Cyberspace and Related Threats

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Abstract:

Purpose: The study encompasses the characterization of cyberspace, and the threats present on the Internet. Furthermore, the changes resulting from the development of information technologies are presented, with particular emphasis on the scale of the phenomenon. The authors elucidate the distinction between the Internet and cyberspace, as well as the origins of the term "cyberspace," which continues to evoke criticism within the scientific community and poses challenges in terms of definition. The authors also address the hazards associated with Internet usage, categorizing them as physical, psychological, social, and dependencies on cyberspace.

Design/Methodology/Approach: Taking into account the magnitude of the phenomenon, the subject of investigation for this study is defined as security threats in cyberspace. Adhering to the theoretical principles of research goal specification, the aim of this study is to present the threats and their impact on cybersecurity in cyberspace. The aforementioned objective is achieved by utilizing theoretical information from the literature on the subject and conducting original research. The primary research problem adopted for this study is as follows: What are the most influential threats to cybersecurity in cyberspace, and what countermeasures exist to mitigate these threats? Accordingly, the following hypothesis is formulated in response to the research problem: Each type of threat carries significant consequences, and it is imperative to counteract these threats through appropriate Internet usage practices. The research employs a methodology that involves literature analysis, the examination of legal acts related to cyber security, detailed analysis of data from the "Teenagers 3.0" nationwide study conducted by NASK – a National Research Institute, as well as synthesis. The authors' existing knowledge on this issue is also taken into account.

Findings: The immense potential of opportunities inherent in cyberspace can bring numerous benefits in various aspects of everyday life, particularly for teenagers who seek answers to many pressing questions. However, cyberspace can also pose numerous threats, including those in the physical, psychological, and social spheres. There is a low societal

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awareness regarding cyber threats, as well as low effectiveness in preventing cyber addictions.

Practical implications*: The article identifies security threats in cyberspace. The authors address this issue in the context of the occurrence of physical, psychological, and social risks among teenagers, as well as youth's dependency on cyberspace, the Internet, and computer games.*

Originality/Value: *The authors present how the development and widespread use of the Internet influence the creation of the phenomenon of virtualization of reality, which manifests itself in attitudes and behaviours, especially among the younger generation, not always positive. Based on the analysis of literature on the subject and conducted research in this area, one can observe a low effectiveness of the existing prevention of cyber addictions and other media pathologies, currently recognized as diseases/civilizational plagues. Therefore, it is crucial to systematically address this issue from a theoretical and empirical perspective.*

Keywords: *Security, cyberspace, computer, human resources, behaviours, teenagers, threats.*

JEL codes: *K24, K23, M14.*

Paper type*: Research article.*

1. Introduction

With the dynamic development of technology over the years, the concept of cyberspace has undergone significant changes. It is one of the main changes in the security environment, bringing forth entirely new threats, and thereby requiring new regulations to ensure the security of not only the state and institutions but also the youngest users.

In the era of advancing computerization, an increasing number of people have access to the Internet. New communication technologies are constantly transforming the world around us. Traditional forms of leisure time activities are being replaced by new ones. Instead of spending time outdoors, most individuals are spending more and more time in cyberspace, a new virtual reality. In this cyberspace, the entire society, regardless of their place of residence, can freely access a wide range of information, exchange views with individuals hundreds of kilometres away, or process data on various topics.

However, the wide accessibility of the Internet brings many challenges, as it can often be exploited for illegal purposes. Open access to cyberspace means that there are numerous threats online. Children, whose minds are still developing, are particularly vulnerable to these threats. Inappropriate content can be harmful to them, leading to serious disorders and health problems of both psychological and physical nature.

Therefore, adherence to basic security principles, education within the environments in which children reside, and effective control over the materials they access become crucial.

2. Cybersecurity as a Component of Public Safety

Previously, the lack of access to modern devices resulted in people spending more time together. Activities and evenings spent together were popular. As a result, children had the opportunity to interact with different individuals and learn to live in a group. Over time, everything has changed with the introduction of modern devices and information technologies. Today, the majority of people spend their time in front of a computer (Andrzejewska *et al.,* 2011). The constant technological progress changes our world on multiple levels every day. This brings both benefits and risks.

