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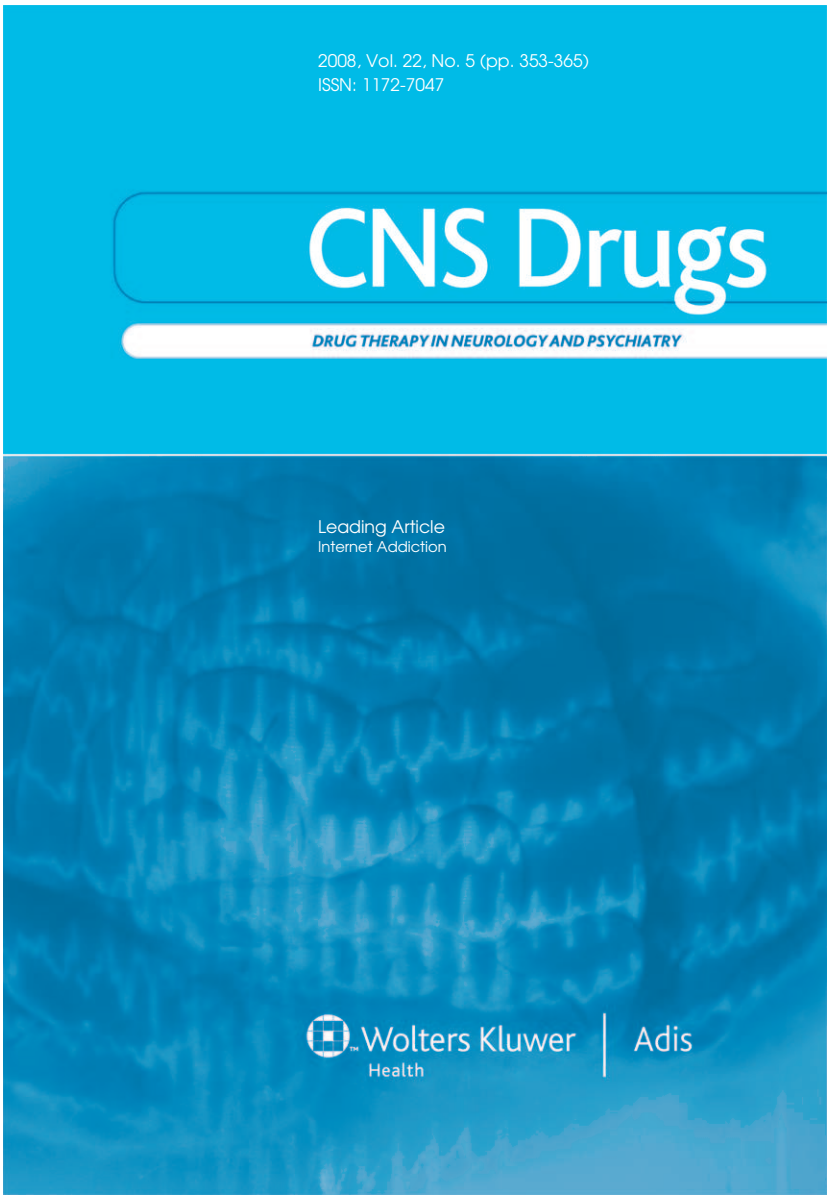

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Internet Addiction

Definition, Assessment, Epidemiology and Clinical Management

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Abstract

Internet addiction is characterized by excessive or poorly controlled preoccupations, urges or behaviours regarding computer use and internet access that lead to impairment or distress. The condition has attracted increasing attention in the popular media and among researchers, and this attention has paralleled the growth in computer (and Internet) access.

Prevalence estimates vary widely, although a recent random telephone survey of the general US population reported an estimate of 0.3–0.7%.

The disorder occurs worldwide, but mainly in countries where computer access and technology are widespread. Clinical samples and a majority of relevant surveys report a male preponderance. Onset is reported to occur in the late 20s or early 30s age group, and there is often a lag of a decade or more from initial to problematic computer usage.

Internet addiction has been associated with dimensionally measured depression and indicators of social isolation. Psychiatric co-morbidity is common, particularly mood, anxiety, impulse control and substance use disorders. Aetiology is unknown, but probably involves psychological, neurobiological and cultural factors.

There are no evidence-based treatments for internet addiction. Cognitive behavioural approaches may be helpful. There is no proven role for psychotropic medication. Marital and family therapy may help in selected cases, and online self-help books and tapes are available. Lastly, a self-imposed ban on computer use and Internet access may be necessary in some cases.

