

Review article

Internet and computer addiction: "new age" disease of the 21st century

Snežana Medenica, Maja Račić, Vedrana Joksimović

Faculty of Medicine Foča, University of East Sarajevo, the Republic of Srpska, Bosnia and Herzegovina

Summary

The aim of this paper is to give a brief overview of research and the newest theoretical considerations on internet addiction classification and treatment. Over the past years we have been increasingly facing the so-called "new age" disease of internet addiction as a serious problem affecting numerous people, especially the young population who has made social networks and other internet contents a *modus vivendi*. A literature search was conducted for the purpose of locating information on prevalence, diagnosis and treatment of internet and computer addiction. Certain researchers and psychiatrists believe that the excessive internet use is a symptom of other disorders, such as depression and anxiety, or impulse control disorder. However, over the past few years a consensus has been reached that this constellation of symptoms is actually an addiction disorder. The American Society of Addiction Medicine (ASAM) has recently come up with a new definition, according to which addiction represents a chronic brain disorder. Consequently, the new American Classification of Mental Disorders (DSM-V) has introduced this form of addiction under the diagnostic category dubbed "cybernetic disorder". The field of internet addiction is advancing rapidly through its official recognition as a separate and distinct addiction disorder. Some individuals with internet addiction are at significant risk and merit professional care and treatment. There are several treatments available, but the primary prevention is the most effective intervention. Family practitioners and psychiatrists should be taught to screen their patients for this disorder.

Keywords: addiction, computer, internet, treatment

Introduction

Over the past years we have been increasingly facing the so-called "new age" disease of internet addiction as a serious problem affecting numerous people, especially the young population

who has made social networks and other internet contents a *modus vivendi*.

With the internet development, communication between people has become quick, easy and efficient, enabling us to access a large number of data at any given

Correspondence to:
Prof. Snežana Medenica, MD, PhD
Faculty of Medicine Foča
Studentska 4, 73330 Foča
medenicasnezana@gmail.com

moment, learn new information and knowledge, which we can then exchange with many others, regardless of where they are. Besides its use in business circles, the internet also enables us to socialize with other people via social networks. In our free time, available to us are numerous games and entertainment options, we can socialize with real-life people and establish numerous contacts. The internet is often used as a learning tool for doing school homework and book reports, for recreational purposes, internet surfing, listening to music and playing games [1].

Nowadays, to have a computer, to use it and to have access to the internet is an imperative and has become the chief instrument of communication, affecting all aspects of human life. Apart from numerous advantages the internet provides to us, there are also numerous negative consequences. The internet is being increasingly misused for recreational purposes, out of boredom, with excessive conversations, with virtual friends, and troublesome contacts are being established. Such use of the internet may have a negative impact on mental health, on social and economic functioning in the daily life of numerous users, and may usher them into the state of internet addiction [2].

The first forms of electronic addiction were reported back in the 1950s with first game (pinball) machines. In the 1980s there was an era of video-games, which here lasted until mid-1990s, when first computers and consoles appeared. Initial research in the field of internet addiction stems from the second half of the 1990s, and the number of documented studies on the subject has been growing ever since, in numerous countries such as Italy, Pakistan, Iran, Germany and the Czech Republic. Some of the most interesting research on internet addiction has been published in South Korea. Using data from 2006, the South Korean government estimates that approximately 210,000 South Korean children (2.1%; aged 6–19) are afflicted and require treatment [3,4]. About 80% of those needing treatment may need psychotropic medications, and perhaps 20% to 24% require hospitalization [5]. In their review Weinstein and Lejoyeux [1] report that surveys in the United States and Europe have indicated prevalence rates varying between 1.5% and 8.2%. Other reports place the rates between 6% and 18.5%. In the United States, despite

a growing body of research, and treatment for the disorder available in out-patient and in-patient settings, there has been no formal governmental response to the issue of internet addiction [6].