Increasingly advanced information technology, which was recently just a creation of novel authors, is now used on a daily basis by millions of cyberspace users. The use of social media platforms, various messengers, and banking services is becoming widespread. The growing possibilities offered by the Internet gradually lead to the virtualization of reality. Cyberspace is exposed to increasingly "sophisticated" and specific threats, thereby increasing the risk to privacy among a growing community of users (Kopczewski *et al.,* 2022).

A hallmark of the 21st century has become the collection and processing of information about users and their activities. The following compilation presents the scale of the phenomenon:

- the world population exceeds 7 billion, and over 2.5 billion of them use the Internet,
- there are over 5 billion active mobile phone numbers worldwide,
- the number of Internet users in Poland is approximately 24 million,
- the average Internet user spends 16 hours per month online, which globally amounts to approximately 35 billion hours per month (equivalent to approximately 4,000 years online for each calendar month),
- the value of online sales in the USA reached 50 billion dollars in the first quarter of 2012,
- the Google search engine receives over a billion queries daily,
- the number of accounts on the Facebook platform exceeds one billion, with over 10 million of them belonging to users from Poland,
- every second, another hour of video content appears on the YouTube platform,
- in the game Farmville (part of the Facebook platform), approximately 500,000 tractors are sold every day,
- in the real world, the company John Deere sells 5000 agricultural machines annually (Wasilewski, 2013).

The above data illustrates the scale of the phenomenon. It raises awareness of the extent to which many individuals spend their lives in front of a computer or other portable device with internet access. Some are willing to pay thousands of dollars for

an item available only in a virtual computer game. Others use the number of people invited to their social media network as an indicator of social status. For the majority of people, the internet is a fundamental and fastest source of information, offering new possibilities for providing various types of services.

Thus, the concept of "cyberspace" has emerged as a place of broad activity on multiple levels. It encompasses gaming environments, online stores, and websites where individuals are represented by avatars (Wasilewski, 2013).

It has emerged due to the development of computer networks, but contrary to common belief, it is not synonymous with the Internet. Based on the assumptions of the Government Program for the Protection of the Cyber Space of the Republic of Poland for the years 2011-2016, the definition of cyberspace is as follows: "Cyberspace - a digital space for processing and exchanging information created by teleinformatics systems and networks, along with their connections and relationships with users" (Ministry of Internal Affairs and Administration, 2010; Government Program for the Protection of the Cyber Space of the Republic of Poland for the years 2011-2016).

In 2013, this definition was expanded in the Policy for the Protection of the Cyber Space of the Republic of Poland, where it states: "a space for processing and exchanging information created by teleinformatics systems, as defined in Article 3 point 3 of the Act of 17 February 2005 on the computerization of entities implementing public tasks (Journal of Laws No. 64, item 565, as amended), along with their connections and relationships with users" (Ministry of Internal Affairs and Administration, 2010; Government Program for the Protection of the Cyber Space of the Republic of Poland for the years 2011-2016).

Over the past two decades, numerous definitions have emerged attempting to define what cyberspace is. Some portray the essence of its functioning in great detail, addressing both technical and social aspects, providing a comprehensive approach. Others, on the other hand, present more general descriptions, often addressing the principles of operation in abstract terms.

The existence of these various definitions highlights a lack of consensus within the scientific community on objective matters such as technical properties. Some argue that devices not connected to a network do not belong to cyberspace, while others point to the immaterial nature of the network.

Considering such perspectives, a valid definition was provided by Aleksander Melnitzky, who indicated that the virtual network serves as a global channel surpassing physical limitations and consists of devices transmitting signals. In this understanding, cyberspace extends beyond physical space but remains directly embedded within it through teleinformatics infrastructure. An example illustrating this interdependency is the attempt of a user to access a website, for which the user

employs devices such as a computer keyboard and mouse to enter a domain address (Ministry of Internal Affairs and Administration, 2010; Government Program for the Protection of the Cyber Space of the Republic of Poland for the years 2011-2016).

In summary, it should be noted that although cyberspace is not a recent creation, it poses certain legal difficulties in accurately defining the virtual space in question. While intuitively identifying specific properties of the network does not pose significant problems, from the perspective of governmental administration, it is immensely important to define cyberspace and cyberspace security for the entire process of ensuring the protection of networks within our country's territory (Wasilewski, 2013).