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The use of personal computers (PCs) is commonplace in contemporary society. Surveys show that over 60% of American households have at least one PC, and nearly 55% of households are connected to the Internet.[1] Not unexpectedly, as PC use and Internet access have become widespread, so have reports of their misuse, the extent of which was recently documented in a telephone survey of 2513 randomly selected adults. In this survey, Aboujaoude et al.[2] reported that 69% of the respondents were regular Internet users and, of this number, 5.9% felt their relationships suffered as a result of excessive Internet use, 8.7% attempted to conceal non-essential Internet use, 3.7% felt preoccupied by the Internet when offline, 13.7% found it hard to stay away from the Internet for several days at a time, 8.2% utilized the Internet as a way to escape problems or relieve negative mood, 12.3% had tried

to cut back on Internet use (of whom 93.8% were successful) and 12.4% stayed online longer than intended either very often or often.

Apart from survey data, excessive or inappropriate use of computers and the Internet has been the subject of increasing attention in the professional literature and popular media. The term 'Internet addiction' has been used to describe this phenomenon; its rising profile parallels the introduction and spread of affordable PCs and the growth of Internet access now available worldwide. The earliest reports on this phenomenon date back to the 1970s when scientists and academics began to express their concern with the overuse of computers, which had just become widespread on college campuses and in the business community. Weizenbaum,[3] a computer scientist, wrote extensively about the 'compulsive programmers' in his 1976 book *Computer Power and Human Reason*, while Zimbardo,[4] a research psychologist, wrote about computer addiction as contributing to social isolation, opinions echoed by Boden[5] and Shallis.[6] It was not until the early 1990s that reports began to appear in the medical and psychological literature for what Griffiths[7] called a 'technological addiction', described as a "non-chemical addiction involving human-machine interaction". For example, Keepers[8] described the case of a 12-year-old boy who turned to crime to fuel his preoccupation with video games at a local arcade. In perhaps the first serious analysis of the phenomenon, Shotton[9] described 106 self-described 'computer-dependent' people, and concluded that computer dependency occurs in a small proportion of users.

Despite the attention Internet addiction has received, scientific understanding has lagged, in part because of the lack of a common definition and consistent terminology. There are no generally accepted definitions for the condition, but investigators seem to agree that it involves problematic computer usage that is time consuming and causes distress or impairs one's functioning in important life domains. To some extent the impact of Internet addiction remains 'under the radar' because its many adverse consequences, including social isolation, marital discord and financial problems, are out of the public's view.

1. Definition and Classification

The appropriate classification of Internet addiction has been debated. Some investigators have linked Internet addiction to addictive disorders, grouping it alongside alcohol and drug use disorders.[7] Others have linked Internet addiction to obsessive-compulsive disorder (OCD)[10] or to the impulse control disorders (ICDs).[11-13] The many names given to this phenomenon recognize the various ways in which it has been regarded: compulsive computer use,[14] pathological internet use,[15] problematic internet use,[16] internet dependency,[17] internet addiction[18] and even internetomania.[19] The terms suggest a tension between those who view the disorder as involving any abnormal or pathological computer use and those who focus specifically on Internet usage. Because most investigators acknowledge that this phenomenon involves a variety of computer-use behaviours, we believe that any consideration of the phenomenon needs to acknowledge all forms of inappropriate and/or excessive computer use, even when it does not involve Internet access. Nonetheless, in this article, the term 'Internet addiction' will be used to describe the collective phenomenon, but the terminology preferred by the respective researchers is used when discussing their work.

There are many definitions available for Internet addiction. In the psychiatric literature, Black et al.[14] described a series of 'compulsive computer users', the only requirement of which was that subjects acknowledged "compulsive computer use that had contributed to personal distress, or social, occupational, financial, or legal consequences". Shapira et al.[20] further refined the definition of 'problematic internet use' by enumerating operational criteria that emphasize cognitive and behavioural aspects of the disorder, as well as impairment characterized by subjective distress, and interference in social or occupational functioning; mania and hypomania should be ruled out as causes of the disorder. These criteria were patterned after those developed by

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McElroy et al.[21] for compulsive shopping, considered by many as a disorder of impulse control.

Young[13] has proposed criteria patterned after the DSM-IV-TR criteria[22] for pathological gambling. In employing her criteria, only non-essential computer/Internet usage (e.g. non-business or non-academic use) is considered. Internet addiction is present when five or more of the eight criteria are present during the past 6 months, and mania has been ruled out as a cause. She further breaks 'Internet addiction' into five subtypes and suggests that people typically become addicted to a particular application that acts as a trigger for excessive Internet use. According to Young et al.,[23] Internet addiction is a broad term covering a wide variety of behaviours and impulse control problems. The five subtypes of Internet addiction are as follows:

1. *Cybersexual addiction:* This occurs in individuals who are typically engaged in viewing, downloading and trading online pornography or are involved in adult fantasy role-play chat rooms.

2. *Cyber-relational addiction:* This occurs in people who become overly involved in online relationships or may engage in virtual adultery. Online relationships become more important than real life ones, and marital discord and family instability may result.