In terms of terminology there is a significant heterogeneity. Dr Ivan Goldberg, American psychiatrist, for the first time used the term “internet addiction” in 1995, defining it as a pathological urge to use the internet [7,8]. Later on, we have had a series of terms referring to this internet-use-related phenomenon: “problematic internet use,” “pathological internet use,” “compulsive internet use” and “excessive internet use.” The terms internet addiction and pathological internet use have been used interchangeably and have been identified by the Diagnostic and Statistical Manual (DSM) IV based on the definition of addiction and pathological gambling disorders [9].

Certain researchers and psychiatrists believe that the excessive internet use is a symptom of other disorders, such as depression and anxiety, or impulse control disorder. However, over the past few years a consensus has been reached that this constellation of symptoms is actually an addiction disorder. The American Society of Addiction Medicine (ASAM) has recently come up with a new definition, according to which addiction represents a chronic brain disorder, adding that all types of addiction, chemical or behavioral, share certain characteristics, including compulsive use or loss of control, mood swings, stress alleviation, tolerance, abstinence crisis and continued use despite detrimental consequences [10]. Consequently, the new American classification of mental disorders (DSM-V) has introduced this form of addiction under the diagnostic category dubbed “cybernetic disorder.” Apart from internet addiction, it also includes all forms of misuse of modern technical devices, such as mobile phones, computers and video games [11].

Neurobiological bases of internet addiction. Structures have been identified in the brain that are in charge of generating reward and punishment, or comfort or discomfort, while the larger part of neocortex and thalamus is neutral in that regard. Brain regions of reward and punishment are significant regulators of our behavior [12].

Mechanisms of positive and negative reinforcement have been discovered through experiments when electrical power was used to stimulate the reticular formation of the rat brain stem, and when an electrode was by mistake implanted into the septum, after which it kept coming back to the area where it was electrically stimulated. If rats could choose between food and electrical stimulation of these areas, in 80% of the cases they chose electrical stimulation, so that almost incessantly they kept pressing the lever which triggered it, even when for days they received so little food to barely survive, and sometimes even until they dropped down with exhaustion, without ever stopping to eat, drink or sleep. If an animal has to cross an electrically charged grid and suffer electrical shocks in order to get electrical brain stimulation accompanied by reinforcement, it will endure more intensive shocks when the reward is electrical stimulation than food/water. Investigations have shown that rat mothers abandon their offspring in order to press the lever enabling a rewarding electrical stimulation of brain regions, even though in normal circumstances they do not part from them for a single moment [13].

Positive reinforcement (reward) increases the probability of a response, and those include almost all events that make us happy/content. These effects may be obtained by the stimulation of: ventral tegmental area (VTA), posterior and lateral hypothalamus, preoptic area, septum (ncc accumbens), hippocampus, gyrus cinguli, parts of temporal and frontal cortex, while they are most visible when the electrodes are in the dopaminergic medial forebrain bundle (MFB) of the associative brain stem pathway connecting the midbrain, limbic system and cortical areas.

In animals, the discomfort (negative reinforcement) is caused by electrical stimulation of cholinergic periventricular fibers parallel with the MFB, and the diffusely distributed sites in the amygdalae, hippocampus, thalamus, hypothalamus and PAG (periaqueductal grey matter), while some of them match the pain transfer pathways. In humans, stimulating these structures provokes poorly defined sensations of anxiety, fear, frustration and unease.

Lying in the basis of addictive behavior, including internet addiction, is an excessive activation of the pleasure system in situations

when we are exposed to the medium, and/or excessive activation of the punishment system when we are not. This results in a repetitive activation of behavioral patterns that include the use of internet [14,15].

Dopamine is a catecholamine, adrenalin and noradrenalin precursor, which acts as a neurotransmitter in the CNS. The reward areas are rich with dopaminergic neurons. Dopaminergic neurons are localized in mid-brain structures - substantia nigra (SNc) and (VTA). Their axons get all the way to the striatum (nucleus caudatus, putamen and striatum ventralis with nucleus accumbens), and dorsal and ventral prefrontal cortex. Additional brain structures, part of the reward center, comprise the frontal lobe motor area, part of the temporal lobe, globus pallidus and subthalamic nucleus. Assumed here is a significant role (excessive or insufficient activity) of other neurotransmitter systems, serotonin, noradrenergic, opioid systems in the formation of the neurobiological basis of this type of disorder [16,17].

