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Internet Addiction

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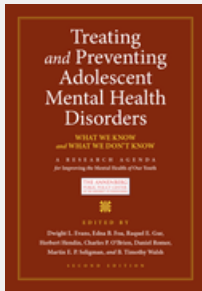
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Treating and Preventing Adolescent Mental Health Disorders: What We Know and What We Don't Know (2 ed.)

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Internet Addiction

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(p. 586) Overview



The Internet has transformed the way youth communicate, learn, and network, with implications for their broader social, psychological, and physical health and well-being. For example, according to the Pew Research Center, 95% of adolescents (ages 12-17) and young adults (ages 18-29) in the United States are online, which is a figure that has for the most part remained stable for nearly a decade (Madden, Lenhart, Duggan, Cortesi, & Gasser, 2013). Differences in Internet access based on income and race are not as steep as previously noted, especially among younger adults (Smith, 2014). Among youth in the United States, estimates of time spent on a computer, but not necessarily online, range from an average of 1.4 hours per day among 15- to 18-year-olds (Rideout, Foehr, & Roberts, 2010) to 2.6 hours per day among 12- to 17-year-olds (Bleakley, Vaala, Jordan, & Romer, 2014). Mobile technologies like smartphones have made the Internet more accessible, and ownership of such devices among youth has increased (Madden et al., 2013). Of course, Internet use among youth is a global phenomenon,

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and not limited to Western countries, but together these trends provide mere snapshots of the time some youth spend online and the technologies that make it possible to do so.

What is internet addiction?



With the ability to access the Internet from anywhere, at any time, paired with the enormous variety of Internet activities in which youth engage (e.g., social networking, chatting, streaming videos, playing games, watching television content), instances of problematic Internet behavior have emerged. The term “Internet addiction” is often used to describe compulsive Internet use similar to clinically diagnosable behavioral and substance use addictions. However, there is widespread disagreement about basic terminology and definitions pertaining to the idea of Internet addiction, and whether it is actually a diagnosable condition or disorder (Mitchell, 2000). The DSM-5 (American Psychiatric Association, 2013) included Internet gaming disorder as a condition for further study. Although the focus of this disorder is the “persistent and recurrent use of the Internet to engage in games, often with other players,” the authors point out that Internet gaming disorder is also referred to as “Internet use disorder, Internet addiction, or gaming addiction.” Obviously, two of these terms are not specific to Internet gaming and appear to conflate different concepts under the rubric of Internet overuse. While inclusion in the DSM was recommended by several scholars (Block, 2008; Petry & O’Brien, 2013; Pies, 2009), in their current form the proposed criteria seem to do little to clarify any differences.

In addition to “Internet addiction,” synonymous terms include “cyberspace addiction, online addiction, net addiction, Internet addicted disorder, and high Internet dependency” (Douglas et al., 2008). Terms used in the literature to describe closely related phenomena include “Internet addiction disorder,” “pathological Internet use,” “problematic Internet use,” “excessive Internet use,” and “compulsive Internet use” (Douglas et al., 2008). In general these terms share conceptual notions of underlying pathology but may vary with regard to diagnostic criteria (Petry et al., 2014), the extent to which Internet addiction should be characterized as a psychiatric disorder or a problematic behavior pattern (Yellowlees & Marks, 2007), and whether the problems associated with Internet use arise from the medium itself or specific uses of it (e.g., social networking, gaming; van Rooij, Schoenmakers, Van de Eijnden, & van de Mheen, 2010).

How is Internet Addiction Assessed?



Internet addiction as a measurable concept emerged through the work of Young (1996, 1998), who pioneered much of the early Internet addiction research. Young contended that Internet addiction is an impulse control disorder, similar to pathological gambling. The terms “impulse control disorder” and “addiction” are often used interchangeably but are defined using different, although overlapping, (p. 587) criteria (Potenza, 2006). The main difference between “addiction” disorders and “impulse control” disorders is that impulse control disorders do not involve a substance or intoxicant. Because of similarities between pathological gambling and Internet addiction, Young adapted the DSM-IV criteria used to diagnose pathological gambling for the identification of Internet addiction. Some modifications (to be discussed below) have been proposed and to some extent implemented since.

