Internet Addiction

7

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Introduction

The internet has undoubtedly revolutionized the way we humans live in our daily lives. It has brought humanity conveniences never previously thought imaginable, readily controlled at our fingertips. The internet has found its way into our lives through our personal and professional lives and is primarily accessed through computers and cell phones. As a result, we are now able to communicate and connect at lightning fast speeds at any time of day and during almost any activity of our choice. The internet has allowed the development of applications, games, programs, hobbies, and an entire new world of human existence. The internet has clear benefits; however, it has the potential to be misused causing severe social and occupational dysfunction.

Internet addiction (IA), a term used interchangeably with problematic internet use (PIU) in the literature, has been on the rise worldwide with surveys estimating that up to half of adolescents worldwide are experiencing negative consequences of excessive internet use [25]. The variability in the literature in studying IA has made it difficult to have more accurate public health estimates. Most studies have not uniformly specified the particular use of the internet the participants engage in, such as gambling, gaming, social networking, smartphone, sex, shopping, and information gathering. Each of these categories of internet use may one day be considered for classification under their own disorder category or as subtypes of IA with further study [5, 7].

Neurobiological and genetic research has found common neural pathways and genes related between IA and substance use disorders, supporting classification IA as an addiction of behavior, as GD has in the DSM-V. Further targeted understanding of the neurobiology and genetic factors of IAD is required to compare differences and similarities among other substance use and behavioral addictions. The evidence currently points to various interconnected, overlapping neural networks in the brain are affected, though apparently differ slightly between which use of the internet the user is engaging in (GD vs. IGD) [23, 27].

The remainder of this chapter discuss the classification, diagnostic considerations, etiology, demographics, treatments, and neurobiology of behavioral addictions with attention to IAD.

Classification

PIU is a term used for individuals whose internet use has become problematic or pathologic, specifically because of one's inability to control their use of the internet despite adverse life

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E. Akerele (ed.), *Substance and Non-Substance Related Addictions*,
https://doi.org/10.1007/978-3-030-84834-7_7

consequences. The DSM-V does not currently categorize disorders under a category of behavioral addictions; however, conditions such as kleptomania and GD have been included in the DSM-V under the categories of impulse-control disorders and non-substance addiction. Internet addiction also shares similar features to these disorders. The culmination of the past decade of research into behavioral addictions, including internet addiction, has provided enough evidence to distinguish pathologic versus non-pathologic internet use. Continued elucidation of specific criteria for diagnosis of internet addiction is needed through further developing validated and standardized measures in collecting epidemiological data [23].

It is also important to consider a cultural context of internet use when formulating a new classification of mental illness. It is not uncommon for people today to use the internet, computers, or smartphones to perform any combination of activities including personal and professional use for a large portion of the day. Distinguishing the intentions and effects excessive internet use has on people is required when pathologizing a common behavior that many people have today. Intentions for use of the internet and the results or consequences of continued use should be evaluated carefully. The purpose of creating diagnostic criteria for disorders is to be able to identify individuals at risk and carefully and systematically define conditions in a reliable and valid manner so that they can be better understood and treated. A balance must be found where the criteria of the disorder are not too narrow to hinder generalizability and not too broad to obscure knowledge [26].

Diagnostic Considerations

Internet addiction does not have as precisely defined criteria as does gambling disorder or IGD. The criteria for IGD may appear to be adapted straight from gambling disorder; however, IGD does indeed have evidence-based support for its criteria, though further studies are needed to specify a threshold of criteria to officially rule-in a diagnosis of IGD. Disagreement remains in the literature with regard to the specific diagnostic criteria for IAD, which causes marked variability in prevalence reports. Future studies are required to more precisely define the criteria for IAD. Barriers to investigation include discrepancies in approach and scale measures used in large population-based studies. There have been several scales measuring the severity of IAD that have been created both in East-Asian countries and United States. Table 7.1 indicates an adapted version of proposed IAD criteria by using the DSM-V diagnostic criteria for another substance use disorder as published by Ascher and Levounis (2015).

Many types of rating scales have been used in the evaluation of IAD with different target cultures and varying areas of focus, some with unknown specificities and sensitivities. These include: the Young Internet Addiction Scale is the best validated tool to date [1]. Other scales such as the gaming addiction scale for adolescents (GASA), internet addiction scale (IAS), scale for the assessment of internet and computer game addiction (AICA, clinician and self-reports), the adolescent pathological internet use scale (APIUS), Beard's diagnostic questionnaire for addiction (BDQ), Internet addiction diagnostic questionnaire (IADQ), impulsive-compulsive internet usage disorder Yale-Brown Obsessive-compulsive scale (IC-IUD-YBOCS), online cognition scale (OCS) and the Internet overuse self-rating scale (IOSS) each have their strengths and weaknesses, however the common theme among these assessments is a lack of evidence supporting their individual validity [3].