The individual character of addictive behavior suggests the need for a consideration of the genetic basis, in terms of the polymorphism of proteins involved in the functioning of these neurotransmitter systems [13,18].

Criteria for diagnosing internet addiction.

Internet addiction means a lasting problematic use of computers, causing distress or diminished functioning in important areas of life, and is believed to be an impulse control disorder. It causes neurological complications, mental disturbances and social problems.

The following criteria are important for diagnosing internet addiction:

1. Excessive internet use often linked with the loss of track of time or neglect for basic obligations. Certain investigations have shown that if someone spent more than 38 hours on the internet per week, or almost 6 hours a day, then without a doubt he has already become an addict. Realistically speaking, anyone who spends "a mere" 4 hours a day doing the internet-related activities, which is no more than 28 hours a week, has already stepped deeply into addiction.
2. Abstinence syndrome - occurs after the cessation or reduced use of the internet, and the symptoms most often include

Table 1. Criteria for diagnosing internet addiction

1	Preoccupation: a strong desire for the internet. Thinking about previous online activity or anticipation of the next online session. Internet use is the dominant activity in daily life
2	Withdrawal: manifested by a dysphoric mood, anxiety, irritability and boredom after several days without internet activity
3	Tolerance: more and more time spent on the internet to achieve initial pleasure
4	Difficult to control
5	Disregard of harmful consequences: continued excessive use of internet despite knowledge of having a persistent or recurrent physical or psychological problems likely to have been caused or exacerbated by internet use
6	Social communications and interests are lost: loss of interests, previous hobbies, entertainment as a direct result of, and with the exception of, internet use
7	Alleviation of negative emotions: uses the internet to escape or relieve a dysphoric mood (e.g. feelings of helplessness, guilt, anxiety)
8	Hiding from friends and relatives: deception of actual costs/time of internet involvement to family members, therapist and others

anxiety, obsessive thoughts, internet pre-occupation, tremor, involuntary movements, psychomotor agitation, withdrawal, including the feeling of anger, tension and/or depression when the computer is not available.

3. Tolerance – more and more time is spent on the internet to achieve initial pleasure (which previously required less time to achieve), including the need for a better computer equipment, more software or the need to spend more hours at the computer.
4. Feeling of fatigue and nervousness, and the person's state of irritation while „offline“; internet access much longer and much more often than planned, continuous wish to reduce time spent on the internet.
5. Offline addiction – the time the person does not spend on the network is used for internet-related activities.
6. Withdrawal of symptoms when the internet game is taken away (symptoms are described as irritability, anxiety or sadness, but without physical signs).
7. Reduced interest in previous hobbies and entertainment.
8. Deceiving family members and therapist as to the amount of time spent playing games.
9. Continuously excessive internet use despite awareness of possible psychological problems.
10. Detrimental consequences, including arguments, lying, poor results at school

or at work, social isolation and fatigue, chronic lack of sleep, reduced efficiency at school, at work, health problems.

It is important to note that the symptoms persist for 12 months or that there exist 5 or more signs [11,19].

Persons who spend too much time at the computer neglect healthy lifestyles, so that in accordance with the above they tend to cut short their sleeping time, thus disturbing the sleep and awake cycle, and they pay no attention to the quality of their diet [20,21,22]. The sedentary position at the computer is related to reduced physical activity and pain in the back, neck, shoulders and arms, thus increasing the risk of developing the carpal tunnel syndrome and listlessness that may lead to obesity [22]. Due to the constant typing on the keyboard, persons who spend too much time at the computer may develop „cybervibrations“ or psychomotor agitation and finger movements that resemble poking at the keyboard, and are present even when the person does not sit at the computer. Also reported are vision disturbances (dryness, burning sensation or excessive eye narrowing, blurred and unclear vision) as well as migraine headaches. All the foregoing symptoms suggest physical internet addiction [14].