Young (1996) specified eight screening criteria to classify (if at least five were answered affirmatively) respondents as Internet addicts:

1. Preoccupation or salience: Do you feel preoccupied with the Internet (think about previous online activity or anticipate next online session)?

2. Tolerance: Do you feel the need to use the Internet for increasing amounts of time to achieve satisfaction?
3. Loss of control: Have you repeatedly made unsuccessful efforts to control, cut back, or stop your Internet use?
4. Withdrawal: Do you feel restless, moody, depressed, or irritable when attempting to cut down or stop your Internet use?
5. Loss of control: Do you stay online longer than originally intended?
6. Interference with work or career: Have you jeopardized or risked the loss of a significant relationship, job, or educational or career opportunity because of the Internet?
7. Need to conceal behavior: Have you lied to family members, a therapist, or others to conceal the extent of your involvement with the Internet?
8. Escape: 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)?

In 2003, Shapira et al. proposed more diagnostic criteria that were consistent with Young's thinking of Internet addiction as an impulse control disorder but were not as broad "as to ignore other known psychiatric disorders that may account for patient's symptomology" (Shapira et al., 2003). In particular, they suggested that a diagnosis of Internet addiction should not be made if excessive use occurred exclusively during periods of hypomania or mania and therefore would be better accounted for by other disorders. The DSM-5 focuses on one form of Internet use: playing games either alone or with others, such as in massive multiplayer online games (MMOGs). It includes one additional criterion that is also common in addictive disorders: loss of interest in other activities, which in the case of gaming includes other forms of entertainment.

Young's eight diagnostic criteria, referred to as the Diagnostic Questionnaire for Internet Addiction, have been treated as a scale with eight yes-or-no items, with some reports of reliability exceeding .70 (standardized alpha = .76 [Johansson & Goetstam, 2004]; 0.72 [Cao et al., 2007]). Eventually, however, Young (1998) developed an expanded 20-item instrument scored on a 0-to-100 scale, called the Internet Addiction Test, which elaborated on the original criteria based on the diagnostic criteria for compulsive gambling and alcoholism (Beard & Wolf, 2001). The Internet Addiction Test was intended to identify two groups: those exhibiting Internet addictive behavior (scores ≥ 70) and those not clearly addicted but for whom Internet use may be problematic (scores 40-69). This test is considered a reliable and valid scale based on initial psychometric testing (Widyanto & McMurrin, 2004). More information on the factors underlying the items (salience, anticipation, excessive use, lack of control, and neglect of work or social life) and the items themselves can be found in Widyanto and McMurrin (2004). A recent review of research specifically related to Internet gaming disorder (Petry, Rehbein, Ko, & O'Brien, 2015) noted that the most diagnostic symptoms were those related to giving up other activities and exhibiting tolerance to gaming.

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There are many other standardized instruments used to assess problematic or addicted Internet use, and subdimensions are not identical across the tools. Lortie and Guitton (2013) reviewed 14 questionnaires used to (p. 588) assess excessive Internet use and provided an overview of their psychometric properties. They concluded that there is great variation in assessment methods as well as study methodology, and that social aspects of the behavior, such as social motivation for overuse, are often missing from these scales (Lortie & Guitton, 2013). The three dominant dimensions among the assessment tools they reviewed were compulsive use, negative outcomes, and salience. It is also important to recognize that instruments such as the Internet Addiction Test rely on self-reports of symptoms on questionnaires and thus may be less sensitive than clinical interviews (Beard, 2005).

Does Internet Addiction Resemble Other Addictions?



Griffiths (2005) argues that the characteristics of substance use addiction apply equally well to behaviors such as Internet addiction (Kuss, Shorter, van Rooij, Griffiths, & Schoenmakers, 2014). In particular, Griffiths (2000, 2005) proposes that core components of addiction, including preoccupation, mood modification, tolerance, withdrawal, conflict, and relapse, are all evident to various degrees in excessive Internet users. Kuss et al. (2014) assessed these criteria in two samples of adolescents and young adults using self-reports and found support for the components model in classifying Internet addiction as a disorder similar to substance use addiction. That Internet addiction shares features with other impulse control disorders has also been supported by other research (Shapira, Goldsmith, Keck, Khosla, & McElroy, 2000; Shapira et al., 2003).

