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Internet Addiction Disorder

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Abstract

Internet addiction (IA) was introduced as a new disorder in mid-1990s. Since then, there is growing concern about the addictive nature of the Internet. This chapter is a comprehensive review of published seminal, research and review papers, meta-analyses and book chapters/books on IA in adolescents. The conceptualization of IA, epidemiology, phenomenology, screening, diagnoses, treatment and prevention are discussed with relevant references. The concept of IA is at fetal level with no consensus on definition, norms or clinical criteria. Asian countries such as China and South Korea are affected most. A multination meta-analysis estimated an overall prevalence of 6% for IA. Most of the research identifies IA in gaming, gambling, social networking and cybersex. A few assessment tools have been used with no comparability or cultural sensitivity. Diagnostic criteria are proposed based on those used for substance abuse and pathological gambling. The treatments are mainly psychological with a lot of emphasis on cognitive behavior therapy. The Internet is a very versatile and useful tool for children and adolescents, and it is not advisable to ban it totally. The review highlights education of them on sensible Internet use and supports inclusion of IA in international disease classifications.

Keywords: Internet addiction, children and adolescents, epidemiology, management

1. Introduction

The Internet evolved from early 1980s to the modern day revolutionizing the broadcasting, information sharing and connecting individuals worldwide. Today, it has become an in-built part of daily lives of people including children and adolescents. The Internet can be used for many purposes: educational such as teaching, learning and research; business, such as monetary/document exchanges and conference meetings; recreational such as games, online gambling and watching sexually explicit material, and as a mode of connecting people via texting, calling, social websites, chat applications and e-mails. Research has found increasing number of students are using the Internet for their academic activities, for example, one US

study showed an increase in the Internet use among students from 24.5% in 1996 to 79.5% in 2001 [1]. However, together with the many benefits come the risks that are inevitably intertwined due to the innate qualities of the Internet.

There is growing concern about the addictive quality of the Internet, and pioneering researchers have introduced the concept of addiction (IA) in mid-1990s [2, 3]. IA has attracted the attention of media and general public increasingly, with the speedy growth in computer use and the Internet access [4]. The Internet today has reached not only the computer, but also the mobile phone and even the wristwatch with many more sophisticated high-tech apparatus with the Internet facility being introduced to the world, incessantly. It is common to find children and adolescents coming from a reasonable socioeconomical background, around the globe, using a personal digital device like a smart phone, tablet or a laptop with the Internet. It is important to look into how it is like to grow up with such a vast degree of stimulating and inviting attractions from the cyber world on the developing brain.

This chapter explores the conceptualization of IA as an evolving novel theme [3, 5], describes the types of Internet addiction disorders (IAD) and looks into available epidemiology and etiology. Then, a proposal of a neurobiological basis for IA in the developing brain is introduced based on the current knowledge on more established dependences of substances/behaviors such as gambling of the maturing brain. Identification of high-risk children and adolescents and association of IA with other psychiatric disorders such as depression are discussed next followed by an account of the symptoms and signs of varying clinical presentations of IA and diagnosis. Then a review of treatment modalities, proposed so far, and prognosis of and finally prevention strategies for this, most probably, a fastest growing addiction disorder of the world is discussed.

2. The concept of Internet addiction and its controversies

IA was introduced as a disorder by Young in her seminal paper “Internet Addiction: The emergence of a new clinical disorder” in 1996 [2]. She proposed diagnostic criteria for IA based on the existing Diagnostic and Statistical Manual of Mental Disorders 4th edition (DSM-4) criteria for substance dependence [6]. In 1999, David Greenfield too proposed IA to be a form of addictive disorder [7]. These researchers highlighted that the tolerance and withdrawal symptoms of Internet use and those of substance use have similar features. There are others who suggest that IA is an impulse control disorder or even an obsessive-compulsive disorder. But the symptom overlap with substance and known behavioral addictions supports the notion that IA is an addiction—a behavioral one—for that matter.

An increasing incidence of IA together with its high cooccurrence with other established psychiatric disorders was pointed out later [8]. The proposal to include “Internet addiction disorder” in the 5th edition of Diagnostic and Statistical Manual of Mental Disorders (DSM-5) was brought forward. DSM-5 acknowledged the growing concern about the Internet use and related problems, but they claimed there is “insufficient peer-reviewed evidence to establish the diagnostic criteria and course descriptions” to identify the behavior as a mental disorder.

However, DSM-5 has introduced the condition Internet gaming disorder with some proposed criteria under “Emerging Measures and Models” heading for future study. The DSM-5 work group has reviewed many articles about online gaming, and they found some behavioral similarities of Internet gaming to other addiction behaviors which are established as disorders, namely gambling disorder and substance use disorders. The proposed criteria for Internet gaming disorder focus on preoccupation and behaviors, which mainly consume most aspects of life, withdrawal, tolerance, lack of control of use and marked deterioration of the function. The criteria are mostly as proposed by early researches on Internet addiction disorder [2].