Types of internet addiction. Considering the contents and activity, the addicts are divided in the following groups [14]:

1. **Cybersex obsession** – compulsive keeping, online review or exchange of

pornographic contents, including all forms of interaction. The mere need for a constant sexual stimulation does not necessarily have to be related to sexual problems in reality.

2. **Cyber-related addiction** – persons who compulsively start new, virtual relationships, replacing real ones, in the form of chat rooms, forums, online conversation or via electronic mail, which may seriously undermine private life. Online relationships or virtual friends often become more important than real ones, than real-life partners and relatives, which leads to family disagreements, break-ups of partner relationships or marriage divorces.
3. **Net compulsions** – include a broad scope of behavior comprising the use of web casinos, playing interactive web games, participation in internet auctions or internet stock markets, which may have negative consequences for social relationships, school or work, and may cause an individual to suffer significant financial losses. These games most often include two or more players, usually playing against each other. The players may be in different parts of the world, and the game is taking place in real time. Besides playing the game itself, the users mutually exchange experiences related to certain games, they have their own leagues, and follow the latest trends in the world of computer games.
4. **Information overload** – pertains to the pathological compulsive behavior characterized by intensive web surfing and online database searches with the aim of collecting information and their categorization. These users spend more and more time searching data, and on their collection and classification, which often reflects negatively on the workplace efficiency. The pathological use of forums and electronic mail – the Mailholism – is related to those persons who excessively communicate with others via internet, who keep checking electronic mail, forward news of jovial character to their friends and acquaintances, who log in the forums over ever decreasing intervals in order to check whether there are

some newly arrived news or topics, or to comment on the same subjects using new messages.

Internet addiction should be distinguished from the normal use of computers, even though sometimes it is difficult to draw a clear line. Whichever way we look at it, whether we first notice a mental disturbance and then internet addiction or the vice-versa, it is inevitable that they may develop a problem of “cybernetic disorder,” or internet addiction. The task that lies ahead of the professionals is to create strategies to deal with cyber-communication in order to help prevent and resolve issues caused by internet communication [2].

Internet addiction treatment. Internet addiction treatment does not essentially differ from alcoholism, drug addiction or pathological gambling treatment, especially the gambling, with which it has marked similarities. The treatment lasts for a year and the only difference in relation to the other three disorders is that during the internet addiction treatment the object of addiction may actually be used, which means the computer or the internet, but only in a useful and creative manner [23].

Treatment is conducted individually and in groups. After the initial contact with the patient, it is necessary to determine the cause of addiction. Those who have used the internet excessively must be advised and properly trained so that they could start using the internet moderately, while controlling the time spent at the computer. In case of patients escaping from real life into the virtual one for various psycho-social reasons, or mental patients, it is real life problems that need to be addressed (treatment of asocial and delinquent behavior, mental disorder treatment), by including psycho-social therapy, occupational-work and sports-recreational therapy, as well as training and advising sessions.

Despite the general lack of treatment studies notwithstanding, there are treatment guidelines reported by clinicians working in the field of internet addiction. Young offers some treatment strategies which are already known from the cognitive-behavioral approach: (a) practice opposite time of internet use (discover patient's patterns of internet use and disrupt these patterns by suggesting new schedules),

(b) use external stoppers (real events or activities prompting the patient to log off), (c) set goals (with regard to the amount of time), (d) abstain from a particular application (that the client is unable to control), (e) use reminder cards (cues that remind the patient of the costs of internet addiction and benefits of breaking it), (f) develop a personal inventory (shows all the activities that the patient used to engage in or cannot find the time due to internet addiction), (g) enter a support group (compensates for a lack of social support), and (h) engage in family therapy (addresses relational problems in the family). Unfortunately, clinical evidence for the efficacy of these strategies is not mentioned [6,24].

Some authors found that internet addiction could be very resistant to treatment, entails significant risks and has high relapse rates. Moreover, it also makes comorbid disorders, such as depression or anxiety disorders less responsive to therapy [25,26].