Researchers who study gambling disorders (e.g., Kuss & Griffiths, 2012; Shaffer et al., 2004) argue that all addictions, including behavioral addictions such as pathological gambling, are manifestations of an underlying addiction syndrome with similar behavioral and neurobiological characteristics. Although research examining brain correlates of persons with Internet addiction is still emerging and has focused more heavily on Internet gaming, a review by Brand, Young, and Laier (2014) found that “the brain of Internet addicted individuals reacts with craving to the confrontation with Internet-related cues in the same way as the brain of substance-dependent individuals reacts on substance-related stimuli.” There is also growing evidence that persons with Internet addiction exhibit impulse control problems similar to those with substance use disorders (Brand et al., 2014). A study of young men with Internet gaming disorder found differential ventral versus dorsal striatal brain responses to gaming cues that were similar to those of persons unable to control their substance use (Liu et al., 2016). This evidence suggests that the same executive function weaknesses that characterize drug use in adolescents also apply to youth engaging in problematic Internet use, including online gaming (Billieux et al., 2015).

Despite the ability to classify persons regarding their problematic Internet use, controversy surrounds the meaning of the classification. In particular, some argue that rather than being a unique disorder, it is more useful to consider it a coping mechanism for other problems (e.g., Davis, 2001). Others question whether the behavior is truly an addiction to the Internet per se or merely a convenient outlet for behavior that would otherwise occur offline, such as gambling, gaming, or use of pornography (e.g., Griffiths & Pontes, 2014).

Cognitive-Behavioral Model of Internet Addiction



One model of problematic Internet use introduced by Davis (2001) uses a cognitive-behavioral approach that labels the behavior as “pathologic Internet use” (PIU) rather than Internet addiction. This model posits the preexistence of other mental disorders as a diathesis

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for PIU. In particular, the model suggests that persons with depression, anxiety, or substance use disorders may retreat to the Internet as a way of coping with their disorder, especially as a substitute for offline social activity. Furthermore, certain maladaptive cognitions that accompany these disorders can enhance attraction to the Internet, such as beliefs of low self-worth that incline the (p. 589) user to retreat to more satisfying online forms of interaction with persons unknown to the individual, such as gaming or certain types of social networking. Social isolation and lack of social support in the offline world, often associated with other disorders, are likely to increase attraction to such online forms of social interaction.

The major difference between the Davis model and addiction models is that the Davis model does not require an addictive process to motivate excessive and compulsive use of the Internet. The person with PIU is using the Internet as an ineffective coping mechanism for other disorders characterized by maladaptive beliefs about the self and the world (Caplan, 2010; King & Delfabbro, 2014). Nevertheless, the symptoms of PIU are largely the same as those of systems that consider compulsive Internet use as an addiction (Davis, 2001). Thus, as with many other disorders in the DSM, symptom clusters for one diagnosis may overlap with those of other disorders, and heterogeneity in underlying pathogenesis may be masked by apparently similar symptoms (Insel & Cuthbert, 2015).

Caplan (2010) attempted to integrate the Davis model with impulse control disorders. In his model, social anxiety associated with face-to-face interaction is proposed as a diathesis for PIU, with persons exhibiting this condition preferring to socialize on the Internet rather than in offline activity. In addition, persons with this characteristic find online interaction effective for regulating their moods and reducing loneliness. These preferences for online social interaction are said to lead to the inability to regulate online behavior. Tests of the model have shown that it can explain considerable variation in PIU in both Internet gamers (Haagsma, Caplan, Peters, & Pieterse, 2013) and users of the Internet in general (Caplan, 2010). A meta-analysis of the relation between social anxiety and PIU found support for the cognitive-behavioral models, with an effect size of $r = .20$ (Prizant-Passal, Shechner, & Aderka, 2016). Another meta-analysis of the relation between PIU and reports of loneliness found the two significantly related, $r = .32$ (Tokunaga & Rains, 2016). Nevertheless, it is likely that the individuals who experience difficulty in regulating their online behavior experience deficits in self-control that increase their risk for PIU.