3. Threats Associated with the Use of the Internet

The rapid development of modern technologies has made the Internet accessible to almost everyone. While new technologies provide us with increasing possibilities, they are also used for practices that are incompatible with the law. Many of the threats present in the world around us have transferred to the virtual world as a result of the emergence of the Internet.

In addition to the family and peers, the Internet has now become an essential educational tool, exerting a more systematic and continuous influence compared to other areas of social functioning. At the same time, serious risks arise from overactivity in the online realm and addiction to it, especially among teenagers, including the so-called digital natives of Generation Y (Solecki, 2017).

Therefore, it is important to ensure adequate protection against these dangers (NASK - National Research Institute, Teenagers 3.0. Report on nationwide student research, 2021). The widespread use of the Internet by children and adolescents is associated not only with a range of benefits but also with real risks. In response to the questions posed in the "Teenagers 3.0" nationwide student research report:

a) "Have you personally experienced cyberbullying?" - Teenagers
b) "Has your child experienced cyberbullying?" – Parents

The respondents provided the following answers (Figure 1).

One in five male and female students declare that they have experienced cyberbullying. 20% of the respondents answered, "hard to say", which may indicate a lack of understanding of the phenomenon, unwillingness or openness to respond, or a desensitization to online aggression. Direct experience of online violence does not apply to only half of the participants (56.2%). As many as 75% of parents claim that their children have not experienced cyberbullying, while 15% admit to having no knowledge on the subject.

Figure 1. *Experience of cyberbullying on the Internet*
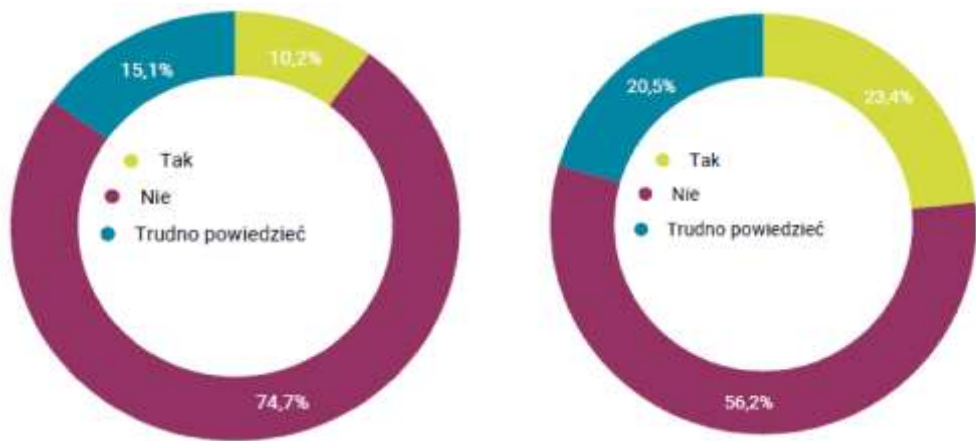
While 23% of children declare that they are familiar with this phenomenon from personal experience, only a fraction of parents (10%) is aware of it (NASK - National Research Institute, Teenagers 3.0. Report on Nationwide Student Research, 2021). The lack of knowledge among adults about their children's negative online experiences may result from a low awareness of cyber threats. The following are types of threats and addictions present in cyberspace.

4. Physical Threats

Prolonged computer use can lead to eye damage. As a result of the action of the electrostatic field, a person is bombarded with dust particles, which can cause allergic reactions, irritation, or redness of the eyes. Another symptom can be eye fatigue manifested by a loss of visual acuity, the appearance of foggy vision, or a change in colour perception, known as dry eye syndrome, which can eventually lead to total vision loss.

The use of virtual helmets by the younger generation, which generate harmful three-dimensional images, is also a significant threat to eye health (Izdebska, 2007). Furthermore, improper lighting can cause the eye muscles to adjust to the significant discrepancy between the display and the surrounding environment, which can lead to the occurrence of screen epilepsy. Excessive light emitted from colourful, highly saturated monitors can disrupt the proper functioning of brain activity. This is particularly dangerous for young individuals whose nervous system is still in the developmental phase:
(http://www.erainformatyki.pl/skutki-uzaleznienia-od-internetu.html).