Lack of consensus on a definition for IA, which is even blurred subcategory of Internet use (i.e., gaming, social media, cybersex, etc.), makes it difficult to derive prevalence data. Also, there is little or no knowledge of natural histories of cases. Thus, limited scientific research from around the globe has hindered IA earning a place as a disorder in DSM-5 [6].

However, in parts of the world where Internet gaming has an apparent high prevalence, relevant governments such as Chinese have accepted Internet gaming as an established “addiction” and South Korea have identified IA as a problem at governmental level and declared it a serious public health hazard [8]. Such highly affected Asian countries have developed separate treatment units for Internet gaming addiction, in hospitals (e.g., China, Korea). There are an increasing number of researchers looking into the diagnosis of IA, and many researchers agree that the criteria to identify Internet addiction are like in any addiction with craving and compulsion to use despite the knowledge of the harm, loss of control in terms of initiation, continuation and conclusion of the use and withdrawal features such as mood symptoms and distress. In the case of children, however, the knowledge of harm may not be relevant due to the level of cognitive development. For example, a Taiwanese study has proposed diagnosis criteria for Internet addiction and when tested on a group of adolescents found them to be of high specificity and sensitivity [9]. The criteria of Ko et al. are more organized than what is introduced by Young in 1998 [10] with the former following the pattern of International Classification of Diseases 10th version (ICD 10) by World Health Organization (WHO) [11]. However, we need larger multicenter international collaborative studies to understand the prevalence, etiology and the course of IA before we adopt criteria proposed based on local studies as the validity and reliability of the diagnostic criteria have to be ensured. Mental healthcare professionals in many countries particularly in Asia and Europe are increasingly urging the authorities such as World Health Organization to identify IA as an independent disorder [12].

3. Controversies

The Internet is undoubtedly a very useful commodity. Can we consider liberal use of the Internet as an illness at all? Is it unwanted pathologization of changing times? A disadvantage of such a labeling could be the stigmatization of the Internet, which has many important and versatile uses. One may wonder whether there is any underlying pharmaceutical company agenda in pushing this as a diagnosis!

One controversial view is based on the argument that there is no “chemical substance” as such, to get addicted to. However, American Society of Addiction Medicine (ASAM) has defined addiction as a chronic brain disorder, which is not limited to substance use [13].

A strong argument against an independent disorder of IA is brought up by some researchers who believe existing and well-established disorders such as depression or social anxiety are the root causes of driving people to misuse the Internet [14, 15]. They argue that IA therefore is not a new disorder but a consequence of a more primary problem in mental health. Others (e.g., Some Forensic Psychiatrists) suggest that we should consider problematic Internet use, and the same way we consider the online gamblers as gamblers but not as Internet addicts [16].

More and more younger age groups are using the Internet with wider prevalence of the availability of the Internet. It is wondered how young is too young for children to go online. Some question the demarcation between passionate high involvement and problematic use or addiction [17]. Some experts in the field bring the argument whether we are pathologizing a common behavior [18, 19]. It is also relevant to keep in mind the discrepancies in cultural beliefs and attitudes toward the Internet use in different parts of the world. In southeast Asia, for example, parents appear to believe any behavior that takes time away from family or educational pursuits as abnormal [20]. This may partly explain the highly inflated prevalence rates of IA in countries such as Taiwan and South Korea [21].

4. Terminology in Internet addiction

Currently, some have settled into a less controversial term for the problem of IA, the “problematic Internet use” (PIU) [22, 23]. A large European Union-funded multicountry study used the terms Internet addictive behavior (IAB) for IA and dysfunctional Internet behavior (DIB) for problematic use of the Internet [24]. Compulsive Internet use (CIU) is another term used [25]. A more recent European study involving 11 countries has adopted the terms pathological Internet use (PtIU) and maladaptive Internet use (MIU) [26]. The salient features of addiction and problem use are more or less the same though the terminology used by different researchers is different. Addiction to the Internet basically implied a craving for the Internet use for uncontrollably long periods with impairment of functionality in the absence of any other disorders accounting for the condition and problem use was when one not meeting addictive features but nevertheless there are problems in bio psychosocial aspects in life. This chapter uses the terms IA and problem use for simplicity and clarity.