Research examining comorbidities between Internet addiction and other psychiatric disorders suggests that the condition exhibits a profile similar to substance use disorders (Ho et al., 2014). A meta-analysis of 1,641 patients with Internet addiction and 11,210 controls, primarily in Asian countries, found rates of comorbidity ranging from 13% to 26%. The highest comorbidity in adolescents was with alcohol abuse (25%), followed by attention-deficit/hyperactivity disorder (ADHD; 20%), anxiety (20%), and depression (14%). The meta-analysis by Tokunaga and Rains (2016) found a correlation of $r = .42$ between PIU and depressive symptoms. It is difficult to determine the source of these comorbidities, because attempts to withdraw from Internet use may produce problems of their own. On the other hand, onset of ADHD is likely to predate the appearance of Internet addiction, consistent with evidence that persons with Internet addiction exhibit executive control deficits (Brand et al., 2014).

A large prospective study of Chinese adolescents ages 13 to 18 found that about 6% of the youth exhibited moderate to severe levels of PIU using Internet Addiction Test criteria (Lam & Peng, 2010). This group was 2.5 times more likely to develop symptoms of depression 9 months later. However, there was no increase in symptoms of anxiety. This study suggests that depression is a potential consequence of Internet addiction in adolescents, while anxiety and alcohol use may more likely be correlates or precursors. A longitudinal study of third- to eighth-grade students in

Singapore (Gentile et al., 2011) found that continued pathological use of videogames predicted increased symptoms of depression and anxiety. Consistent with the cognitive-behavioral model, youth with poor social skills were more likely to be classified as pathological gamers. However, consistent with addiction models, youth with impulse control problems were overrepresented (p. 590) as pathological gamers. A longitudinal study of adolescents and young adults in the United States found that heavy Internet use, including gaming, was both a consequence and a precursor of depressive symptoms (Romer et al., 2013). Similarly, a longitudinal study of adolescents in Spain found that prior depressive symptoms predicted later Internet use and symptoms of Internet addiction and that prior symptoms of Internet addiction predicted later depression symptoms (Garmez-Guadix, 2014). Thus, bidirectional relations between depression and Internet addiction are likely to characterize the condition in adolescents.

A recent study of 1,057 primarily young, European MMOG players (mean age 26) attempted to disentangle the sources of Internet gaming disorder (Billieux et al., 2015). The authors found that about half reported relatively high levels of Internet addiction symptoms. However, it was possible to identify three subtypes with this condition. In support of the cognitive-behavioral model, one type was characterized by low self-esteem, high impulsivity, and high needs for escape from life problems. These players appeared to play MMOGs as a coping mechanism for life problems. However, two other groups did not display deficits in self-esteem as predicted by the Davis model. One group appeared to be motivated by the achievement opportunities afforded by the game, but the members of this group were also highly impulsive, suggesting that they also had problems controlling their behavior. The members of the third group were also highly impulsive but very controlled in other ways (high levels of perseverance), suggesting that their play was more characteristic of a compulsive disorder. These divergent patterns suggest that although Internet gaming disorder is characterized by impulse control problems (see also Gentile et al., 2011), it is a complex behavior that may reflect very different underlying motivations. Among those who did not display symptoms of Internet addiction but who played at high rates, there was evidence that the games were attractive for their social value. Other studies of online MMOG players have found that many can be characterized as highly social and interested in gaming for both its social rewards and its opportunity for achievement (Herodotou et al., 2014). Thus, simply spending time on MMOGs does not imply disorder.

Does the Type of Internet Use Matter?



In his development of the cognitive-behavioral model, Davis argued for a distinction between two types of pathological Internet use (PIU): specific use and generalized use. In specific use the user has an addictive disorder, such as pathological gambling, and then migrates to the Internet to satisfy the addiction. In that case, PIU is restricted to a behavior that would otherwise occur offline. Alternatively, generalized use is a broader condition that refers exclusively to online activities, for example social media. In such instances, the Internet may be used to overcome problems in maintaining satisfying social relationships offline. Griffiths, too (1999, 2010, 2012; Widyanto & Griffiths, 2006), has maintained that the concept of Internet addiction is too broad to be useful. He notes that we should distinguish between “addictions *on* the Internet” and “addictions *to* the Internet.” The former merely represent the use of the Internet to satisfy addictions (perhaps more conveniently) that are also pursued offline, such as gambling, video gaming, or use of pornography. However, if the behavior is particularly attached to the Internet (e.g., social networking or playing MMOGs), this might suggest that it truly is a form of addiction to the Internet, at least for the uses to which it is put. This distinction is less about the breadth of Internet use than the need to use the Internet to satisfy a particular addiction.