Continuous sitting can affect the skeletal system, posture problems, and hinder psychomotor development. Lack of movement can lead to a condition known as "television disease," characterized by obesity, spinal deformities, sunken chest, and decreased physical fitness. Repeating the same movements frequently can result in overloading of the hands, wrists, arms, and neck. Improperly fitting keyboards or mice can further strain the musculoskeletal system and may lead to neck pain and wrist stiffness.

Additionally, there can be problems with the nervous system, manifested by excessive excitability, lack of focus, depression, and sleep disturbances (Izdebska, 2007).

5. Physical Threats

The human psyche is highly sensitive due to its complex structure. Children are particularly vulnerable to its damage. Excessive exposure to stimuli from cyberspace can have a highly negative impact on its functioning, leading to transient or lasting psychological disorders characterized by a phobic fear of people and aggression (Kopczewski, 2012).

Excessive computer use can even result in the stunting of a child's development. Often, children are unable to transcend the realm of images found on the Internet and connect the experiences gained online with their own real life. This leads to desensitization to violence in everyday life and a constant increase in hostility. Individuals who had contact with computer games during childhood were found to exhibit significantly higher levels of aggression towards others, especially in conflict situations, and were more likely to engage in criminal behaviour.

Computer games, particularly online ones, have a detrimental influence that manifests as an increased need for autonomy or self-expression. Non-gaming children can be characterized as individuals with heightened aggression, self-assuredness, and a tendency to evade responsibility. They may exhibit traits indicative of narcissistic personality, such as a sense of their own uniqueness and perfection (Przybysz-Zaremba, 2005).

Those who kill in the virtual world and then restart by pressing the appropriate key fall into the trap of a distorted reality, blurring the image of the real world (http://www.erainformatyki.pl/skutki-uzaleznienia-od-internetu.html). Children who spend time in cyberspace are often exposed to a sense of "cyber-loneliness," which is often illusory. They present virtual reality as a better alternative where they can spend a lot of time before eventually transitioning to a world of fantasy. This can result in the emergence of delusional states, with young individuals believing in their unlimited animation capabilities that allow them to control their environment.

Conversely, breaks from Internet usage can lead to the occurrence of "withdrawal hunger," characterized by impatience and worsened mood. Individuals who abuse virtual games and the Internet exhibit low emotional expressiveness, with their displays of emotion being superficial and shallow. They experience anxiety, which hinders interpersonal connections and leads to impulsive behaviours. Another concerning issue is the thinking patterns of addicted individuals, who view people as objects serving their own goals and as entities that can be deceived (Przybysz-Zaremba, 2005).

The Internet contains numerous psychologically harmful contents for young individuals, such as websites dedicated to suicide, some of which encourage its commission. There are also popular websites with discriminatory themes that promote intolerance and hatred. Exposure of young minds to such content can lead to serious psychological problems (Skowroński, 2013).

6. Social Threats

Virtual space expands the scope and nature of interpersonal contacts through computers and other technical devices. In today's world, it is possible to communicate with anyone worldwide through appropriate social media platforms or email.

There is an opportunity to connect with support groups as well as users who intentionally hide their identities. The Internet, as a wide communicative medium, creates significant opportunities for anonymity and manipulation of identity, posing a significant threat to unaware children. Extensive communicative possibilities have paved the way for pathological phenomena such as pornography and paedophilia.

Many individuals exploit the potential offered by new technology for their own selfish purposes, often with destructive implications for the psychosocial development of the younger generation. The Internet, as a space for engaging entertainment and the possibility of escaping reality, offers what is seemingly unattainable in the real world. It presents a fictional realm that appears more captivating and perfect than reality.

The influence of the misleading perception of the world created by programmers can lead to an inability of distinguishing between right and wrong, thereby resulting in thoughtless actions suggested by ubiquitous media. Individuals experiencing challenges in interpersonal relationships or negative experiences seek solutions to their problems by escaping to the virtual realm, which can exacerbate the current situation.

