Problematic Internet use: an overview

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There is wide agreement that the Internet can serve as a tool that enhances well-being. It is more difficult, however, to find consensus around the issue of problematic Internet use. That may be in part because scientific investigation has lagged far behind technological advances and media attention. The diagnostic schemas that have been proposed since 1996, and the screening tools that have been developed, stress similarities with substance use, impulse control disorders, and obsessive-compulsive disorder. Prevalence figures vary as a function of the diagnostic definition used, the age group studied, and whether the surveys were conducted online. Studies suggest high comorbidity rates with mood disorders and, among younger individuals, attention-deficit/hyperactivity disorder. Treatment should address any comorbid conditions present, as those may be causing, or exacerbating, problematic Internet use. Interventions that may specifically target problematic Internet use include cognitive behavioral therapy and selective serotonin reuptake inhibitors, but detailed guidelines must await further studies. For a medium that has so radically changed how we conduct our lives, the Internet's effects on our psychology remain understudied. More research is needed into the pathophysiology, epidemiology, natural course, and treatment of problematic Internet use. In addition, the more subtle psychological changes, such as disinhibition, that seem to characterize people's online behavior also deserve attention, even if they cannot be seen as necessarily pathological.

Key words: Internet, problematic use, impulse control disorders, comorbidity, cognitive behavior therapy

The "global village", a metaphor used to describe how the Internet has shortened distances and facilitated the flow of information, has grown to over one billion users (1).

Statistics from across the world highlight its reach and penetrance: 90% of South Korean households connect to high-speed, inexpensive broadband (2); Londoners spend an average of 45 days a year online, more than they spend watching TV (3); and the rate of increase in the number of Internet users in Africa and the Middle East exceeded 1,300% between 2000 and 2009 (4).

For the majority of Internet users, the World Wide Web represents a tremendous wellspring of opportunity that enhances well-being. For others, however, it can lead to a state that appears to meet the DSM definition of a mental disorder, described as a "clinically significant behavioral or psychological syndrome… that is associated with present distress… or with a significantly increased risk of suffering death, pain, disability, or an important loss of freedom" (5).

Scientific understanding of that state has lagged behind media attention (6), in part because of inconsistency in defining the problem (7), disagreement about its very existence (8), and the variable research methodology used in studying it. Still, a body of data by scientists from the East and West (with the East

increasingly leading the way) tells a cautionary tale about the Internet's potential to bring about psychological harm.

DIAGNOSTIC DEFINITION

In 1996, the psychologist K. Young became the first to publish a detailed case report of problematic Internet use (9). Her "patient zero" was a non-technologically oriented 43-year-old homemaker with a "content home life and no prior addiction or psychiatric history", who, within three months of discovering chat rooms, was spending up to 60 hours per week online. She reported feeling excited in front of the computer, and depressed, anxious, and irritable when she would log off. She described having an addiction to the medium "like one would to alcohol". Within one year of purchasing her home computer, she was ignoring household chores, had quit social activities she used to enjoy, and had become estranged from her two teenage daughters and her husband of 17 years.

Based on this and other patients she interviewed, Young proposed the first set of diagnostic criteria for what she termed "Internet addiction". She modeled them on the DSM-IV definition for substance dependence because of similarities she observed with the states of tolerance (needing more of the sub-

stance to achieve the same effect) and withdrawal (psychological and physical discomfort upon reducing or stopping the substance) (9).

Others conceptualized problematic Internet use as a *behavioral* addiction not involving an intoxicant (10), and Young subsequently updated her definition, adapting the DSM-IV criteria for pathological gambling, an impulse control disorder often described as a behavioral addiction, into her Diagnostic Questionnaire (11) (Table 1). The questionnaire, which required at least five of the eight criteria be met for the Internet addiction diagnosis, has not received adequate psychometric testing.

Shapira et al (12) proposed five years later a more inclusive diagnostic schema in the general style of the impulse control disorders. They argued that definitions based solely on substance dependence or pathological gambling were too narrow to capture the population of problematic Internet users and could lead to premature conclusions about the new disorder and the patients. They eschewed the "Internet addiction" label for lack of scientific proof for true addiction and favored the less controversial "problematic Internet use", defining it as: a) maladaptive preoccupation with Internet use, experienced as irresistible use for periods of time longer than intended; b) significant distress or impair-

ment resulting from the behavior; and c) the absence of other Axis I pathology that might explain the behavior, such as mania or hypomania.