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Research supports the notion that specific uses often dominate PIU (see Lam, 2014). For example, in a longitudinal sample of Dutch adolescents, van Rooij et al. (2010) found that time spent on the specific Internet application of online gaming (both MMOGs and casual, or simple and free, games) was most strongly associated with PIU in their sample. Nevertheless, PIU was also associated with downloading, social networking, chatting, instant messaging, and blogging (van Rooij et al., 2010). Several (p. 591) studies have demonstrated an association between online gaming and PIU (e.g., Billieux et al., 2015; Kiraly et al., 2014), but the relation between social anxiety and gaming appears to be stronger than between some forms of online social interaction, such as instant messaging and using email (Prizant-Passal et al., 2016).

Despite the prevalence of online gaming in Internet addiction, it is not always the most dominant activity associated with the condition. Kuss et al. (2013) found that social networking rather than online gaming was the activity most closely associated with PIU in British college students. A study of 4,875 16-year-old Hungarian high school students reported rates of PIU as well as problematic online gaming (Kiraly et al., 2014). The study found that 15.5% could be classified as engaging in PIU; however, less than half of this group (6.7%) engaged in problematic online gaming. In contrast, more than half of the problematic gamers were also classified as engaging in PIU. Thus, it appears that problematic gaming is an important subset of PIU in adolescents but that PIU can encompass a broader set of problematic Internet activities, a finding observed in other studies (e.g., van Rooj et al., 2010).

In sum, it is difficult to determine the exact nature of the behavior variously labeled as Internet addiction, PIU, or Internet gaming disorder. There is very little research designed to determine whether youth who use the Internet excessively do so primarily to satisfy a preexisting addiction, such as gambling. These ambiguities extend to the interpretation of prevalence rates of problematic Internet behavior.

How Widespread is Internet Addiction?



Competing definitions and theoretical approaches to Internet addiction, in addition to inconsistent measurement, have led to a range of estimates on the prevalence of PIU (Moreno et al., 2011). Two studies on Internet behavior among adolescents from Europe are worth mentioning because of their cross-national samples. A study by Durkee et al. (2012) included 11,956 participants (mean age 14.9 [SD 0.89]) from 11 European countries and found that the overall prevalence of what they called PIU was 4.4%. Estimates varied by gender and country, with males exhibiting greater PIU than females. A later study by Tsitsika et al. (2014) found that 1% of 13,284 adolescents from seven European countries exhibited Internet addiction based on the Internet Addiction Test, with 12.7% exhibiting problematic Internet behavior. The authors concluded that 13.9% showed “dysfunctional” Internet behavior, defined as the sum of the two Internet Addiction Test classifications. Similar to the Durkee et al. (2012) study, differences were found in rates by gender and country, once again with boys displaying greater Internet addiction than girls.

The DSM-5 states that the prevalence of Internet addiction seems to be highest in Asian countries (American Psychiatric Association, 2013), although rates vary from study to study and between countries. A meta-analysis of studies across 31 countries (Cheng & Li, 2014), which included samples of respondents ages 12 to 41 (average age 18.4), did not find lower rates of Internet addiction in the United States (8.0%) compared to Asia (7.1%) or northern and western Europe (2.6%). A large study across six Asian countries (China, Hong Kong, Japan, the Republic of Korea, Malaysia, and the Philippines) involving a randomly selected sample of over 5,000 adolescents ages 12 to 17 found rates ranging from 1.2% in the Republic of Korea to 4.9% in the Philippines using Internet Addiction Test cutoffs (Mak et al., 2014). The authors noted that their

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rates were higher than those observed in Europe, which as noted above tended to have rates closer to 1% using the Internet Addiction Test. However, it is in the category of problematic Internet use (the less serious form of Internet addiction according to Young's classification) that Asian youth appear to be at greater risk. In the Mak et al. study, these rates ranged from 12.5% in the Republic of Korea to over 40% in Japan and the Philippines. Rates in college students may be even higher. In a survey of 3,616 college students in Taiwan, Internet addiction prevalence measured using the Chen Internet (p. 592) Addiction Scale—Revision (CIAS-R) was 15.3% (Lin, Ko, & Wu, 2011).

