a theoretical framework for the processes that underpin the formation and maintenance of an addictive usage of internet applications or sites that promote gaming, gambling, pornography viewing, shopping, or communication. The model is built in the form of a process model. Predisposing factors, such as neurobiological and psychological constitutions, moderators, such as coping styles and internet-related cognitive biases, and mediators, such as affective and cognitive responses to situational triggers in combination with reduced executive functioning, are believed to be the cause of specific internet-use disorders [44].

Genetic elements and other biological determinants of individual behaviour, such as ontogenetic components and early childhood experiences (such as early trauma, emotional or physical abuse [45], inter-parental conflicts [46]), and their consequent biological implications and effects on learning experiences, are often the first predisposing factors in the development of PIU [47, 48]. Although numerous preliminary studies suggest that genetic factors may play a role in internet-related disorders, more research is needed.

Personality traits plays a significant role in being potential risk factor in the development of one's PIU [49]. The study was performed using the Big Five Inventory (BFI), assessed and measured the big five personality traits of 752 students. The results indicated that agreeableness and conscientiousness were negatively associated with PIU [50]. In that case we can assume that one's personality qualities may have a part in the development of the PIU.

Unfortunately, various studies stated that there is also considerable evidence to demonstrate that people with foregoing mental health conditions are more vulnerable to develop the PIU throughout the years [51-53]. The most common conditions which potentially could correlate with PIU is the lack of anxiety control and severe depression. Furthermore, ADHD in female internet users, were seen to be a noteworthy predictor to develop an addiction [54].

Additionally, coping, cue-reactivities, cravings, needs for mood management, and attentional biases are also one of the I-PACE model components. Stress in everyday life, as well as following use of the internet as a coping mechanism for difficult or stressful life events, have been identified as major elements that may contribute to the development of PIU [55]. Cue-reactivities, cravings [56, 57], needs for mood management [58], and attentional biases [59, 60] are some of the affective and cognitive responses that arise from interaction effects. According to researchers, these are essential processes that influence decisions to use specific applications or websites. However, studies suggest [44] that there may be mediating variables between affective and cognitive reactions and the decision to use the internet, and that these mediating factors could be found in the domains of inhibitory control and executive functioning.

### Treatment

Considering that PIU is becoming progressively major problem in today's society, the treatment should be well-established. Unfortunately, it has not yet been systematized [61, 62]. There is still a lot of confusion over what constitutes IA, how to name it, and whether it should be classified as a single diagnosis or as multiple sub-diagnoses [63].

Nevertheless, the initial goal of a treatment is to determine the level of patient's motivation [64]. Parental participation in treatment is also crucial for a beneficial outcome. The patient in many circumstances may be a child, adolescent, or young adult and treatment must include both parents during all stages. Doctor should attempt structuring therapy around the patient's and family's motivation. Understanding patient's developmental and psychosocial context of symptoms, moreover, observing patient's ongoing reasoning of the treatment is essential.

Both psychological and pharmacologic treatments were found to be promising in treating PIU by Winkler and colleagues [65] as well as Lithuanian scientist [66]. To treat PIU, scientist examined medications that are commonly used to treat depression (bupropion, escitalopram) or ADHD (methylphenidate, atomoxetine). Two studies were performed that presented head-to-head comparisons of two distinct medications. One compared bupropion and escitalopram for 6 weeks [67], while the other compared atomoxetine and methylphenidate for 12 weeks [68]. Both studies established that both treatments reduced PIU symptoms, although there were no significant differences in efficacy between the two medications.

Moreover, Cognitive – Behavioural Therapy (CBT) could be incorporated in the treatment of the PIU. Several studies states that CBT effectiveness is noticeable, and it helps

patients to minimize the time spent online [16, 65]. 67 patients (66,3%) who had CBT versus 34 patients (33,7%) who didn't receive CBT, showed greater decrease in PIU than those who were treated without CBT [69]. However, because there is still little data on CBT impact on PIU treatment, it should be approached with caution.

### Prevention

Considering the PIU problem in a modern world, many researchers agree that preventative strategies should initially target children and adolescents [70]. Children and adolescents are in the formative years of their lives, when values and standards are being formed, and they have the highest rates of PIU [71]. In that case, prevention initiatives should be introduced in schools, particularly in elementary schools, which teachers are frequently on the front lines of identifying potentially bad habits [72].

Researchers suggest that adolescents' teachers should focus on the development of certain skills in those at risk of PIU, but one of the main characters of one's PIU prevention remain parents, significant others, or even peers.

The specific skills for preventing PIU can be divided into four categories: (a) skills associated with internet use, such as self-control, and the ability to recognize the maladaptive thoughts associated with addictive behaviour [73, 74]; (b) abilities associated with managing stress and emotions, including the development of individual coping mechanisms, less aggression, and increased self-esteem [75, 76]; (c) interpersonal skills: decreased interpersonal sensitivity, and

the ability to communicate face to face and carry conversation with peers [75]; (d) skills related to one's daily routine and leisure activities: maintaining sleep schedule, participating in group and free-time activities [77]. Therefore, maintaining presented skills are vastly relevant to prevent or reduce the chance of one's PIU.

### CONCLUSIONS

Problematic internet use (PIU) is an ever-growing issue in a modern society and the number of internet users increases globally every year. It has been observed that male internet users are more prone to get addicted using it. The COVID-19 pandemic has also contributed to the growing scale of PIU. During the past couple of years, studies reveal that prevalence of PIU was higher during the COVID-19 pandemic than reported before the pandemic. Inseparable part of PIU is neurobiological and psychological constitutions, moderators, such as coping styles and internet-related cognitive biases. Furthermore, person's environment, personality traits and on-going mental issues play a significant role in developing PIU. Despite the fact, that scientist and media has paid attention to this issue, the treatment of PIU has not yet been systematized. According to scientists, psychological and pharmacologic treatments have been found to be very promising in the treatment of PIU. Prevention of the PIU primarily should be introduced in schools, particularly elementary schools, considering that problematic use of internet strongly prevalent among children and adolescents and if not applied could lead one to serious health issues.

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