To date, only two studies have attempted to develop diagnostic criteria empirically by testing them against the diagnosis made on the basis of a systematic psychiatric interview. Ko et al (13) tested a set of criteria in 468 Taiwanese high school students. Starting with 13 candidate criteria, they eliminated those with low diagnostic accuracy, and determined that a cutoff of six out of the nine remaining criteria had the best diagnostic accuracy while maintaining high specificity (97.1%) and acceptable sensitivity (87.5%). The criterion for functional impairment was listed separately as criterion B and was required for the diagnosis (Table 2). In a second study, Ko et al (14) confirmed the diagnostic accuracy of their criteria in an older cohort of 216 Taiwanese college students. However, the relatively small size of both studies and the non-representative nature of the groups studied limit the applicability of the proposed criteria to the general population.

Several assessment scales have been proposed to screen for, and help diagnose, problematic Internet use. As a group, these instruments show no consensus on the underlying dimensions that constitute the condition (6,15). In addition to Young's Diagnostic Questionnaire, two are in relatively common use in research and/or clinical settings: Young's Internet Addiction Test (16) and the Chen Internet Addiction Scale (17).

Young's Internet Addiction Test (16) consists of 20 "how-often" questions, each rated on a scale of 1 to 5 (1=rarely; 2=occasionally; 3=frequently; 4=often; 5=always.) A score of 80 or above is consistent with problematic use (Table 3). The psychometric properties of the instrument were studied in 86 subjects (18). Six factors were extracted from the questionnaire: salience, excessive use, neglect of work, anticipation, lack of control, and neglect of social life. These factors showed good concurrent validity and internal consistency. Salience explained most of the variance and was also found to be the most reliable as in-

Table 1 Young's Diagnostic Questionnaire for Internet addiction (11)

Diagnosis suggested by five or more "yes" answers to:

1. Do you feel preoccupied with the Internet (think about previous online activity or anticipate next online session)?
2. Do you feel the need to use the Internet for increasing amounts of time in order to achieve satisfaction?
3. Have you repeatedly made unsuccessful efforts to control, cut back, or stop Internet use?
4. Do you feel restless, moody, depressed, or irritable when attempting to cut down or stop Internet use?
5. Do you stay online longer than originally intended?
6. Have you jeopardized or risked the loss of significant relationship, job, educational or career opportunity because of the Internet?
7. Have you lied to family members, therapist, or others to conceal the extent of involvement with the Internet?
8. Do you use the Internet as a way of escaping from problems or of relieving a dysphoric mood (e.g., feelings of helplessness, guilt, anxiety, depression)?

Table 2 Ko et al's proposed diagnostic criteria for Internet addiction (13)

A. Six or more of:
   1. Preoccupation with Internet activities
   2. Recurrent failure to resist the impulse to use the Internet
   3. Tolerance: a marked increase in Internet use needed to achieve satisfaction
   4. Withdrawal, as manifested by either of the following: a) symptoms of dysphoric mood, anxiety, irritability, and boredom after several days without Internet activity; b) use of Internet to relieve or avoid withdrawal symptoms
   5. Use of the Internet for a period of time longer than intended
   6. Persistent desire and/or unsuccessful attempts to cut down or reduce Internet use
   7. Excessive time spent on Internet activities
   8. Excessive effort spent on activities necessary to obtain access to the Internet
   9. Continued heavy Internet use despite knowledge of physical or psychological problem caused or exacerbated by Internet use
B. Functional impairment. One or more of:
   1. Recurrent Internet use resulting in a failure to fulfill major obligations
   2. Impairment in social relationships
   3. Behavior violating school rules or laws due to Internet use
C. The Internet addictive behavior is not better accounted for by another disorder

Table 3 Young's Internet Addiction Test (16)

Answer the following questions on the Likert scale:
1=rarely; 2=occasionally; 3=frequently; 4=often; 5=always