3. *Net compulsions:* This subtype includes a broad category of behaviours, including online gambling, shopping or stock trading. Significant financial losses may result, as well as relational and job disruptions.

4. *Information overload:* The World Wide Web has created a new kind of compulsive behaviour that involves excessive web surfing and database searches. These individuals spend a disproportionate amount of time searching for, collecting and organizing information.

5. *Computer addiction:* Most computers come equipped with pre-programmed games and people become addicted to playing them at the cost of work performance or family obligations.

The diagnostic classification of Internet addiction remains elusive. There is currently no listing for the disorder in DSM-IV-TR[22] and Internet addiction remains an orphan disorder. Stein[24] has observed that, while the terms 'addiction' and 'compulsion' that are frequently used to describe the phenomenon are probably incorrect, the 'intense attachment to computers seems to be a real one'. In our view, Internet addiction is best considered a disorder of impulse control because many of its features are similar to those of other disorders within the category, including pathological gambling, pyromania and kleptomania. These conditions are characterized by the failure to resist one's impulses to engage in a particular behaviour despite serious personal consequences, and are considered pleasurable and are seldom resisted. Until Internet addiction achieves recognition as a disorder, we recommend that clinicians use the Axis-I DSM-IV-TR category 'Impulse Control Disorder not otherwise specified' and to indicate the specific problem within parentheses.[22]

It was recently suggested that the disorder be included in a new diagnostic category combining behaviour and substance addictions.[25] In addition to Internet addiction, other 'behavioural addictions' include pathological gambling, kleptomania, pyromania, compulsive shopping and compulsive sexual behaviour. In fact, the National Institute on Drug Abuse considers behavioural addictions to be relatively pure models of addiction because they are not contaminated by the presence of an exogenous substance.[26] Whether Internet addiction is valid as a distinct disorder or whether it is part of a larger behavioural syndrome is unknown.

Some authors have criticized attempts to categorize Internet addiction as a disorder. For example, both Griffiths[27] and Huisman et al.[28] have questioned the existence of Internet addiction and have criticized supportive research as methodologically weak. Yet, ignoring Internet addiction only trivializes and stigmatizes attempts to understand or treat it.

2. Assessment

As with any psychiatric or behavioural disorder, the patient's history forms the most important basis for diagnosing Internet addiction. The initial goal of the clinician is to define the extent of the problem

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through relatively non-intrusive inquiries, and then to move on to more specific behaviours and use patterns. For general screening purposes, a clinician might ask the patient the following:

- Do you feel overly preoccupied with using your computer or accessing the Internet?
- Do you ever feel that your computer (or Internet) use is excessive, inappropriate or poorly controlled?
- Have your urges to use your computer (or the Internet), or the usage itself, ever been overly time consuming, caused you to feel upset or guilty, or led to serious problems in your life (e.g. financial or legal problems, relationship loss)?

The psychiatric history of the patient should be carefully explored because many individuals with Internet addiction will meet the criteria for co-morbid psychiatric disorders, such as major depression, an anxiety disorder or another disorder of impulse control (e.g. compulsive shopping). The presence of co-morbid disorders may also suggest particular treatment strategies or approaches, as well as explanations for the excessive Internet usage that may be helpful in counselling patients.

Clinicians should ask about past psychiatric treatment, including medications used, hospitalizations and psychotherapy. Bipolar disorder should be ruled out as the cause of the disorder because some individuals with Internet addiction may excessively use the computer while manic. Although unlikely, the patient's history of physical illness, surgeries, drug allergies and medical treatment will help to rule out medical causes as an explanation for the symptoms (e.g. mass lesions), or identify conditions that may contraindicate the use of certain medications prescribed to treat the disorder.

Importantly, Internet addiction should be distinguished from normal computer use, although in some cases it may be difficult to draw a clear distinction. In contemporary society, computer ownership and usage, as well as Internet access, is widespread. People in all walks of life spend many happy and productive hours daily or weekly using their computer or accessing the Internet. Yet, for the Internet addict, computer usage significantly preoccupies their time and thoughts, and may contribute to a downward spiral of adversity. Normal computer use can take on an addictive quality at times, such as when the person buys a new computer, first connects to the Internet or upgrades their Internet service, or is researching a topic of special interest. The clinician needs to exercise judgement before making a diagnosis, and should be mindful of the need for evidence of distress or impairment before assigning a diagnosis.

2.1 Rating Scales for Internet Addiction

Several screening instruments have been developed to assess Internet addiction, although none have emerged as the 'gold standard'. In one of the earliest studies, Egger and Rauterberg[29] devised a 46-item instrument to assess usage patterns, together with feelings and experiences regarding Internet use. They did not report on the measure's psychometric properties. Brenner[30] developed the Internet Addictive Behavior Inventory (IRABI), a 32-item questionnaire that probes a user's Internet experiences, modelled after the section on substance abuse in DSM-IV-TR.[22] The instrument was reported to display good internal consistency ($\alpha = 0.87$), but no other information was provided.