This, in turn, creates a vicious cycle. It is important to remember that the Internet is an intermediary medium of communication, characterized by anonymity, which frees children from social control. Young individuals have the ability to provide

arbitrary information, altering their gender, age, and social role at any given moment. These possibilities detach users from the real world. Fantasy games, in particular, have a significant impact, as they allow individuals to spend hours as someone different from their real-life identity. This can lead to the breakdown or weakening of interpersonal bonds and foster a distorted sense of self-identity. Consequently, children may become completely immersed in the virtual world (Izdebska, 2007).

Inappropriate computer use resulting in antisocial behaviour in children leads to the development of personality disorders and detachment from the real world, often accompanied by a significant weakening of family bonds. Children lose interest in their immediate surroundings, communication diminishes, and they become disoriented in the real social world.

The internet has a substantial impact on the manner and scope of communication. In today's world, communication largely takes place indirectly through appropriate devices. Instead of spending time engaging in face-to-face conversations in the real world, young people sit in front of the computer, where they often remain anonymous and use the computer keyboard for communication. These new communication devices do not destroy social bonds but rather influence a shift in the communication formula, which harbours many dangers (Izdebska, 2007).

7. Addiction to Cyberspace

Modern technologies have led to the emergence of modern threats associated with addictions. They are particularly dangerous because individuals using these devices may not realize when they become absorbed by the network and have difficulty extricating themselves. This problem affects everyone, especially the youngest individuals (http://www.powiat.bielsko.pl).

A young child, whose psyche is not yet fully formed and who is left to their own devices, will struggle with the proper perception of content flowing from cyberspace. Human beings are highly susceptible to various forms of addiction and can become addicted to practically anything. While addictions to alcohol, cigarettes, and drugs have long been recognized, contemporary society faces many more addictions related to modern technology. Addiction to computers or the Internet can develop. Addiction causes changes in the psyche, altering the psychological mechanisms of addiction without which individuals struggle to function. Such mechanisms include:

- Emotional regulation habit - initially, it involves using [technology] to improve one's mood, but over time, it becomes an escape into addiction.
- Illusion and denial - individuals deceive themselves, convincing themselves that it is not an addiction.

- Self-experience - individuals struggle to create a self-image. They are unable to view themselves in a relative manner. When they manage to regain mental sobriety, they experience depressive states (Kopczewski *et al.,* 2012).

8. Addiction to Computer Games

The computer, as one of the main hallmarks of the modern world, is a device with vast capabilities. Children can harness the immense potential of this device for educational purposes. The curiosity of young individuals is significant, indicating the need to control the time spent on the computer to limit the possibility of addiction. Leisure time can be spent outdoors instead of sitting in front of a monitor for hours.

Psychologists estimate that a child can safely use a computer for only one hour per day. Therefore, parental control is crucial. The abundance of computer games of various themes exposes children to the dangers of cyberspace at a rapid pace. To prevent this, children should utilize the computer appropriately, engaging in educational or recreational programs that help avoid the unpleasant consequences of addiction (Kopczewski *et al.,* 2012).

Computer games provide an engaging form of entertainment that increasingly captivates young individuals with each passing day. Modern technology has enabled the creation of visually appealing graphics that closely resemble real-life scenarios, with little distinction from a video film. The attractiveness of this form of entertainment lies in the opportunity to participate in exciting adventures that are limited only by the imagination of the programmers.

The majority of computer games produced exhibit elements of violence, as they are often based on brutal and aggressive scenarios that greatly appeal to children. Moral values take a backseat in the gaming world, with the more brutal and rule-free the environment, the more captivating the computer game becomes. The virtual world exposes children to inappropriate behavioural patterns, stimulating their worst instincts (Andrzejewska *et al.,* 2013).

Symptoms of addiction include:

- an increasing desire to engage with the medium for extended periods of time,
- the emergence of irritability, excessive arousal, anxiety, and even depression when there is a disruption in contact with the used device,
- lies about the actual amount of time spent on the computer, futile attempts to stop,
- satisfaction and increased sense of self-worth resulting from participation in online games,

- limitation of other activities, detachment from everyday life problems,
- neglecting daily responsibilities, lack of willingness to meet with peers,
- emergence of family problems due to the use of a particular medium.

Figure 2 displays the devices predominantly utilized by adolescents for accessing the Internet.