1. How often do you find that you stay on-line longer than you intended?
2. How often do you neglect household chores to spend more time on-line?
3. How often do you prefer the excitement of the Internet to intimacy with your partner?
4. How often do you form new relationships with fellow on-line users?
5. How often do others in your life complain to you about the amount of time you spend on-line?
6. How often do your grades or school work suffer because of the amount of time you spend on-line?
7. How often do you check your e-mail before something else that you need to do?
8. How often does your job performance or productivity suffer because of the Internet?
9. How often do you become defensive or secretive when anyone asks you what you do on-line?
10. How often do you block out disturbing thoughts about your life with soothing thoughts of the Internet?
11. How often do you find yourself anticipating when you will go on-line again?
12. How often do you fear that life without the Internet would be boring, empty, and joyless?
13. How often do you snap, yell, or act annoyed if someone bothers you while you are on-line?
14. How often do you lose sleep due to late-night log-ins?
15. How often do you feel preoccupied with the Internet when off-line, or fantasize about being on-line?
16. How often do you find yourself saying "just a few more minutes" when on-line?
17. How often do you try to cut down the amount of time you spend on-line and fail?
18. How often do you try to hide how long you've been on-line?
19. How often do you choose to spend more time on-line over going out with others?
20. How often do you feel depressed, moody, or nervous when you are off-line, which goes away once you are back on-line?

Scoring: 20-49 points, average on-line user; 50-79 points, occasional or frequent problems because of the Internet; 80-100 points, Internet usage is causing significant problems

Table 4 Chen Internet Addiction Scale (17, adapted)

Focusing on the last three months, rate the degree to which each statement matches your experience (1=does not match my experience at all; 2=probably does not match my experience; 3=probably matches my experience; 4=definitely matches my experience)

1. I was told more than once that I spend too much time online
2. I feel uneasy once I stop going online for a certain period of time
3. I find that I have been spending longer and longer periods of time online
4. I feel restless and irritable when the Internet is disconnected or unavailable
5. I feel energized online
6. I stay online for longer periods of time than intended
7. Although using the Internet has negatively affected my relationships, the amount of time I spend online has not decreased
8. More than once, I have slept less than four hours due to being online
9. I have increased substantially the amount of time I spend online
10. I feel distressed or down when I stop using the Internet for a certain period of time
11. I fail to control the impulse to log on
12. I find myself going online instead of spending time with friends
13. I get backaches or other physical discomfort from spending time surfing the net
14. Going online is the first thought I have when I wake up each morning
15. Going online has negatively affected my schoolwork or job performance
16. I feel like I am missing something if I don't go online for a certain period of time
17. My interactions with family members have decreased as a result of Internet use
18. My recreational activities have decreased as a result of Internet use
19. I fail to control the impulse to go back online after logging off for other work
20. My life would be joyless without the Internet
21. Surfing the Internet has negatively affected my physical health
22. I have tried to spend less time online but have been unsuccessful
23. I make it a habit to sleep less so that more time can be spent online
24. I need to spend an increasing amount of time online to achieve the same satisfaction as before
25. I fail to have meals on time because of using the Internet
26. I feel tired during the day because of using the Internet late at night

dicated by its Cronbach's alpha. However, the selection bias introduced by online recruitment and the small size of the study limit its value.

The Chen Internet Addiction Scale (17) is a self-report instrument composed of 26 items rated on a 4-point Likert scale (adapted in Table 4). It assesses five domains of Internet-related problems: compulsive use, withdrawal, tolerance, interpersonal and health consequences, and time management difficulties. Scores range from 26 to 104. In a study of 454 Taiwanese adolescents who completed the scale and received a structured diagnostic interview, a cutoff of 64 was shown to have high diagnostic accuracy and specificity (88% and 92.6%, respectively) (19). The internal reliability of the scale and subscales in the original study ranged from 0.79 to 0.93 (17).

PREVALENCE

Due to the lack of consensus on diagnostic criteria and the dearth of large epidemiological studies, the prevalence of problematic Internet use in the general population has not been established. Overall, prevalence surveys conducted in various countries fall into two main categories, online vs. offline studies, with the former typically yielding higher rates, most likely because of inherent selection bias (20).

Only two epidemiological studies exploring the prevalence of problematic Internet use in the general population have been published. One was conducted in the US, the other in Norway (20,21).

The US study used random-digit telephone dialing (cellular phone numbers were not included) to interview 2,513 adults taken from all 50 states in a manner proportional to the population in each state (20). More than half of the people reached agreed to be interviewed. Participants' average age was 48, and 51% fell in the middle class socio-economic stratum. 68.9% were regular Internet users. The authors' diagnostic definition, based on published criteria and on similarities with impulse control disorders, substance dependence and obsessive-compulsive disorder, required:

a) Internet use that interferes in personal relationships; b) preoccupation with the Internet when offline; c) unsuccessful attempts at quitting or cutting down; and d) staying online longer than intended. This definition yielded a point prevalence of 0.7%. Less stringent definitions yielded higher prevalence rates, and individual features consistent with problematic Internet use were endorsed by as many as 13.7% (respondents who found it hard to stay offline for days in a row).