Young[31] created the Internet Addiction Test (IAT), a 20-item scale that rates degree of preoccupation, compulsive use, behavioural problems, emotional changes and impact of general functioning related to computer use. This instrument was designed to (i) help respondents determine whether they meet Young's criteria for Internet addiction; (ii) help self-identified Internet addicts determine which life domains the condition has impacted on; and (iii) for those concerned about another person's Internet usage, to rate that person or to give the test to that person. The IAT appears to be valid and reliable.[32]

Morahan-Martin and Schumacher[33] developed a 13-item scale to assess problems associated with Internet use, including personal distress, academic, work or interpersonal issues, withdrawal symptoms or mood disturbance. These investigators considered a respondent to be a pathological Internet user

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Table I. Surveys of Internet addiction prevalence

Survey	Year	Location	Sample	Prevalence (%)	Gender[a]
Egger and Rauterberg[29]	1996	Switzerland	Online, 450 people	10.6	Not addressed
Greenfield[36]	1999	US	Online, 17 251 people aged 8–85 years	5.7	M = F
Morahan-Martin and Schumacher[33]	2000	US	277 undergraduate students	8.1	M > F
Chou and Hsiao[39]	2000	Taiwan	910 university students	5.9	M > F
Whang et al.[37]	2003	Korea	Online, 13 588 respondents	3.5	M = F
Kaltiala-Heino et al.[40]	2004	Finland	7229 youths	1.7 (boys) 1.4 (girls)	M > F
Yoo et al.[34]	2004	Korea	535 chemistry students	0.9	M > F
Leung[35]	2004	China (Hong Kong)	699 people aged 16–24 years	38	F > M
Johansson and Gotestam[41]	2004	Norway	3237 youths aged 12–18 years	2	M > F
Niemz et al.[38]	2005	UK	Online, 371 students	18	M > F
Kim et al.[42]	2006	Korea	1573 students	1.6	F > M
Aboujaoude et al.[2]	2006	US	2513 adults	0.3–0.7	Not addressed
Pallanti et al.[43]	2006	Italy	275 students	5.4	M = F

a Influence of gender on prevalence: M > F indicates a higher prevalence among males; M = F indicates similar prevalence among males and females; F > M indicates a higher prevalence among females.

F = female; **M** = male.

if he or she positively endorsed four or more items on the scale. The authors also developed the Internet Behavior and Attitudes Scale, a 25-item four-point Likert-like scale, which explores the social aspects of Internet use and feelings of competency online.

A full discussion of the many instruments developed to diagnose or rate Internet addiction is beyond the scope of this article.

3. Epidemiology

There have been at least nine community and four online surveys to estimate the prevalence of Internet addiction (table I), with little uniformity of the definitions employed or assessment methods used in these studies being shown. With one exception,[2] the studies focus on younger populations rather than the wider adult population, perhaps reflecting the view that this is primarily a disorder of younger persons. In studies that focus on younger people, prevalence estimates range from 0.9%[34] to 38%.[35] The four online surveys[29,36-38] produced estimates ranging from 3.5%[37] to 18%.[38] Aboujaoude et al.[2] have reported perhaps the most methodologically rigorous study, which involved a random telephone survey of 2513 adults aged 18 years and older, and employed four criteria sets producing prevalence rates ranging from 0.3% to 0.7%. However, from 4% to 13% of respondents endorsed one or more 'markers' consistent with problematic Internet use, such as being 'preoccupied when offline' or concealing one's Internet use. Thus, while all studies confirm that there are many people who endorse problematic computer use, its true prevalence is unknown.

Internet addiction appears to have a male preponderance based on data from the community and online surveys, as well as clinical samples. Of the 13 surveys described in table I, six found a male preponderance, two found a female preponderance and three found an equal gender distribution; two studies, including Aboujaoude et al.,[2] did not report a gender distribution. Of the clinical reports, Black et al.[14] reported that of 21 people reporting compulsive computer use, 16 (76%) were men, and Shapira et al.[11] reported that 11 of 20 subjects (55%) were men. Morahan-Martin and Schumacher[44] suggested that the gender distribution may be explained by the fact that men are more likely to express interest in games, pornography and gambling, activities that have all been associated with problematic Internet use.

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Both Black et al.[14] and Shapira et al.[11] report that the disorder has an age of onset in the late 20s or early 30s. Furthermore, in both studies the subjects were in their 30s at the time of interview and reported a 3-year history of problematic use. Black et al.[14] reported that their subjects were introduced to computers at a mean age of 17 years, and that there was a lag-time of 11 years from initial computer use to problematic computer use. Because computer use has become so widespread, and even young children are now well versed in computer usage and technology, it is likely that the age at onset of problematic use has dropped.