There is evidence that youth who exhibit symptoms of Internet addiction will no longer show signs of the disorder within a year's time. A remission rate of 50% was observed in samples of Taiwanese adolescents (Ko et al., 2007). On the other hand, Gentile et al. (2011) observed a much lower rate of remission for Internet gaming disorder in Singapore (16%). Whether these differences are due to the type of behavior (gaming vs. other forms of online behavior) or to other factors is difficult to determine. Nevertheless, the evidence suggests that at least some forms of the condition may be relatively temporary and that it can remit on its own without intervention. This also has implications for evaluating treatment interventions that do not assess long-term outcomes.

Characteristics and Correlates of Problematic Internet Use in U.S. Adolescents



Using data from a national survey of adolescents and their parents in spring 2012 (the Annenberg Media Environment Survey), we investigated problematic Internet behavior and its various correlates in an effort to gain a more comprehensive understanding of U.S. youth who report symptoms of Internet addiction. Data were obtained from an online survey of 629 adolescents ages 12 to 17 and one of their parents who were members of an Internet research panel maintained by the survey firm Gfk (see Bleakley et al., 2014, for details of the procedure). The panel comprised parents recruited through random-digit dialing or address-based sampling procedures in an effort to reach as representative a sample of U.S. adolescents as possible. We present findings here weighted to be representative of the U.S. population of 12- to 17-year-olds based on age, gender, race/ethnicity, region, metro status, and household income.

Adolescents were asked to answer four questions about their Internet use, irrespective of whether it was accessed through a computer or a cellphone. These items were adapted from Young's original criteria (described above) and, using a 4-point scale ranging from 0 (never) to 3 (often), measured the frequency with which adolescents had the following experiences when using the Internet:

1. You stay on the Internet (online) longer that you thought you would
2. You find yourself thinking about when you will go online again
3. You have trouble trying to cut down on the amount of time you spend online
4. Your grades or schoolwork have suffered because of the amount of time you spend online

A composite problematic Internet scale was created for analytic purposes (Cronbach's alpha = 0.82; mean: 1.20, SE: 0.04). Distributions (p. 593) of these items are shown in Table 28.1, with the distribution of the index presented in Figure 28.1.

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Table 28.1 Frequencies for Symptoms of Problematic Internet Use

Item %	Never %	Rarely %	Sometimes %	Often %
Stay online longer than you thought you would	6.1	17.6	54.7	21.6
Think about when you will go online again	25.7	37.4	28.0	9.0
Have trouble cutting down the amount of time you spend online	32.1	37.4	21.1	9.3
Grades or school have suffered because of amount of time online	60.0	24.2	12.4	3.3

Weighted estimates.

From Bleakley et al., 2016.

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The most commonly reported behavior was staying online longer than anticipated. As seen in Figure 28.1, only 15.7% of the sample reported experiencing the symptoms on average more often than sometimes. Nevertheless, the problematic Internet index was correlated with reports of weaker grades at school ($r = .18$). Surprisingly, neither age nor gender was related to the index.

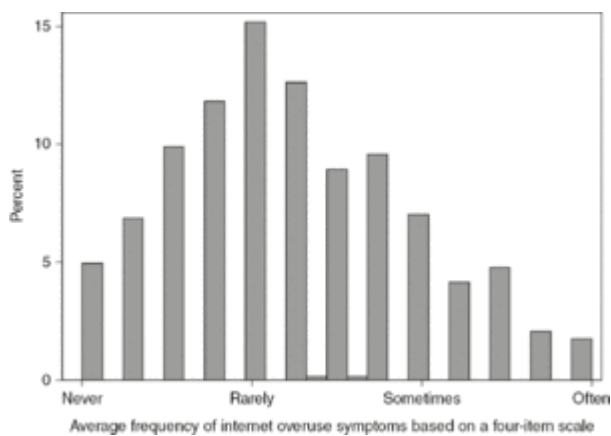


Figure 28.1
Unweighted distribution of problematic Internet use scale. (Four items, $\alpha = .82$) (From Bleakley et al., 2016)