5. Types of Internet addiction disorders

One very common online activity among adolescents is recognized as online gaming. Many attractive single- and multiplayer games are being marketed among the youth worldwide. (e.g., World of Warcraft Clash of Clans, Slither.io, Clash Royale, Pokemon). Virtual communities created by some of the games could be more appealing for an adolescent than the real communities; the gamer can become an avatar of anybody he or she wishes; some games

are designed in such a way gamers can buy cars and mansions and have a virtual second life. People spend/invest a whole lot in the second life at the cost of a deteriorating real life. Author, going by her clinical experience, wonders whether the adolescents with low self-esteem who are not recognized in real life might gain a lot of recognition from other fellow gamers in the online community as great warriors. However, this hypothesis needs to be explored through proper research. A US study has found Internet gaming to be associated with alcohol and recreational drug abuse and poor interpersonal relationships with no gender differences [27]. Research has found online gaming addiction to be associated with aggression, low sociability and self-efficacy, and a lower satisfaction with life [24]. The gamers with these risk factors engage in intense use and are of all age groups. It should be interesting to see the nature of these associations, whether these negative characteristics in the adolescents lead to IA or IA results in these traits. Such knowledge can provide us with interventions in terms of prevention of IA. No clear answer is evident from available data at present.

Another type of internet use, which is popular among adolescents, is social networking using applications such as viber, whatsapp, instagram, facebook, twitter, my space etc. and chat rooms/e-mail. A child or an adolescent will be very much overwhelmed by the amount of online connections he or she can have through these connecting apps. Notifications popping up will invariably distract the youth from homework or any other academic activity. Being connected with around the world friends 24 × 7 could be an around the clock distraction and disturbance. Author recalls one of her patients, a 16-year-old schoolgirl who receives 14,000+ text messages via Viber per day. Her life revolved around receiving and sending texts to her boyfriend and friends and would become aggressive toward family and property when the parents attempted to limit the Internet time. Another grave risk involved in social media sites is children and adolescents getting exposed to unknown adults who may abuse the “online friendship” and bring harm on the young.

Cybersex is also an attractive type of Internet activity among adolescents. Premature exposure to various aspects of sexuality and exposure to adverse sexual activity may hinder the healthy psychosexual development in children and adolescents. Problem use of Internet pornography by adolescents has been associated with alcohol, illicit drugs, greater number of sexual partners, poor interpersonal real-life relationships with partners and poor self-worth [27].

Online gambling is the most studied type of IA. It is found to be highly addictive among adults, yet there are not enough studies to know the situation among adolescents. However, it is reasonable to state that going by available data and author’s clinical experience, social networking and gaming are strongly associated with problem use of the Internet.

Watching videos/movies was not related to problem use of the Internet according to one study [24]. Yet the evidence is not conclusive to derive a definite idea about this type of Internet activity.

Males are found to have been engaging in gaming significantly more compared to females, whereas more females tend to spend time in social media at a significantly higher rate than males. Children and adolescents tend to indulge in these online attractions at the expense of their school work and real-life relationships with friends/family and sports. Researchers have found that IA or problem use can arise from involvement in a range of online activities [2, 23, 28–30].

6. Epidemiology of Internet addiction

Researchers have looked into the prevalence of IA. As discussed above, being an evolving concept there are very few empirical studies and even fewer meta-analyses on IA. Further, it is difficult to compare and contrast available studies due to the vast differences in the methodology as a result of the ill-defined and poor consensual concept of IA. The considerable lack of unanimity in terminology is apparent in studies, and prevalence rates mentioned here are from studies that use many different terms for IA.

IA is reported more commonly in Asian countries and in males aged 12–20. The available research on game addiction centers mostly on young males worldwide. There is some evidence to believe that the onset of IA is probably in late childhood/early adolescence [31]. There are many reports in countries such as China and South Korea. A few European and American studies are also available. The researchers who make an effort to educate the authorities and public in USA claim that IA is a silent epidemic in United States, at present. There are a fewer African studies mainly from South Africa that indicate a lower prevalence estimate compared to other countries of the world. One study reported the figure as 1.67–5.29% [32]. A meta-analysis from 31 nations from seven world regions (North America, Oceania, North & West Europe, South & East Europe, Middle East, Asia and South America) revealed an overall prevalence estimate of 6% in IA. The results showed that the adverse real-life living conditions such as poor satisfaction with life, greater overall pollution, lower national income and greater time spent in traffic were directly proportional to the IA. Middle East had the highest individual world region prevalence estimate of IA, the figure being 10.9% [33].

The far eastern countries such as China report 10.2% of moderate users and 0.6% of severely addicted [34]: South Korea have found 1.6% [35], 3.5% [36], 4.3% [37], 10.7% [38] and 20.3% [39] of adolescents with IA. In Taiwan, 17.9% of students were found to be addicted to the Internet [40].