Assessments such as the Korean-internet addiction scale (K-IAS) and Chinese Internet addiction scale (CIA) have been developed in their respective countries for the specific study of IAD as it presents in their cultures. Culture, context, and demographics have shown to be essential in understanding the holistic picture of an individual with problematic internet use. More studies are needed using one agreed-upon

Table 7.1 Proposed adapted diagnostic criteria for other (or unknown) substance use disorder: problematic internet use

A problematic pattern of use of the internet and other related technologies leading to clinically significant impairment or distress, as manifested by at least two of the following, occurring within a 12-month period:
1. Internet usage is in larger amounts of time or intensity than was intended.
2. There is a persistent desire or unsuccessful efforts to cut down or control use of the internet.
3. A great deal of time is spent in activities necessary to use or recover from use of the internet.
4. Craving, or a strong desire or urge to use the Internet.
5. Recurrent use of the internet resulting in a failure to fulfill major role obligations at work, school, or home.
6. Continued internet use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of its use.
7. Important social, occupational, or recreational activities are given up or reduced because of internet use.
8. Recurrent internet use in situations in which it is physically hazardous.
9. Internet use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by internet use.
10. Tolerance, as defined by either of the following:
(a) A need for markedly increased amounts of internet use to achieve the desired effect.
(b) A markedly diminished effect with continued same amount of Internet use
11. Withdrawal, as manifested by the following: internet use is at times employed to avoid withdrawal symptoms.
Specify if: *In early remission*: After full criteria for problematic internet use disorder were previously met, none of the criteria for problematic internet use disorder have been met for at least 3 months, but for less than 12 months (with the exception that Criterion A4, "Craving, or a strong desire or urge to use the internet," may be met). *In sustained remission*: After full criteria for problematic internet use were previously met, none of the criteria for problematic internet use disorder have been met at any time during a period of 12 months or longer (with the exception that Criterion A4, "Craving or a strong desire or urge to use the Internet," may be met).
Specify if: *In a controlled environment*: This additional specifier is used if the individual is in an environment where access to the internet is restricted.
Specify current severity: *Mild*: Presence of 2–3 symptoms. *Moderate*: Presence of 4–5 symptoms. *Severe*: Presence of 6 or more symptoms.

Source: [34, 35]

standardized questionnaire in larger populations to elicit a more accurate estimate of IAD worldwide [3].

Differential Diagnosis

The first step in formulating a differential diagnosis of a patient with IAD is to understand whether the disorder is as a result of an underlying, comorbid psychiatric condition, or if it contributes or potentiates another illness. Patients with IAD who are treated for a mood, anxiety, obsessive-compulsive or substance use disorder and whose internet use reacts accordingly, we can conclude that the problematic internet use was as a result of the underlying condition. Having a thorough understanding of a timeline or pattern of occurrence may help the provider identify what internet use may be the result of. Does internet use change with an improvement in mood after a depressive episode, a stabilization of mood during a manic episode, alleviation of anxiety associated with social phobia or a reduction in the use of a substance?

Being able to identify the purpose of the internet use also becomes an essential component of specifying an appropriate diagnosis and treatment plan. A patient who uses social media as a mode of communicating without the pressure of having real-life, casual social encounters may require further work-up for social phobia. It is also possible for a patient with social phobia to

have IAD, it is also important to categorize the amount of time the patient also spends watching pornography, using social media, gambling, shopping, or gaming (Balakrishnan and Griffiths 2018).

Epidemiology

Estimates of IAD range broadly (0.3–38%) as the prevalence and cultural context within each country are combined with the inconsistency and variability of scales measuring symptomatology ([10], Mihajlov et al. 2017). Standardization and agreement on basic criteria measures will be required to further strengthen the validity of prevalence reports. More confounding variables regarding reports of epidemiological data include failure to distinguish or specify what exactly the populations of individuals being studied were actually using the internet for (social media, smartphone use, gaming, shopping, pornography, gambling) as well as evaluating for the presence of other comorbid psychiatric disorders such as social anxiety, mood disorders, obsessive-compulsive and ADHD. In a comprehensive review of problematic internet gaming and internet gaming disorder, Gonzalez-Bueso and colleagues found that 92% of individuals have comorbid anxiety, 89% with depression, 85% with symptoms of ADHD, 75% with social phobia and obsessive-compulsive symptoms with IGD. Rates were clearly higher in males. As previously discussed, there are contradictions in the literature regarding these variables and require more longitudinal studies addressing the complex relationship of these comorbidities.