Most important is prevention, in the framework of which people are supposed to be informed about the ways to recognize excessive use of the internet as well as possible symptoms. Once we are aware of the problem, it is important to find the right cause, why we are escaping from real life. When the cause has been established, it is necessary to come up with an idea as to how to solve the real-life problem, instead of escaping into the virtual world. During internet addiction treatment, no sudden disruption of internet use is recommended, but rather a breaking of the internet

habit by reducing, daily, the time spent at the computer by half an hour or an hour until one has reached a reasonable amount of time spent at the computer, without neglecting other social activities.

Conclusion

The field of internet addiction is advancing rapidly through its official recognition as a separate and distinct addiction disorder. Despite some obvious differences with respect to the methodologies, cultural factors, outcomes and assessment tools, the encountered prevalence rates of this disorder are generally high and sometimes alarming. The development and maintenance of internet addiction takes into account different socio-cultural factors, biological vulnerabilities, psychological predispositions and specific attributes of the internet to explain "excessive engagement in internet activities". Some individuals with internet addiction are at significant risk and merit professional care and treatment. There are several treatments available, but the primary prevention is the most effective intervention. Family practitioners and psychiatrists should be taught to screen their patients for this disorder. The further research effort aimed at understanding the nature of this condition and treatment strategies is necessary.

The authors declare no conflicts of interest.
Autori izjavljaju da nemaju sukob interesa.

References

1. Weinstein A, Lejoyeux M. Internet addiction or excessive Internet use. *Am J Drug Alcohol Abuse* 2010;36(5):277-83.
2. Block JJ. Issues for DSM-V: Internet Addiction. *Am J Psychiatry* 2008;165(3):306-7.
3. Choi YH. Advancement of IT and seriousness of youth Internet addiction. In: *International Symposium on the Counseling and Treatment of Youth Internet Addiction 2007*. Seoul, Korea: National Youth Commission; 2007. p. 20.
4. Koh YS. Development and application of K-Scale as diagnostic scale for Korean Internet addiction. In: *International Symposium on the Counseling and Treatment of Youth Internet Addiction 2007*. Seoul, Korea: National Youth Commission; 2007. p. 294.
5. Ahn DH. Korean policy on treatment and rehabilitation for adolescents' Internet addiction. In: *International Symposium on the Counseling and Treatment of Youth Internet Addiction 2007*. Seoul, Korea: National Youth Commission; 2007. p. 49.
6. Cash H, Rae CD, Steel AH, Winkler A. Internet Addiction: A Brief Summary of Research and Practice. *Curr Psychiatry Rev* 2012;8(4):292-8.
7. Young KS. Internet addiction: the emergence of a new clinical disorder. *Cyber Psychology & Behavior* 1998;1(3):237-44.
8. Young KS. *Caught in the net: how to recognize the signs of Internet addiction and a winning strategy for recovery*. 1st ed. New York: Wiley; 1998.
9. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition-DSM-IV-TR*. Washington: American Psychiatric Association; 2000.