A European Union-funded research project was carried on among adolescents in Greece, Germany, the Netherlands, Iceland, Poland, Romania and Spain [24]. The Internet addiction was detected in 1.2% of the total sample, and 13.9% have been found to have problematic Internet use. Less affluent countries of the sample, Spain, Romania and Poland, have showed a higher prevalence of problem use, while Germany and Iceland have shown the lowest. The problem use was associated more commonly with boys, older adolescents and those who had parents with low level of education. The problem users have shown lower psychosocial well-being.

A more recent research on the prevalence of Internet addiction on a large number of adolescents from 11 European countries has showed that the overall prevalence of problematic Internet use was 4.4%, and rates were higher in males than in females (5.2% versus 3.8%) and differed between countries ($\chi(2) = 309.98$; d.f. = 20; $P < 0.001$). A significant correlation between problem use and mean hours online and male gender were found [26].

The Indian subcontinent is seemingly overtaking other nations with 53% of Indians connected to the Internet every waking hour according to a recent study conducted in 10 countries by a global management consulting firm AT Kearney Global Research based in London. India has made several attempts to contribute to available knowledge base on IA and related problems

in adolescents. One 2013 cross-sectional study conducted among 987 adolescents in Mumbai has revealed 74.5% as moderate users, 24.8% as possible addicts and 0.7% as addicts. Males in comparison with females were significantly more addicted [41]. Many such local researches are available online, yet a national figure on prevalence of IA or problem use is not yet available in India where one of the leading and fastest growing information technology industries prevails.

A preliminary survey was conducted on the Internet use in a convenient sample of 179 adolescents from schools in central Sri Lanka by author and her team to derive a general idea about the Internet use among adolescents and the views of their significant adults on the Internet [42]. Sri Lanka is a middle-income developing country in South Asia where the Internet is promoted at large scale by multinational companies for competitive prices. No published studies are available on the Internet use among children and adolescents in Sri Lanka. The survey found that 91.06% of the sample was using the Internet with no sex difference; 2.79% of parents and 3.3% of teachers liked students using the Internet; and 45% of each adult group had a neutral view (**Table 1**). This is interesting as for some parents and teachers in Sri Lanka believe the Internet is a bad influence on the young that entices them into pornography and risky relationships. The Internet is not affordable to many young Sri Lankans yet, but mobile phone packages with Internet facility are coming up increasingly enabling the children and adolescents to use the Internet unsupervised by adults. Out of the sample, 68.7% used the Internet for social media and 55.6% was watching films and videos (**Table 2**).

Responses	Parents (%)	Teachers (%)
Like	2.79	3.35
Neutral	45.81	44.69
Somewhat against	43.02	44.13
Totally against	7.26	5.70
Not responded	1.12	1.12

Table 1. View of the parents and teachers about Internet usage of students [42].

Components	Number of users	Percentage (%)
Social media	112	68.7
Gossip sites	13	8
Films and videos	90	55.6
Online games	49	30.1
Educational purposes	119	73
Blogs	2	1.2
Other	11	6.7

Table 2. Purpose of Internet usage (out of 163 Internet users) [42].

7. Etiology

Many children and adolescents are engaging in the Internet use for academic pursuits as well as recreation. But not all will end up being addicted to or problem users of the Internet. The pertinent question what makes a particular adolescent becomes a victim of IA is the question we should try and find an answer. However, like the etiology of any other mental and psychosomatic disorder in psychiatry, the answer is not that simple. After reviewing the attempts made by researchers to come up with a model to understand IA and its management, the author believes that the well-known biopsychosocial model of disease is a feasible and logical explanation for IA, too.

The genetic factors play a part in addictions, and therefore, biological vulnerability is considered to contribute for IA too. The psychological component with cognitive errors, negative effects and personality traits also accounts for the condition. Here, it is noteworthy that personality is again determined by the genetic composition of the individual. Finally, the social factors such as affordability and availability of the devices and networks, the attitudes of the parents and schools about the Internet and the nature of the education system (i.e., whether students are requested to use a lot of online activities for school work as in most high schools in North America) and the inert qualities of the Internet itself that attract youngsters are also contributing for IA.

Researchers have wondered whether different types of Internet addictions (i.e., cybersex, social networking, gaming, etc.) have same underlying mechanisms or not. Apparently, all the types have common features of the well-established signs and symptoms of addiction, pleasure generating quality and the ability to go anonymous if necessary. Yet it is only speculation until scientific evidence is available on underlying pathophysiology.