Figure 2. *Devices commonly employed by adolescents for accessing the Internet: Adolescents and Parents*
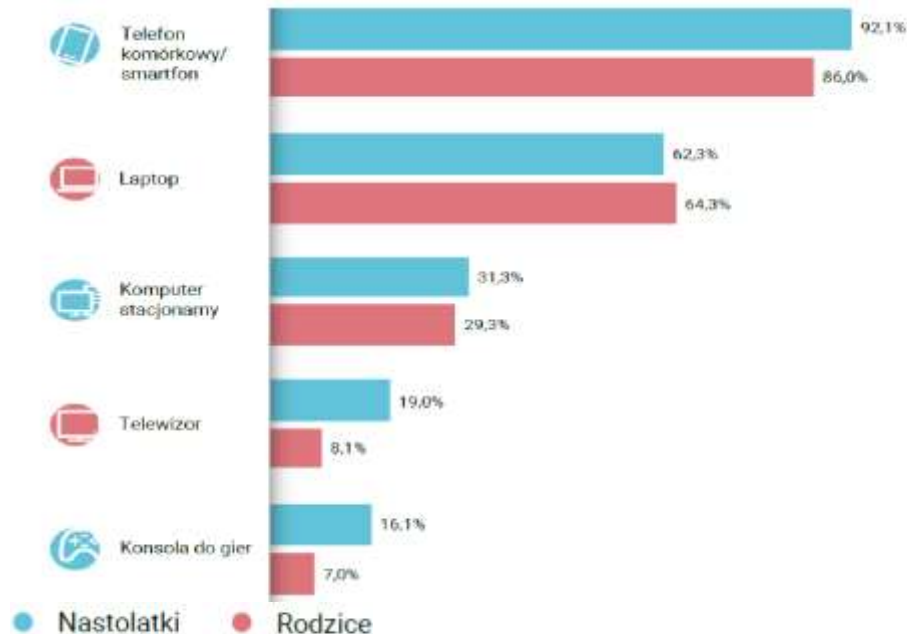
Source: *NASK - National Research Institute, Adolescents 3.0: Report on a Nationwide Research of Students, 2021.*

The popularization of Internet usage is directly related to the proliferation of computers, laptops, smartphones, tablets, and multimedia devices offering access to online content. Among these, adolescents primarily utilize smartphones and mobile phones (92.1%) for this purpose. The next most frequently used devices, in terms of frequency, include laptops (62.3%), desktop computers (31.3%), televisions (19.0%), and game consoles (16.1%).

An addicted individual considers games as the most important value, even surpassing basic physiological needs that may become burdensome during gameplay. In the case of computer games, committing an error allows for restarting with a new strategy, providing a sense of security. After completing a game, the user continues to think about it, seeking newer solutions and improving strategies. Often, they spend their free time using other mobile devices while still engaging in alternative solutions helpful to their main gameplay.

Addicted individuals collect materials related to games, such as magazines and t-shirts. Irrational computer usage leads to sleep problems, the occurrence of nightmares, and increased anxiety. Spending time in front of the computer is a passive activity that does not require leaving the house, promoting mental laziness and depriving young individuals of the ability to engage in abstract thinking. Individuals with addiction symptoms similar to anxiety disorders can appear at a very young age (NASK - National Research Institute, Adolescents 3.0: Report on Nationwide Research of Students, 2021).

9. Addiction to the Internet

The term "Internet addiction" began to emerge in the late 1990s, thanks to the work of Kimberly Young, who popularized this term. Alternatively, terms such as Internet Addiction Disorder, net addiction, cyber addiction, and cyber-dependency can be used interchangeably. As early as 1998, Kimberly Young categorized internet addictions into various types:

- Internet porn addiction involves the compulsive consumption of pornographic content.
- Internet relationship addiction, characterized by addiction to online relationships and interactions.
- Internet addiction, manifested by an incessant pursuit of new information, the involvement in newly emerged online games, the excessive use of online auctions, and so forth.
- Information overload, characterized by participation in various forums, obsessive search for new information, and compulsive browsing of databases.
- Computer addiction, manifested by a compulsion to use the computer.

Internet addiction is highly dangerous because its symptoms often resemble those of traditional substance addictions, such as alcohol addiction. Similar symptoms can also be observed in the case of computer game addiction. There are several factors that significantly contribute to the development of addiction. The most important ones include low self-esteem, genetic predispositions, a solitary lifestyle, and mental illnesses.