While the natural history of Internet addiction is unknown, age-related differences have been documented. Brenner[30] presented results from a survey of 563 Internet users who admitted to problematic use. While men and women did not differ in the amount of time spent online or problems experienced, older users reported fewer problems than younger users.

Quality of life was examined by Black et al.[14] using the Short Form-36 health survey.[45] In this report, compulsive computer users had a specific deficit in general mental health, but their functioning was otherwise unimpaired.

4. Psychiatric Co-Morbidity

Two clinical studies suggest that Internet addicts frequently meet the criteria for Axis-I and -II disorders; mood, anxiety, substance use and ICDs are particularly common. Black et al.[14] assessed 21 subjects with compulsive computer use, using a computer-interactive version of the Diagnostic Interview Schedule (DIS).[46] Nearly 30% of the subjects met the criteria for a current disorder, with the most common being mood disorders (24%), anxiety disorders (19%), substance use disorders (14%) and psychotic disorders (10%). Nearly one-half of the subjects met the criteria for a lifetime psychiatric disorder, including substance use disorders (38%), mood disorders (33%), anxiety disorders (19%) and psychotic disorders (14%). The Minnesota Impulsive Disorders Interview (MIDI)[47] was administered to assess the presence of the ICDs. Thirty-eight percent of subjects had at least one ICD, with compulsive buying being the most frequent condition identified (19%). Other disorders included pathological gambling (10%), pyromania (10%), compulsive sexual behaviour (10%), kleptomania (5%) and compulsive exercise (5%). There was no comparison group for this study.

Shapira et al.[11] evaluated 20 subjects with problematic Internet use, using the Structured Clinical Interview for DSM-IV,[48] to assess Axis-I disorders and found that 70% met the criteria for a current bipolar disorder (bipolar I disorder 55%; bipolar II disorder 5%; schizoaffective disorder, bipolar type 10%). For lifetime disorders, these figures jumped to 80% (bipolar I disorder 60%; bipolar II disorder 10%; schizoaffective disorder, bipolar type 10%). These investigators also noted that 35% of their subjects met the criteria for an ICD, including intermittent explosive disorder (10%), kleptomania (5%), pathological gambling (5%) and compulsive buying (20%).

While the reports of Black et al.[14] and Shapira et al.[11] confirm the presence of co-morbid psychiatric disorders in Internet addicts, the rates for mood disorders reported by Shapira et al.[11] were much higher than those reported by Black et al.,[14] particularly for bipolar disorder. These high rates may reflect ascertainment bias in that most subjects studied by Shapira et al.[11] had a history of receiving psychiatric treatment, while the subjects studied by Black et al.[14] were recruited through advertisements and word-of-mouth, and had not received prior psychiatric treatment. It is important to recognize the small sample sizes in these studies, and use caution in generalizing about co-morbidities until further data become available.

Other researchers have employed a dimensional approach to assess psychological status. In an early study, Kraut et al.[49] reported that increased use of the Internet was associated with higher ratings on measures of depression, loneliness and social isolation. These findings were compatible with those of Nie and Erbring[50] who reported that of the total number of people spending more than 5 hours online per week, 8% reported a decrease in social activities,

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13% reported spending less time with family and friends, and 26% reported having shorter phone calls. These investigators concluded that the Internet is an isolating technology, even more so than television.

Young and Rodgers[51] administered the Beck Depression Inventory to 259 'addicted users' and reported a mean score of 11.2, which suggests that the group had elevated levels of depression. These investigators suggested that the low self-esteem, poor motivation, fear of rejection and need for approval associated with depression contributes to increased Internet use, presumably as a way of coping with emotions.

From a study of 445 individuals, 46% of whom identified themselves as addicts, Petrie and Gunn[52] concluded that there was a significant relationship between high Internet use and both depression and introversion base on responses to both the Beck Depression Inventory[53] and Eysenck's Introversion/Extroversion Scale.[54]

In a study of Korean school children, Yoo et al.[34] found an association between scores on Young's Internet Addiction Test and an attention-deficit hyperactivity disorder rating scale. They postulated a relationship between the two disorders.

5. Personality Disorders and Traits

Black et al.[14] used the Personality Diagnostic Questionnaire, revised[55] to assess Axis-II disorders among their subjects. Eleven subjects (52%) met the criteria for at least one personality disorder, with borderline personality disorder being the most frequent (24%), followed by the narcissistic (19%) and antisocial (19%) types. Histrionic, avoidant, passive-aggressive and self-defeating personality disorders were each identified in 14% of subjects, whereas schizoid, schizotypal, obsessive-compulsive and dependent personality disorders were each present in 10% of subjects. While there appears to be no special 'Internet addict personality', Young and Rodgers[51] found that persons dependent on the Internet ranked high in self-reliance, had a strong preference for solitary activities and tended to restrict their social outlets. They reported that "dependents were abstract thinkers who appear less conforming to social convention and more emotionally reactive toward others." It was hypothesized that these traits predispose to Internet addiction.