8. The neurobiological basis of the Internet addiction

It is known that the developing brains of children and adolescents are more vulnerable to get addicted to rewarding activities. Adolescent period is a period of heightened neuroplasticity that makes this age more susceptible to the effects of addictive drugs [43]. Internet addiction and other similar addictive behaviors too can reasonably be considered to have the same effect as drugs on these vulnerable brains. Based on the available knowledge of neurobiology of addiction, scientists have proposed a neurobiological theory for Internet addiction. The “reward center” or “pleasure pathway” of the brain is responsible for the pleasure experienced by an individual. Neurochemicals associated with pleasure such as dopamine, morphine, like endorphins, and others are released when the brain areas such as nucleus accumbens of the pleasure pathway are activated [44, 45]. Substances of addiction or similar behaviors of addictions are found to activate the pleasure pathway. The receptors involved gets affected when exposed to the chemicals over time, and tolerance and withdrawal develop like in any addiction, needing more and more online input to achieve the same stimulation or “kick” together with continuous engagement in the behavior to avoid withdrawal features

[46]. Some activists working on education of public against hazards of the Internet argue, in the genetically vulnerable adolescent or child, lack of love care and affection by the significant adults in his or her life leads to no or minimal activation of pleasure pathways. The children are left alone to fill the emptiness from outside pleasures such as the Internet. That is a theory worth more research as it can be utilized to prevent Internet addiction.

The Internet offers a strong reinforcement for addiction like any other addiction as depicted in Dr. Kimberly Young's Hand Book on Internet Addiction [47]. In gambling, as psychologists found through their extensive research, a variable ratio reinforcement schedule (VRRS) operates giving the gambler the suspension of unpredictability and varying rewards. It is proposed what happens in Internet addiction is also the same. The computer applications are increasingly developed to engage the user fully and incessantly. The coupling of the online activity with pleasure generating themes (sex, sense of connection through social networks, etc.) will heighten the reinforcement leading to more severe addictions [48].

9. High-risk groups for Internet addiction

Qualitative research has reported how the adolescence itself is a risk factor [49].

The developing brain of adolescents has an innate quality of curiosity and a drive for adventures with risk taking. The Internet also gives answers to almost any query they have, keeps them connected and can be a load of never-ending fun at mere finger tips.

However, certain adolescents are more vulnerable to the addictive quality of the Internet than others. One with deficient real-life social skills may find it easy to have online relationships as there is no pressure of real-life eye-to-eye contacts, gestures and human touch. They may find it boosting to be liked and praised online. They may tend to overuse virtual realities offered by attractions in the Internet to fill the voids of boredom and loneliness of real life. At the press of a key, an "emoticon" expressing the due feeling could be far less distressing and comforting than all the "hard work" of trying to express emotions in real-life relationships for the shy adolescent.

Adolescents who are lacking emotional and psychological support are found to be at highest risk and so are the adolescents with identified emotional and behavioral disorders [31].

It is worth exploring the fact whether the adolescents who face tremendous academic pressure in real life tend to find temporary solace in stress-free virtual reality of being online. This may explain the high prevalence of gaming reported in Asian cultures those give priority to the education of the children even at the expense of the psychological well-being of the children. However, this theory needs empirical support.

It is found that living in metropolitan areas was associated with problem use of the Internet. It is not clear whether it is due to wider availability of the Internet by way of free WiFi in cafes, shops and malls in metropolitan area. Poor adult supervision seems a key element in high-risk adolescents. Students not living with a biological parent, low parental involvement

and parental unemployment have shown the highest relative risks of both problem use and addiction of Internet.

Availability of one or several devices to log into the Internet such as smart phones, tablets and even wrist watches at present with wide spread availability of the Internet paves way for increase in the risk of IA.

The Internet-based treatment programs are trialed and used in the management of individuals with autism spectrum disorders. However, there is some concern that, despite its benefits, the Internet has the risk of addictive use in this special group of people [50].

It has been found that doing homework/research was negatively associated with problematic Internet use [24]. A positive correlation was found between Internet use for academic purposes and greater self-esteem, better relationship with parents and less use of substances of abuse [27]. Maybe the studious adolescent does not possess some of the risk factors leading to problem use of Internet to begin with, and it could be the reason for positive findings. This needs more exploration as it may lead us to understand preventive measures.

10. The association of Internet addiction with psychiatric conditions

Several authors have reported a significant comorbidity of IA and mental health disorders. Particularly, depression and anxiety disorders among adolescents may increase the vulnerability of an IA. The affected adolescents may find online activities distracting them from real life low or anxious mood and distressing cognitions [51]. Attention deficit hyperactivity disorder (ADHD) is another behavioral disorder IA is associated with making the affected children and adolescents more vulnerable to IA [52].

But some work brings about the notion whether the depressive and anxiety symptoms experienced by problem or addicted Internet users are more a consequence rather than a cause or co-occurrence [53].