In a systematic review by Carli et al., males were the majority affected by PIU and most commonly had symptoms of depression and ADHD. As previously stated, the significant heterogeneity that is pervasive in the literature of IAD makes accurate conclusions less apparent. In other studies, IAD was found to be more common among young females and IGD more common among males [26].

Etiology

The etiology of IA may be looked at through a variety of lenses. Viewing IA through a biopsychosocial model may be most holistic, which is inclusive of analyzing genetic vulnerabilities or abnormalities in neurochemical processes, personality characteristics, demographic factors, and ease of accessibility. Other models of understanding the development and maintenance of IA are the triple A model (accessibility, anonymity and affordability), the cognitive-behavioral model, and the anonymity, convenience, escape model [8]. As discussed, the etiology of IA must be further specified to the specific intention or purpose the user is using the internet for.

Treatment (Pharmacotherapy and Psychotherapy)

IA lacks definition consensus, as previously mentioned, which directly impacts the quality of studies that address treatment methods. Both psychopharmacology and psychotherapy interventions have been studied independently and together as well described in a systematic review by [33]. Antidepressants such as escitalopram and bupropion were compared both head to head, with and without psychotherapy (cognitive-behavioral, motivational interviewing, family-based). These studies indicated statistically significant reductions in the Young Internet Addiction Scale score after 4–6-week trial of both antidepressant and CBT interventions in affected individuals from around the world. Inclusion criteria varied between these studies, some documenting change in time in hours spent online versus scale based. Studies were also of small sample sizes between 10 and 62 participants. Overall, the groups treated with bupropion with and without CBT were found to be more effective in reducing YIAS scores than escitalopram with and without CBT. Other medications that have been studied include psychostimulants such as methylphenidate and

atomoxetine, which have been shown to reduce ADHD symptoms and internet use in a group of 62 medication-naïve children after 8 weeks of treatment [16].

As will be further explained, the phenomenology and neurobiology of IA shares similarities with other psychiatric disorders such as substance-use disorders, impulse control disorders, obsessive-compulsive disorders, and other mood and psychotic disorders. Studies using medications such as antipsychotics, mood-stabilizers opioid-receptor antagonists, and glutamate-receptor antagonists are limited in number and treatment effectiveness, though may be important to consider if another psychiatric disorder is suspected in the work-up of a patient affected with IA.

Psychotherapy techniques such as cognitive-behavioral therapy (CBT), motivational interviewing (MI), psychodynamic psychotherapy, family therapy, and mindfulness-based interventions have also been studied in IA as well as IGD. Most studies are limited due to lack of control groups and a consensual agreement on diagnosing IA.

Cognitive-behavioral therapy for internet addiction (CBT-IA), developed by Young includes maintaining a log of time spent online, development of time management skills, goal setting, and restructuring cognitive distortions. CBT period has been shown to be the most evidence-based method of reducing distress and improving functionality in IA to date [12].

IA affects the family dynamic at home, as the most likely sufferers of IA are currently adolescent males. Family therapy has been shown to be effective in reducing IA distress at both the level of the patient and family. Included in family therapy are three approaches: improving family communication through active listening, establishing limits on screen time and screen free zones, and enhancing family bonding through close examination of current relationships and through role playing.

Motivational interviewing has been shown to be helpful for IA. Adolescents typically have minimal desires to change their addictive or problematic behaviors and therefore it is the parents who typically present for help. Helping teens bring attention to the activities that are being missed is an effective exercise in the process of behavior change [9, 31].

Neurobiology of Behavioral Addictions

The definition of addiction has mostly been exclusive to substance use disorders in the twentieth century. There are defined neuroplastic changes that occur in those developing an addiction via alterations in glutamatergic signaling, altering the motivation, executive functioning, reward pathways in the brain leading to changes in the patterns of cognition, emotion, and behavior [20]. It is not surprising that after chronic use of substances as well as behaviors that the neural pathways are altered and strengthened to promote continued engagement with the substance and/or behavior. Their new neurobiological functioning predisposes individuals to experience irresistible cravings, developing tolerance, experiencing withdrawal syndromes when the substance or behavior is removed, leading to high rates of relapse after discontinued use and further engagement with the substance and/or behavior [30].