6. Family History

Family history data are limited. In their study of 20 problematic Internet users, Shapira et al.[11] observed that all but one subject had positive family histories of psychiatric disorder. Thirteen subjects (65%) had at least one first- or second-degree relative with a depressive disorder, ten (50%) had a relative with a bipolar disorder and 12 (60%) had a relative with a substance use disorder. However, these investigators did not ask if relatives had an Internet addiction.

7. Aetiology

The cause of Internet addiction is unknown, although speculation has centred on psychological, neurobiological and cultural influences. As with any psychiatric disorder, aetiology is often multifactorial and involves many mechanisms.

7.1 Cognitive Behavioural Theory

According to Davis,[56] the cognitive behavioural theory can explain the onset and maintenance of pathological Internet use. This model distinguishes between specific and generalized pathological Internet use. Specific pathological Internet use involves the misuse or abuse of specific functions on the Internet, such as Internet gambling, shopping or pornography. Davis[56] argues that these specific behaviours would likely be displayed in another venue if the Internet did not exist or was unavailable. Generalized pathological Internet use refers to a more global set of Internet behaviours that could not exist outside the realm of the Internet, such as chat rooms, surfing the Web or email. The cognitive behavioural model proposes that maladaptive cognitions are critical to the development of generalized pathological Internet use behaviours. Examples of maladaptive cognitions include self-doubt, self-focused rumination, low self-efficacy and negative self-appraisals. Dysfunctional behaviours that occur

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along with generalized pathological Internet use cognitions include compulsive Internet use that leads to negative outcomes at work, school or in personal relationships; denying or lying about Internet use; and using the Internet to escape from one's problems (e.g. depression, loneliness, etc.). Over time, generalized pathological Internet use cognitions and behaviours intensify and continue to produce negative outcomes, producing a diminished sense of self-worth and increased social withdrawal. As symptoms of generalized pathological Internet use worsen, they exacerbate existing psychopathologies, resulting in a vicious dysfunctional cycle.

7.2 Social Skills Deficit Theory

Caplan[57] has developed an explanatory theory invoking deficient social skills. His first assumption is that lonely and depressed individuals hold negative views of their social competence. The second assumption is that there are several features of computer-mediated communications that are particularly attractive to persons who see themselves as low in social competence; computer-mediated communication interactions give people a greater flexibility in self-presentation than face-to-face communication, and one may omit or edit information they feel is negative or harmful. There is also a greater opportunity to fabricate, exaggerate or intensify the positive aspects of one's self. Thus, for some individuals the Internet represents a place where they can exercise a control over the impressions others have of them. A preference for online social interaction may stem from one's belief that computer-mediated communication is easier (i.e. requiring less interpersonal sophistication), less risky (e.g. greater anonymity, heightened sense of private self-awareness and lower sense of public self-awareness) and more exciting than face-to-face communication. As Morahan-Martin and Schumacher[44] put it, "The Internet can be socially liberating – the Prozac of social communication".

7.3 Neurobiological Theories

Neurobiological theories tend to centre on disturbed neurotransmission, particularly of the serotonin and dopamine neurotransmitters. SSRIs have been used to treat Internet addiction, as described in section 9.1, in part because investigators have noted similarities between Internet addiction and OCD,[10] a disorder known to respond to SSRIs.[58] Dopamine has been theorized to play a role in 'reward dependence', which has been claimed to foster 'behavioural addictions' (e.g. pathological gambling, Internet addiction). There is currently no direct evidence to support the role of these neurotransmitter systems in the aetiology of Internet addiction.

Pallanti et al.[43] have observed that most work on Internet addiction has involved adolescent subjects who, they observe, appear to be at increased risk for this and other 'addictions'. They hypothesize that immaturity of the frontal cortical and subcortical monoaminergic system during normal neurodevelopment underlies adolescent impulsivity, considered the 'foundation of disorders marked by disturbance of reward motivation'.

7.4 Cultural Mechanisms

Cultural mechanisms have been proposed to recognize the fact that Internet addiction occurs wherever computer usage is available. Reports on the disorder have come from the US,[44] Finland,[40] Hungary,[59] Italy,[43] Korea,[34,41] Norway,[42] South Africa,[60] Taiwan,[39] the UK[38] and China.[35] It seems unlikely that Internet addiction can occur in poorly developed countries where the availability of computers and Internet access are limited, except perhaps among those in the academic, business or government circles, or among the elite.