A cross-sectional survey among a sample of 175 university undergraduates in Peradeniya, Sri Lanka, reported IA was positively correlated with depression, loneliness and time spent on the Internet, while it negatively correlated with healthy lifestyle [54].

11. Clinical features and diagnosis

A good detailed history from is paramount for the diagnosis of IA. The adults bring the affected child or adolescent, usually. Mostly, it is the parents who notice the changes in behavior. The clinical picture may be subtle or marked. In subtle cases, the parents or teachers may complain of a drop in school work, disinterest in extracurricular activities previously interested in and lying about the Internet usage—both about the time spent and the particular online activity (e.g., “No.... I did not spend one hour it was just a half an hour!!!!” or “No.... I was not playing Clash of Clans but just checking up something for my home work!!!!”). Denial and

concealment of the extent of the Internet use are quite often seen in the clinical practice, and they complicate matters as help is then sought very late into the problem. Problem use leads to irritabilities, arguments with parents and sleepiness in daytime. However, if the condition is not intervened early, there may be a risk of the adolescent engaging in the behavior openly and resisting adult interventions more aggressively.

Dramatic or marked presentations around the Internet use may also occur. The adolescent may be caught engaging in cybersex during school hours or at home, and the school or devastated parents will bring him or her to a psychiatrist.

In some other cases, a teenager may be engaging in online gaming for excessive hours. Going by the DSM-5 proposed criteria, clinicians can have some directives in order to diagnose Internet gaming disorder. An adolescent who is sitting at a device with the Internet and spends 8–10 h or more per day and at least 30 h per week, in gaming neglecting not only academic activities but also food or sleep, may be diagnosed as a victim of Internet gaming disorder [6]. They typically get angry and agitated if parents try to prevent the addicted behavior.

Clinicians should keep in mind the close association the IA or problem use has with the mental health of the adolescent. It should be the rule to look for features of comorbid, consequent or causative psychiatric disorders such as depression or anxiety. A thorough history and a mental state examination are warranted.

Extreme cases were reported in mostly Asian countries. The world was shocked to hear the news of the young adult couple from Seoul, South Korea, neglecting their infant daughter to death in order to raise a virtual baby called Animus in a gaming community. There are many news items of individuals including teenagers dying after excessive game playing from China, Taiwan, Hong Kong and South Korea. In these extreme cases, the online game is usually a highly addictive role-playing fantasy game.

Young states not only psychological but also physical problems such as back pain, eye strain and carpal tunnel syndrome can be caused by long hours (more than 18 h a day) online [10]. It is reported that cardiopulmonary-related deaths have also occurred in addicts in Internet cafes [55]. Therefore, it is important to look for any associated physical problems.

In the absence of any DSM or ICD 10 criteria for diagnosis of IA, reader is directed to two criteria commonly used to arrive at a diagnosis of IA: Young's diagnostic questionnaire for Internet addiction [10] and Ko et al.'s proposed diagnostic criteria for Internet addiction [9].

12. Assessment tools for Internet addiction

Despite the lack of consensus in diagnostic criteria, many tools of screening and assessing the degree of the Internet-related problems have been developed and used in research around the globe. Internet addiction disorder diagnostic criteria (IAD-DC) by Goldberg in 1995 [56] is the first scale on IA, found in literature. Later a widely used 20-item, quantitative, assessment scale Internet addiction test (IAT) was developed: Young's Internet addiction test [57]. Many researchers are using IAT up-to-date due to its high reliability. Internet addiction disorder scale

by Goldberg in 2000 is a qualitative 11-item scale. Readers are directed to the critical review of existing scales and their psychometric properties by Laconi et al. published in 2014, which is freely available online in the journal, *Computers in Human Behaviour*, for a more comprehensive in-depth review of the subject [58]. (One of the many advantages of the Internet!)

However, the assessment tools will only substantiate the clinical assessment through history and mental state in diagnosing IA.

13. Management of Internet addiction

It is understandable that there are no definitive treatments laid down for IA in light of the knowledge it is not an accepted disorder at present. However, while world health authorities are being cautious about the fundamental existence of a disorder of IA, children, adolescents and adults are increasingly reported to be facing adversities related to the Internet. Some states (e.g., China, South Korea) have gone ahead and started their own diagnoses and management systems, as they cannot afford to wait till the disease classification systems give them a label to start. Internet addiction can be detrimental to the affected individual adolescent and his or her family, and if one such adolescent walks into the clinical practice of a mental health professional, he or she should be armed with best available options of treatment.