Regions of the brain that affect motivation, executive functioning, and reward pathways are the glutamatergic and dopaminergic neurons within the dorsal striatum, nucleus accumbens, ventral tegmental area, and prefrontal cortices (mesocorticolimbic system and extended amygdala pathways). MRI, fMRI, and PET studies of affected individuals indicate that altered functioning of these areas in the brain is shared among IAD, IGD, and substance-use disorders, thus, in favor of labeling internet use as an addiction. EEGs have been used to assess brain wave reactivity, such as reductions of inhibitory control and an increase in cue-reactivity; therefore, requiring

increased levels of cognitive resources to complete tasks secondary to impulsivity and impaired executive functioning [20].

Smartphones and Social Media, Pornography, Gambling, and Gaming

Social Media and Smartphones

The smartphone has become one of the most accessible methods using the internet [21]. Problematic smartphone use and social media use have been found to be directly related and identified as the most common issue regarding smartphone use [19, 29]. Socializing via online social media platforms may present as an opportunity to those individuals who are fearful of real-life social situations or could present as evidence of a pathological coping mechanism for adult developmental transitions and crises. They use social networking to find psychological meaning to a deep and compelling need to feel emotionally close to others. In an online environment they can express themselves and find the acceptance missing in their lives [28]. Excessive smartphone usage also facilitates problematic pornography viewing and gambling [19].

Most frequently reported estimate of college students affected by smartphone addiction is between 10% and 20% [6]. As the internet and smartphones have infected the entire world, use of smartphones should especially be evaluated in the context they are being studied in. With relation to Asian society, there is commonly little time for in-person socialization which contributes to high usage of mobile devices [18].

Problematic smartphone use is not classified as addiction as no large studies have been conducted to evaluate the suitability of such a diagnosis. General lack of construct validity to "smartphone addiction studies" [24]. Current internet use may be a natural progression of the modern-day way of life, which researchers may only have a pathological explanation for this phenomenon [29]. This is another instance where it is especially important that mental health providers not pathologize normal behavior in a technologically developing society [13].

Online Gambling

Gambling disorder (GD) has been identified as a unique disorder and classified under the category of substance-related and addictive disorders in the DSM-V as it has been found to share more commonalities with substance use disorders (SUDs) rather than those of obsessive-compulsive disorders (OCD) or impulse control disorders. Concepts such as "chasing losses" and superstitious beliefs differentiate gambling disorder from SUDs. These findings have been based on multiple domains including diagnostic criteria, clinical characteristics, social factors, co-occurring disorders, personality features, behavioral measures, biochemistry, neurocircuitry, genetics, and treatments [27]. The dysregulation of dopaminergic tone is the neurobiological link gambling disorder and impulse control disorders. Games that are classified under the umbrella of gambling include games commonly found at casinos such as slots and card games, sports betting, dice, and lottery. The shift of these common casino games to an online platform has increased the access, availability, and exposed vulnerable individuals to gamble more frequently and with ease.

Gambling involves risking something of value in a game of chance in hopes of obtaining something of greater value. Online gambling has become immensely popular with tens of millions of dollars in quarterly earnings at many casinos nationwide. Online gambling features many enchanting, spectacular, and engaging displays of fun and suspense as the slots appear to be in traditional casinos, though with more customizable options and unique themes. Online gambling closely relates to internet gaming in that the flashing lights and engaging game play keep the player glued to the screen awaiting the next attractive sound or visual splendor.

In business and law, gambling is debated even within other online domains such as gaming. A mystery "loot box" found in some games offers

the player to spend money on the contents within the box, which is unknown to the player. The contents of the box may be superior in some way, allowing the player to gain unique access to aspects of the game otherwise not available to others. Loot boxes have already been banned in some countries and are currently under investigation in the USA.

The South Oaks Gambling Screen is a validated tool that has been extensively used to identify pathologic gambling, though may be somewhat outdated with a high number of false positives. Gamblers Anonymous Survey has not yet been validated, though can provide useful clinical information and can be helpful to patients and families. The Lie/Bet Questionnaire is simply two questions to ask when evaluating a patient: "Have you ever had to lie to people important to you about how much you gamble?" and "Have you ever felt the need to bet more and more money?" This tool is highly sensitive and will signal the evaluator to investigate further about the patient's gambling tendencies.