The most vulnerable group to addiction comprises introverts who struggle with social interactions. Addiction can also occur when an individual lacks developed communication skills and sees the use of social networking sites as an alternative to social life (Wojciechowska-Filipek *et al.,* 2016).

In academic literature, one can also come across terms such as "Internet overuse," "FOMO" (Fear of Missing Out), and "problematic Internet usage" (PUI) (NASK - National Research Institute, Adolescents 3.0: Report on Nationwide Research of Students, 2021). To investigate this phenomenon, the 18-item E-SAPS18 test was

utilized, and the test results were published by NASK in the "Adolescents 3.0" nationwide research report. Figure 3 illustrates the intensity of PUI indicators (PUI - problematic Internet usage).

Figure 3. *The intensity of PUI indicators (PUI - problematic Internet usage).*
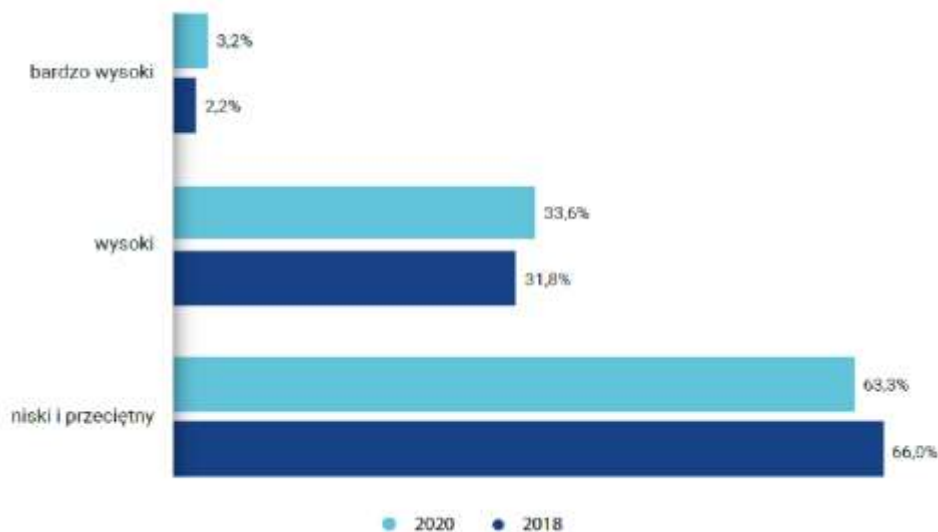
Source: *NASK – National Research Institute, Adolescents 3.0: Report on Nationwide Research of Students, 2021.*

The E-SAPS18 test consists of five subscales that measure specific components of PUI: tolerance (escalation of frequency and/or intensity of stimuli), positive anticipation (expectation of rewards), cyberspace (reduction of activities to the online realm), withdrawal (withdrawal symptoms), and somatic symptoms (perceived health effects).

The obtained test results indicate that one in three adolescents (33.6%) demonstrates a high intensity of PUI indicators, and three out of a hundred exhibit very high intensity (3.2%).

"Addictive behaviours are often subjectively experienced as a 'loss of control' - they appear despite conscious efforts to stop or reduce them. Immediate short-term rewards and later harmful and long-lasting consequences are typical. Attempts to change these behaviours - through therapy or personal initiative - are usually accompanied by a high relapse rate" (Griffiths, 2004).

Experts emphasize that internet addiction poses a significant psychopathological threat, requiring specialized therapies, and is classified as a mental disorder. It is predicted that in the future, internet addiction will become one of the plagues of the 21st century (Wojciechowska-Filipek *et al.,* 2016).

10.   Conclusion

The aforementioned risks are only the basic and most common consequences of a lack of control over a child's online activities. While the law protects children's privacy, it is also the responsibility of every parent to fully protect their children from various risks, particularly those related to the Internet.

It is important to remember that the Internet is not solely a place of threats, and therefore there is no need to fear this medium. Proper usage ensures wide access to information, making it a vast field for scientific activities. The Internet serves as a communication platform where young individuals can broaden their horizons, get to know new people, their cultures, and enjoy their time.

The enormous potential and opportunities in cyberspace can bring many benefits in various aspects of daily life, especially for children who can seek answers to their pressing questions about the world.

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