In the second study, Bakken et al (21) mailed Young's Diagnostic Questionnaire to 10,000 inhabitants of Norway, randomly selected from a database of the entire population. 3,399 completed questionnaires were returned (a somewhat lower response rate than the US study). Recipients of the mailed questionnaire also had the option of completing it online. Among respondents, 87% were Internet users. The prevalence of "addicted Internet use" (≥5 questions answered "yes") was calculated to be 1%, whereas the prevalence of "at risk" Internet use (3-4 questions answered "yes") was 5.2%. Multivariate analysis showed young age, male gender, higher educational achievement, and financial stress to be positively associated with "problematic Internet use" (defined by the authors to include both "Internet addicts" and "at risk" respondents).

Prevalence rates among adolescents have been researched more extensively, perhaps because the so-called "digital natives" grew up incorporating the Internet in many aspects of life and as a result are perceived to be at higher risk. However, even when online-based surveys are excluded, the results can vary widely and are difficult to compare, due to differences in Internet access, recruitment methodology, the exact age bracket studied, and the definitions utilized. Considering only relatively large and offline studies, research from China (22), South Korea (23,24), Greece (25), Norway (26), and Iran (27) has yielded prevalence estimates ranging between 2% and 11%.

COMORBIDITY

Problematic Internet use has not been

incorporated into large-scale epidemiological studies aimed at estimating the relative prevalence of mental disorders. Still, a review of published studies reveals that the presence of other psychiatric conditions in patients with problematic Internet use is the rule rather than the exception (6). The studies, however, were not designed or statistically powered to detect the nature of the association (cause, effect, or independent).

In Bakken's general-population study (21), based on subjects' self-report, 41.4% of Internet "addicts" reported feelings of depression in the 12-month period prior to the study, compared to 15.8% of non-problematic users. Sleep disturbances, anxious feelings, and alcohol and substance abuse were also more common (38.6% vs. 26.4%, 36.4% vs. 5%, and 13.6% vs. 1.1%, respectively). However, the questions used to assess co-occurring psychological impairment were not based on established criteria for mood, sleep, anxiety, or substance use disorders.

Two US case series involved face-to-face interviews of adult patients with problematic Internet use. Black et al (28) assessed 21 subjects with the Diagnostic Interview Schedule and found the lifetime prevalence of mood disorders and major depression to be 33% and 15%, respectively. Further, 38% had a lifetime substance use disorder and 19% had a lifetime diagnosis of anxiety disorder.

In a case series that included 20 patients, Shapira et al (29) found a very high (70%) lifetime prevalence for bipolar affective disorder, type I or II, compared with 15% for major depression. Fifty-five percent had a lifetime prevalence of substance abuse, and 45% met criteria for social anxiety disorder. Fifty percent of subjects had a lifetime diagnosis of an impulse control disorder. The authors highlight their observation that patients' Internet-related symptoms were more impulsive and egosyntonic than compulsive and egodystonic, concluding that problematic Internet use resembles the DSM-IV definition of an impulse control disorder more closely than that of obsessive-compulsive disorder. Our clinical experience supports this conclusion.

As a group, surveys conducted among high school and college students show similarly high comorbidity rates with mood and anxiety disorders, but a link between attention-deficit/hyperactivity disorder (ADHD) and problematic Internet use seems more obvious than among adults. One study in 752 South Korean elementary students found that 33% of those with ADHD also met criteria for problematic Internet use (30). Another study in 216 Taiwanese college students showed that 32% subjects with problematic Internet use also had ADHD compared to only 8% of regular Internet users (31). Whether Web-based activities appeal to the short attention span of ADHD sufferers or whether excessive Internet use may cause inattention remains to be elucidated.

TREATMENT

The clinical evaluation of the patient with problematic Internet use should include a careful assessment of the comorbid conditions frequently present. Those should then be treated according to established treatment guidelines. To the extent that the Internet-related problem may stem from another diagnosis (e.g., a patient with severe social anxiety who starts leading a "virtual" life at the expense of offline interactions), it might improve as the primary condition is addressed.