10. American Society of Addiction Medicine. Public Policy Statement: Definition of Addiction. 2011. Available at: http://www.asam.org/docs/public-policy-statements/1definition_of_addiction_long_4-11.pdf Accessed February 19, 2015
11. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. DSM-V. Washington: American Psychiatric Association; 2013.
12. Grant JE, Brewer JA, Potenza MN. The neurobiology of substance and behavioral addictions. *CNS Spectrums* 2006;11(12):924-30.
13. Linden DJ. *The Compass of Pleasure: How Our Brains Make Fatty Foods, Orgasm, Exercise, Marijuana, Generosity, Vodka, Learning, and Gambling Feel So Good*. New York: Viking Adult; 2011.
14. Young KS, Nabuco de Abreu C. *Internet Addiction: A handbook and guide to evaluation and treatment*. New Jersey: John Wiley & Sons Inc; 2011.
15. Amichai-Hamburger Y, Ben-Artzi E. Loneliness and Internet use. *Comput Human Behav* 2003;19(1):71-80.
16. Bai YM, Lin CC, Chen JY. Internet Addiction Disorder Among Clients of a Virtual Clinic. *Psych Serv* 2001;52(10):1397.
17. Ko CH, Liu GC, Hsiao S, et al. Brain activities associated with gaming urge of online gaming addiction. *J Psychiatr Res* 2009;43(7):739-47.
18. Eisen S, Lin N, Lyons M, et al. Familial influences on gambling behavior: an analysis of 3359 twin pairs. *Addiction* 1998;93(9):1375-84.
19. Baer DJ, Corado J. Heroin addict relationships with parents during childhood and early adolescent years. *J Genet Psychol* 1974;124:99-103.
20. Ceyhan E. Predictors of problematic Internet use on Turkish university students. *Cyberpsychol Behav* 2008;11(3):363-6.
21. Zsolt D, Beatrix S, Sandor R. The three-factor model of Internet addiction: The development of the Problematic Internet Use Questionnaire. *Behav Res Methods* 2008;40(2):563-74.
22. Wieland DM. Computer addiction: Implications of Nursing Psychotherapy Practice. *Perspect Psychiatr Care* 2005;41(4):153-61.
23. Petersen KU, Weymann N, Schelb Y, Thiel R, Thomasius R. Pathological Internet use - epidemiology, diagnostics, co-occurring disorders and treatment. *Fortschr Neurol Psychiatr* 2009;77(5):263-71.
24. Young KS. *Internet Addiction: Symptoms, Evaluation and Treatment*. *Innovations in Clinical Practice [serial on the Internet]*. 1999;17 Available from: <http://www.netaddiction.com/articles/symptoms.pdf> Accessed February 19, 2015
25. Block JJ. Pathological computer use in the USA. In: *International Symposium on the Counseling and Treatment of Youth Internet Addiction 2007*. Seoul, Korea: National Youth Commission; 2007. p. 433.
26. Block JJ. Lessons from Columbine: virtual and real rage. *Am J Forensic Psychiatry* 2007;28:5-33.

Zavisnost o internetu i kompjuteru: "nova bolest" 21. vijeka

Snežana Medenica, Maja Račić, Vedrana Joksimović

Medicinski fakultet Foča, Univerzitet u Istočnom Sarajevu, Republika Srpska, Bosna i Hercegovina

Cilj ovog rada je dati kratak pregled istraživanja i najnovija teorijska razmatranja o klasifikaciji i liječenju zavisnosti o internetu. Proteklih godina se sve više suočavamo sa tzv. "bolešću zavisnosti o internetu novog doba" kao ozbiljnom problemu koji utiče na brojne ljude, posebno mlade, koji koriste društvene mreže i druge sadržaje na Internetu kao *modus vivendi*. Pregled literature je izvršen u svrhu lociranja informacija o prevalenciji, dijagnostici i liječenju zavisnosti o internetu i kompjuteru. Pojedini istraživači i psihijatri smatraju da je prekomjerna upotreba interneta simptom drugih poremećaja, kao što su depresija i anksioznost, ili poremećaj kontrole impulsa. Međutim, u posljednjih nekoliko godina postignut je konsenzus da je ovaj skup simptoma zapravo poremećaj zavisnosti. Američko Društvo Medicine Zavisnosti (ASAM) nedavno je smislilo novu definiciju, prema kojoj zavisnost predstavlja hronični poremećaj mozga. Prema tome, nova američka Klasifikacija mentalnih poremećaja (DSM-V) je uvela ovaj oblik zavisnosti kao dijagnostičku kategoriju pod nazivom "kibernetički poremećaj". Oblast zavisnosti o internetu brzo napreduje od kad je službeno priznata kao odvojen i različit poremećaj zavisnosti. Neki pojedinci koji su zavisni o internetu su u značajnom riziku i zaslužuju profesionalnu njegu i liječenje. Na raspologanju je nekoliko metoda liječenja ali primarna prevencija je najefikasniji postupak. Porodične ljekare i psihijatre treba naučiti da prepoznaju ovaj poremećaj kod svojih pacijenata.

Ključne riječi: zavisnost, kompjuter, internet, liječenje