8. Clinical Symptoms

In perhaps the earliest systematic study of 106 computer 'dependents', Shotton[61] found that, compared with two normative groups, computer dependents were less likely to be married and most were first-born children. They tended to buy computers as soon as they were available, owned more computer paraphernalia and computers than others and most admitted to becoming addicted from their first 'hands-on' experiences with computers. Additionally, they spent significantly more time using their

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computers at home and at work than did the others, and found it difficult to stop 'computing' when at the keyboard, often losing all sense of time. Shotton writes: "Old hobbies disappeared and family activities were no longer undertaken".[61] Egger and Rauterberg[29] also found that Internet addicts developed urges to use the Internet when offline, to feel guilty or depressed when spending too much time online and to report negative consequences for their Internet use.

Black et al.[14] systematically assessed the experiences of 21 compulsive computer users. Subjects admitted that their computer use led them to feel excited (52%), happy (48%) or powerful (19%), yet that it was sometimes used to assuage feelings of sadness (38%), frustration (10%) or irritability (14%). The subjects also reported positive aspects from their computer use; 52% reported that computer use distracted them from their problems or concerns, while 29% reported that they enjoyed obtaining new information on the Internet. Most admitted that their computer usage had caused problems with family or friends, or with work or school. Nearly one-third had tried to cut back, but observed that doing so made them more anxious. None felt that the disorder was sufficiently problematic to seek treatment. Another aspect of the disorder, as captured in the case reported by Belsare et al.,[62] is the sense of tension or arousal before successfully logging on to the Internet, and the sense of relief obtained once logged on.

The most characteristic symptom of Internet addiction is excessive 'non-essential' time spent online. This term refers to time not related to work or academic pursuits, yet apart from this generality there is little agreement on what constitutes 'non-essential' computer time and what is allowable in contemporary society. Black et al.[14] reported that the 21 subjects in their study spent a mean of 27 hours per week in non-essential computer use, while Shapira et al.[11] reported a similar figure (28 hours per week) in their study of 20 subjects. In contrast, the pathological Internet users described by Morahan-Martin and Schumachers[44] spent a mean of 8.5 hours online weekly. It may be that the actual amount of time spent online is less important than the amount of distress or impairment the computer use leads to. Non-essential activities recorded in these studies included web surfing, chat rooms, email, games, designing web pages, pornography, newsgroups and shopping. These activities frequently intertwine; for example, people interested in pornography may spend hours searching websites for particular images or may spend many hours in chat rooms, as illustrated in a case reported by Stein et al.[60] of a 42-year-old man preoccupied with Internet pornography.

In her research of 596 subjects, 396 of whom were considered computer dependent, Young[13] observed that 'dependents' predominately used the two-way communication functions on the Internet, such as chat rooms, Multi-User Dungeons (MUDs, a computer programme or 'cyberspace', where users can take on the form of a character or avatar and interact with each other), newsgroups or emails, while nondependents tended to use information-seeking aspects of the Internet and email. Computer dependents reported that their excessive Internet use resulted in personal, family and occupational difficulties, with more than 50% rating these problems as 'severe'. Young[13] also noted that marriages, dating relationships, parent-child relationships and close friendships were disrupted by excessive use of the Internet as computer dependents spent less time in face-to-face encounters and more time in front of their computers. Marriages and dating relationships were the most affected, as computer dependents formed new relationships online, some of which led to romantic interactions and 'cybersex' (i.e. online sexual fantasy role playing). Many computer dependents (52%) experienced severe financial problems as a result of excessive time spent online when Internet providers billed for time spent online instead of the flat rate fee most charge today. In this study, weekly Internet use of computer dependents ranged from 20 to 80 hours, with individual sessions lasting up to 15 hours. They reported sleep deprivation and lack of exercise, and were at an increased risk for carpal tunnel syndrome, and back and eye strain. Lastly, 51% of computer dependents in the

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study reported significant work-related problems, mostly as a result of misusing their online access for personal use (i.e. 'cyberslacking').

9. Clinical Management

There are no evidence-based treatments for Internet addiction, yet both psychotropic medication and psychotherapy have been recommended. In addition, clinics exist in the US and elsewhere to treat this disorder. With a single exception discussed in section 9.1, none of these approaches have been systematically studied; therefore, treatment recommendations are based on clinical experience, not empirical data. Of course, the best strategy for some people may be a self-imposed ban on computer access outside of work situations (where computer use can be monitored), which would entail getting rid of home PCs and cancelling their Internet service.