It is important to keep in mind that it is very easy to place restrictions on a child not to use the Internet by adults, parents, teachers and therapists themselves, who grew up in a pen and paper era! The new technology evolves and societies have to keep abreast with the development for successful survival. Therefore, total banning of an adolescent from using the Internet is not the answer. In other words, total abstinence should not be the goal [59]. Instead, controlled/safe/balanced or more preferably **sensible Internet usage** should be the goal. Both the treating clinician and the affected individual should come to a consensus about the details of sensible use depending on the age, educational demands, cultural value system, etc.

14. Assessment of Internet addiction

The first step has to be a detailed history and mental state examination as in the case of any other mental health disorder.

A suitably validated assessment scale such as Young's Internet addiction test (IAT) [10] can be utilized to substantiate clinical diagnosis but not to replace it, as the gold standard in diagnosing any mental and behavioral disorder, including behavioral addictions such as IA, is the clinical diagnosis. However, the cultural differences should be considered when using a tool developed in another sociocultural background.

Comorbidities should be considered, actively looked for and intervened. For example, a social phobic or a depressed adolescent may be masking his affective status by engaging in the Internet activities that make him happy and gives the feeling of being in control. In such

cases, where the IA is only secondary, treating the underlying mental health disorder should be the priority. In mild cases of secondary IA, treating the root condition itself may help the individual to refrain from misusing the Internet.

15. Treatment of Internet addiction

According to a 2011 systematic review and consort evaluation on clinical trials of Internet addiction treatment by King and his team, we are unable to come up with definitive treatment modules for Internet addiction. The evidence base available for treatment is defective with conclusions coming from anecdotal reports, small-uncontrolled studies with no randomization [60].

15.1. Psychological treatments

The clinicians and therapists have attempted to have some direction from existing treatment types mainly extrapolating methods used for more known addictions such as substance addictions. Many methods such as boot camp-style treatments, cognitive behavior therapy (CBT), family therapy, group therapy, behavior therapies such as social skills training and counseling have being used worldwide [60].

Most of the psychological treatments employed had sprung from CBT [61]. This is probably due to the fact that CBT has proven to be efficacious in many other behavioral addictions such as gambling disorder and impulse control disorder.

Dr. Young the pioneering researcher on IA in her book “Internet Addiction: Symptoms, Evaluation, and Treatment” [62] and in her study [63] offers some practical treatment strategies based on CBT. Though the clinical evidence for the efficacy of the methods is not stated, they offer some important directions in managing the individual patient until more evidence to establish them or replace them arrives. The suggestions are mainly based on practical behavioral techniques that are agreed upon by the user. The reader is referred to Dr. Young’s book for a detailed account on those treatment strategies. The user’s consent, willingness and high motivation are important in order to practice the suggested treatment strategies. In the case of children and adolescents, they may not be very agreeable to the suggestions as their cognitive development is not complete to understand the adverse aspect of the Internet.

A randomized controlled study used eight sessions of multimodal school-based group CBT or no treatment on 56 adolescents aged 12–17 years randomly allocated into treatment and no treatment [64]. The Internet use has decreased in both groups, while actively treated group has additionally improved in some other general constructs.

Many other investigators have found CBT-based treatment approaches being effective on the sample of adolescents they studied [65–67].

Cash and his colleagues in their summary on Internet addiction mention the importance of utilizing motivational interviewing (MI) a client-centered technique used to change adverse

behaviors, as a component in treatment plans for IA (19). MI has not been used so far in the treatment of Internet addiction according to available information.

Since any problem in children and adolescence is closely associated with the family, it is warranted to consider family-based therapies for IA. Though there is not enough evidence to support for efficacy of such interventions, overall improvement in communication in the family and better monitoring of the Internet use are some of the benefits noticed [68, 69].

Many enthusiastic and innovative therapies based on behavior therapy have been put to practice to bring about a positive change in Internet addictive behaviors, such as Reality therapy (RT) [70] and Acceptance & Commitment Therapy (ACT) [71] with varying results.

Simple educational programs for children in real life or ironically online are considered to combat problem use of the Internet. One such online program follows the 12 steps self-help treatment approach used for alcoholic anonymous [60].

Some suggests that there is an important place for physical exercise in helping adolescents to reduce the use of the Internet. Sports believed to be compensating for the reduced dopamine levels in brain resulted in the decreased online use. Further, sports can be a part of CBT programs [72].

15.2. Pharmacological treatments

A few types of medications have been used, and there are some studies looking into the effectiveness of them. However, there are no adequate randomized controlled trials to derive definitive guidance to treatments.

There are several reports on the use of selective serotonin-reuptake inhibitors (SSRIs) particularly when Internet addiction is comorbid with depression and anxiety for which SSRIs have an established place as an effective treatment [73, 74]. The SSRI, escitalopram [75], non-tricyclic antidepressants, bupropion [76], psycho-stimulant, methylphenidate [77], mood stabilizers [22], antipsychotic, quetiapine [78] and opioid receptor antagonist and naltrexone [79] have been trialed as treatments. However, most of these studies were quite short term and some are case reports. Hence, no pharmacological medication can be recommended for IA per se in children and adolescents at present.