Internet Gaming

Internet Gaming Disorder (IGD) has been added in Sect. 3 of the DSM-V as a condition for future study and is likely the closest of other behavioral addictions to be added to the next version of the DSM. In China, internet gaming has already been defined as an addiction. There continues to be a lack of a standard definition from which to derive prevalence data (diversity of assessment tools). Criteria for this disorder closely resemble that of gambling disorder (GD; previously known as pathological gambling, PG) and substance use disorders including aspects such as tolerance, withdrawal, cravings, preoccupation, and dysfunction in major life areas (school, work, relationships) [4].

It is estimated that the majority afflicted with IGD are adolescent men with comorbid psychiatric conditions such as depression, ADHD, OCD, and substance use disorders. Other disorders such as generalized and social anxiety, hypomania, obsessive-compulsive personality disorder, borderline personality disorder, avoidant personality disorder, and psychosis have been found to be higher in prevalence with individuals with IGD. Those most susceptible to developing the disorder are children and adolescents who have high impulsivity, lower social competence, and higher amounts of game play. These individuals tend to also have higher rates of aggression and poor relationships with parents and comorbid depression and ADHD symptoms. Males are almost twice as likely to suffer from IGD than females [14].

Affected individuals are typically drawn into games with team aspects and that are competitive in nature. They will play a game between 8 and 10 hours per day on average and exceed 30 hours of gameplay per week. Male adolescents and Asian populations tend to have been the most commonly studied populations to date.

Various types of psychotherapeutic approaches such as psychodynamic, cognitive-behavioral, family, and group-based interventions as well as psychopharmacologic interventions have been studied for treatment of IGD. It is of greatest importance to uncover what motivating factors are most salient to the individual who is suffering from excessive game play and tailor treatment specifically to that individual [14, 15].

Problematic Online Pornography Use

POPU fits the triple A framework (accessibility, affordability, anonymity) and thereby enhances the risk for prone individuals, to engage in various types of sexually related behaviors, most commonly including masturbation. Risk factors for developing POPU are being a novelty-seeking, young, religious man who uses the internet frequently, most commonly finding himself in negative mood states, prone to sexual boredom. Minors are a particularly vulnerable population as they are still in the process of sexual neurodevelopment. The clinical manifestations of POPU are sexual dysfunction and psychosexual dissatisfaction, which are reversible when the behavior is controlled. Out-of-control sexual behavior has been included in the

ICD-11 and will be of use when addressing patients that seek medical attention [2].

Love et al. [22] conclude that internet pornography addiction fits into the addiction framework and shares similar basic mechanisms with substance addiction, similarly to other behavioral addictions mentioned in this chapter. It stimulates the brain's reward system, and the person is searching for additional excitement online. The excessive use of internet pornography could also be explained from a neurobiological aspect, as there is an expectation of a more intense content the individual seeks further excitement by increasing the frequency of online sexual activities [11, 17].

Criteria most commonly proposed include concepts of loss of control, excessive time spent on sexual behavior, and negative consequences to self and others. A flexible assessment tool must be developed to aid in determining when a normal behavior becomes pathologic, which may require correlation with neurobiological evidence. Treatment is focused on the reduction or elimination of the behavior. Fortunately, it appears that clinical symptoms are reversible with reduction or removal of the behavior and normal functioning returns. Individual treatment course will be determined on case-by-case basis and may typically include elements of mindfulness and acceptance-based psychotherapy, which on occasion has been shown to be equally or more important than a pharmacological approach [2]. A pilot study for POPU with acceptance commitment therapy showed promising results teaching coping skills around distress tolerance or frustration intolerance may be useful [32].

Conclusions

The internet has evolved from simple personal and professional applications like text chatting and web browsing to include more spectacular and psychologically engaging activities such as gaming, gambling, pornography, and social media. The availability, access, and vulnerability model has opened the flood gates for people to use the internet excessively for these purposes, ultimately leading to problematic or addictive behaviors that have severe consequences in these individual's lives in all aspects. The first step is to identify the reason for usage and rule-out any underlying mental illnesses to be treated, as problematic internet use may subside or resolve upon treatment of any mood, anxiety, or psychotic disorders. Further work in this field will involve reaching a consensus for criteria for the above-mentioned disorders that do not pathologize behavior that may be considered normal in our technologically advancing society as to avoid negative consequences.

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