9.1 Pharmacotherapy

Hadley et al.[63] recently reported the results of a small open-label study of 19 subjects with a 'compulsive-impulsive computer usage disorder' who received escitalopram for 10 weeks, followed by a 9-week double-blind discontinuation phase. In the first phase, subjects experienced significant improvement in hours spent in non-essential computer activity and other measures of response. Improvement persisted throughout the second phase, although there were no significant differences between the escitalopram and placebo groups. These results suggest that the improvement experienced by the subjects could have been a result of the 'placebo effect'. Sattar and Ramaswamy[64] had earlier reported, in a single case, that escitalopram reduced the subject's urges for online gaming.

Shapira et al.[11] reported retrospective data on the medication management of 15 individuals with problematic Internet use. Five of 14 (36%) antidepressant monotherapy trials resulted in a favourable response, defined as a 'moderate' or 'marked' reduction in Internet use, with only two of nine (22%) SSRI trials (e.g. fluoxetine, paroxetine, sertraline) resulting in favourable responses. Shapira et al.[11] noted that 14 of 24 trials (58%) employing a mood stabilizer produced a favourable response. This favourable response rate increased to 75% when trials involving concurrently administered antidepressants or stimulants were excluded from the analysis.

9.2 Psychotherapy

Cognitive behavioural therapy has been modified to treat Internet addiction. Hall and Parsons[65] observe that these techniques are familiar to many mental health treatment providers and can apply not only to treating substance misuse but also 'nonchemical addictions', including Internet addiction. They illustrate these techniques in the case of an 18-year-old college student who was addicted to the Internet.

Young[66] has recently developed a guide, which employs cognitive behavioural techniques, for therapists working with Internet addicts. She writes that emotional states, maladaptive cognitions and life events can serve as triggers for Internet 'binge-behaviour'. Emotional triggers include negative thoughts and emotions such as feelings of depression, hopelessness and pessimism. Maladaptive cognitions, such as overgeneralization, selective abstraction, magnification or personalization,[67] may also be coupled with Internet misuse. Young[66] suggests the following exercises to achieve abstinence from problematic Internet: (i) practicing the opposite behaviour; (ii) using external stoppers, such as a timer signalling when an Internet session should end; (iii) setting time limits; (iv) setting task priorities to aid in Internet goals during each Internet session; (v) using reminder cards (posted on the computer) with a list of the five major problems caused by the Internet addiction, and a parallel list of the five major benefits of cutting down on Internet use; and (vi) taking a personal inventory, whereby the therapist helps the client cultivate alternative activities that take him/her away from the computer.

Self-help books and tapes are available online and may be helpful to some people with Internet addiction.[31] Support groups are available in some areas, as well as online. These groups may provide a sense of mutual support and encouragement that

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some people might find helpful. Some people with Internet addiction develop financial problems and may benefit from financial counselling. Marriage (or couples) counselling may be helpful when the Internet addiction in one member of the dyad has disrupted the relationship. Likewise, family therapy may be helpful when the behaviours of an Internet addict have disrupted the family unit. Interestingly, a half-way house for adolescents with Internet addiction has opened in China. The length of stay is from 10 to 14 days and treatment includes group therapy, medication, acupuncture and sports.[68]

10. Conclusion

Interest in Internet addiction has grown in the past decade, leading to a better understanding of the condition, yet there is little agreement regarding its definition. The lack of agreement has complicated attempts to study its prevalence and gender distribution. Of interest is whether the prevalence is continuing to grow as the use of computers and Internet access expand. Perhaps the prevalence will not stabilize until computer access reaches a saturation point wherein all but the most isolated communities have access. Nonetheless, research suggests that the disorder and its symptoms are relatively common and are associated with co-morbid psychiatric disorders. More work is needed to determine the age at onset and risk factors for Internet addiction. The issue of gender differences is not yet settled, although the literature suggests a male preponderance.

Important gaps remain in our understanding of this disorder. Firstly, there are several instruments that appear to identify Internet addicts, but their reliability and validity have not been adequately determined. Little is known about the natural history of Internet addiction, perhaps because it is a relatively new phenomenon. Whether it is chronic and persistent, waxes and wanes in severity or remits spontaneously is unknown. Follow-up studies are necessary to chart its course, track its emergence and/or subsidence, and determine its relationship to other disorders.

Whether Internet addiction is a single construct or has multiple subtypes suggesting different aetiologies or pathophysiologies is unexplored, as is family history. It is not known whether certain psychiatric disorders, such as alcohol and other drug use disorders or depression, run in these families. These associations may help investigators to better understand the issue of classification of Internet addiction. Some investigators suggest a relationship to OCD, others to the addictive disorders and some to the ICDs. It could be that all investigators are correct in that subgroups of Internet addicts could be motivated by different underlying diatheses that correspond to these different diagnoses. Finally, while the disorder has become widespread, there have been no systematic studies of proposed treatments, and it is not clear which patients might be helped with cognitive behavioural therapy or whether medication is of value in treating the disorder.

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