15.3. Multimodal treatments

IA being a complicated phenomenon involving many aspects of life as biological, psychological and sociocultural, a combined or a multimodal treatment approach is increasingly considered by the concerned scientific community. There are reports on group CBT, parental training, teacher education, family therapy, medication, case management and brief intervention therapies, which are combined according to the necessity [80–85]. A widely inclusive IA recovery program with mindfulness-based relapse prevention, digital detoxification and animal-assisted therapy among many other different multidisciplinary approaches is proposed in 2012 [86].

16. Tips on sensible Internet use

Author suggests, after reviewing available solutions on the Internet (You tube, Ted Talks, etc.) by activists as well as scientific reports, some simple techniques based on behavior therapy with or without cognitive component that can be utilized to use the Internet sensibly (Box 1).

-
- Having a prior discussion and an agreement on Internet use before a family purchase Internet facility. (healthy digital diet and digital nutrition)
 - All in the household following through the plan. (Modeling by the adults)
 - Setting aside devices at family/friends gatherings and meal times. (Disconnect to reconnect)
 - Having a family Internet-free day probably on a Sunday so that education or work/business is not affected. (Digital Detox)
 - When at studies or assignments switching of the notifications of chat sites or social networks just the way people place mobile phones on silent mode or switch them off.
 - Have an assigned time for socializing on the net (by using an alarm) and setting limits on checking on social media responses, for example, only three times per day or once a week. (Checking on checking)
 - Internet times to be replaced by more attractive offline activities (not offline studies!) such as getting together with friends in real life, competitive or recreational sports, aerobics, etc. (Doing it in real)
 - Reward for being off Internet as planned, for example, by having a vacation every 3 months or weekend movie/dinner out. (Celebrate)
-

Box 1. Tips on sensible Internet use.

17. Clinical course and prognosis

Not much is known about the natural history of the condition as the concept of IA itself is at a very preliminary level. We need follow-up studies.

The experience from highly affected countries suggests that the problem of IA is quite a complex one. With the ubiquity of the Internet and its innate qualities of urging individuals to misuse despite harm, the course of IA is seemingly long term and resistant to treatment.

Prognosis of the highly addicted adolescent seems poor in general given the available information. However, clinicians should not be pessimistic in attempting to treat IA of an affected individual patient as multimodal treatment approached though not tested adequately offers some hope.

18. Prevention

IA is considered at different intensity by different countries depending on how affected their population by it. Asian countries are undoubtedly most affected and hence have come up with most solutions too.

Most of the Internet-based activities are promoted among children and adolescents. Case is particularly so in online gaming which seemingly is the most prevalent type of Internet addiction disorder that could even reach DSM-5 at least at a warning stage.

A mass awareness program on the concept of IA is important. It has to be carefully planned and implemented as a total aversion from the Internet even before it reaches most of the children and adolescents in some parts of the world would be a shame given the unbeatable wonderful positive aspects of the Internet on education, business and recreation. The reader is also reminded at this point, of the accusation by some, that a normal phenomenon is being pathologized by introducing the concept of Internet addiction.

Primary prevention is encouraged by developing a sensible Internet culture starting from the individual household. Adults should set living examples and have controlled access to the Internet following a discussion and agreement in the family upon the way of the Internet use (Box 1).

Secondary and tertiary prevention may call for drastic methods if a nation is seriously affected. For example, total ban of the Internet in certain time of the day for under 18-year-olds, developing a system to slow down the Internet if played more than a certain number of hours (South Korea) [8], restricting Internet gaming among youth by demanding a “game fatigue system” from the game operators (China) [8].

19. Summary

The Internet use is increasingly becoming an integral part of day-to-day life of all age groups around the world. The concept of “Internet addiction” remains controversial and at a fetal stage waiting to be evolved into maturity with better quality research. While IA has not reached DSM-5 or probably the future ICD 11, we cannot ignore the numbers or the seriousness of cases reported in Asian countries, neither can we ignore the individual families seeking help for problematic Internet users, children and adolescents. An internationally consensual multicenter attempt to define the concept, look into etiology, develop valid and reliable diagnostic criteria and come up with effective management strategies that involve prevention is warranted. We are gifted with the technology of Internet, and it has come to stay and will expand in new horizons we may only see in science fictions today. The children should be taught to use it with respect in a moderated and controlled but positive way. Such an approach only will win the cooperation of today’s children and adolescents who are growing up with the Internet as a daily commodity.

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