Pharmacotherapeutic and psychotherapeutic interventions specific to problematic Internet use have not yet received adequate testing in large, rigorous studies. Pharmacotherapy often begins with selective serotonin reuptake inhibitors (SSRIs). However, while effective in treating obsessive-compulsive disorder, SSRIs have shown mixed results in impulse control disorders (32-36). In light of the greater similarity between problematic Internet use and impulse control disorders compared to obsessive-compulsive disorder (29), it is unclear whether SSRIs will ultimately prove beneficial, and no double-blind placebo-controlled studies have been published so far.

One discontinuation study tested escitalopram, 20 mg/day, in 19 subjects with problematic Internet use (37). During the 10-week open-label phase, subjects showed significant decreases in weekly hours spent online (from a mean of 36.8 hours to 16.5 hours) and improvement in global functioning. At the end of the 10 weeks, subjects were blindly randomized to either continued escitalopram treatment or to placebo. Beyond that, they were followed for 9 weeks. No significant difference was seen between the two groups at the end of the second phase, as gains achieved at week 10 were maintained in both treatment groups. The authors speculate that nine weeks may have not been sufficient for the effect to be lost in the placebo group or for additional gains to be made in the escitalopram group, but do not rule out the possibility that the improvement seen in the open-label phase may have been a placebo response.

One case study reported successful treatment with naltrexone (38), a drug that has shown benefit in other impulse control disorders (39,40). The patient was a 31 year old male with compulsive cybersexual behavior who had failed antidepressants, group and individual psychotherapy, Sexual Addicts Anonymous, and pastoral counseling. Naltrexone (150 mg/day), gradually added to a stable dose of sertraline which on its own had been ineffective in treating his problematic Internet use, helped induce a three-year remission. The authors hypothesize that, by blocking the capacity of endogenous opioids to trigger dopamine release in response to reward, naltrexone may block the reinforcing nature of compulsive Internet sexual activity.

Another case study reported the successful use of an atypical antipsychotic, quetiapine, 200 mg/day, gradually added to citalopram, in a 23 year old subject with problematic Internet use (41). The improvement was maintained at four-month follow-up.

More recently, a study tested methylphenidate in 62 children with ADHD who were Internet video game players (42). Participants' average age was around 9. After 8 weeks of treatment (average dose 30.5 mg/day), Internet usage decreased significantly and correlated with reduction in ADHD symptoms. The

authors cautiously suggest that methylphenidate might be beneficial as a treatment for problematic Internet use, especially when co-occurring with ADHD.

Of the psychotherapy approaches used, cognitive behavioral therapy (CBT) has received the most empiric investigation. The largest study enrolled 114 adult subjects and employed CBT interventions including: keeping a daily log of Internet activity, teaching time management skills, and confronting cognitive distortions and rationalizations frequently used by patients to justify continued Internet usage, such as "just a few more minutes won't hurt" (43). Most subjects were able to control their symptoms by the eighth session, and improvement was sustained over a 6-month follow-up.

For children and adolescents, family-based interventions that improve communication and teach family monitoring of Internet use can be helpful (44). However, the intensive (and typically very expensive) residential treatment options that have received much media attention have undergone little empiric investigation to warrant a strong recommendation (2,45). The same applies to online treatment websites that encourage the person with problematic Internet use to "click here if you are addicted to the Internet".

CONCLUSIONS

For a medium that has so radically changed the way we conduct our lives, the Internet's effects on our psychological health remain understudied. Simply stating that similar fears were raised when the radio, movies and early video games were introduced is not sufficient: the immersive and interactive qualities of the virtual world, and its sheer penetrance, make it potentially more serious.

Also deserving of exploration are the more subtle psychological changes that occur in the virtual world, such as online disinhibition and increased risk-taking (46). Those changes are not necessarily evidence of "Internet addiction", and may not be pathological, but, as important features of the new virtual psychology, should also be studied.

As our field continues to debate whether their condition belongs in the next edition of the DSM (47), patients continue to present with symptoms born out of the digital age, and their symptoms are changing as the technology evolves from browsers, to "crackberries", to "smart phones" that combine texting, talking, video games, and browsing in one device that to many is like a new appendage. Even the "problematic Internet use" designation now seems outdated, which is why some have wisely opted for "pathological use of electronic media", instead (47). Technology, like media outlets, remains far ahead of scientific investigation. Given the dramatic changes that our society is undergoing as a result of the Internet revolution, it behooves us to try to bridge the gap.

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