We asked about various uses of the Internet that might be related to our index. The strongest relation with the index was for socializing with friends, including using instant messaging or chatting ($r = .40$), which about 23% of the adolescents reported doing most days of the week. Also related were other social activities, such as using social networks ($r = .25$), playing MMOGs ($r = .30$), and blogging ($r = .28$). Accessing YouTube was also common and related to problematic use ($r = .29$). Using the Internet for schoolwork ($r = .05$) or as a source of news ($r = .17$) were less related to problematic use. Use of other entertainment media, namely watching television and playing videogames, was unrelated (r 's = $-.02$ and $.07$, respectively). These patterns are consistent with other research showing that heavy use of the Internet can be separated from other forms of entertainment and that using the Internet for school and acquiring information is not associated with unhealthy outcomes (Romer et al., 2013). Youth who scored higher on the index were also somewhat less likely to participate in school activities, such as sports ($r = -.10$), clubs ($r = -.14$), and voluntary community service ($r = -.12$). All of these relations are consistent with the finding that PIU is associated with a wide range of Internet activity and that youth with PIU are more socially isolated offline.

Youth scoring higher on the index appeared to experience greater stress in their lives, including less favorable relations with parents and greater exposure to both online and offline harassment from peers. An index of recent experience of stress was correlated ($r = .31$) with the problematic Internet index. Youth with higher scores also reported receiving less support from their parents, such as praise for doing well in school and getting help with schoolwork. Indeed, they reported receiving more criticism and blame from their parents than youth (p. 594) with lower scores on the index. This pattern is consistent with findings from studies of both Asian (Chng, Li, Liau, & Khoo, 2015; Liu, Fang, Deng, & Zhang, 2012) and European (Siomos et al., 2012) adolescents exhibiting PIU, who also report less favorable relations with parents. In addition, adolescents with higher scores on the index reported less parental monitoring of their behavior outside the home ($r = -.33$), a pattern consistent with their also experiencing more harassment both online

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and offline. Other research with the same sample found that adolescents with less parental monitoring experienced greater harassment online, such as receiving upsetting emails or instant messages and having rumors posted about them on social media (Khurana et al., 2015).

The associations we observed with problematic Internet use among U.S. adolescents suggest that youth who engage in this behavior have a less favorable social environment both at home and school. This pattern is consistent with the Davis model, which emphasizes poor social support and other adverse conditions as precursors to PIU. It is not surprising, therefore, that those who reported feeling “sad or hopeless for a period of at least two weeks during the past year” were more likely to report problematic Internet use than those who did not. Nevertheless, this could also be an outcome of Internet use. Finally, in a further analysis of the data from this survey, Bleakley et al. (2016) found that motor impulsivity was a significant correlate of the index controlling for parenting behavior, time spent online, and demographic characteristics. Thus, our findings suggest that PIU in youth is bound up with a constellation of risks for poor mental health, including the family, the peer group, individual characteristics, and excessive use of the Internet.

Other Health Correlates



Another health-related outcome associated with problematic Internet use is lack of sleep. A review by Lam (2014) of four studies (all conducted in East Asia) found that problematic Internet use was associated with sleep problems, such as insomnia, short sleep duration, and poor sleep quality. The Annenberg Media Environment Survey also supports an association between problematic Internet use and sleep outcomes. For example, the problematic index was positively correlated with using media in the hour before bed, which is related to poor sleep (Cain & Gradisar, 2010), and time spent at night using media (from 6 p.m. to bedtime). Similarly, the index was negatively correlated ($r = -.15$) with reported average number of hours spent sleeping per night. Furthermore, self-reports of general health status on a scale of very poor to excellent were also negatively correlated ($r = -.23$) with the index, such that youth with more problematic use of the Internet had poorer self-reported health.

More general societal indicators have also been linked to Internet addiction. The meta-analysis across 31 countries conducted by Cheng and Li (2014) found that various quality-of-life indices were related to Internet addiction, in particular time spent commuting to work and levels of air pollution. In addition, countries with lower life satisfaction ratings were likely to report higher levels of Internet addiction. The authors suggested that people living in high-stress, poor-quality environments may be more inclined to spend time on the Internet, leading to higher levels of Internet addiction.

Therapeutic Interventions



The cognitive-behavioral approach described by Davis (2001) suggests that cognitive symptoms often associated with PIU actually precede the use, which is in contrast to other models that contend that PIU results in adverse cognitive symptoms, such as “feelings of self-consciousness, low self-worth, a depressogenic cognitive style, low self-esteem, and social anxiety” (Davis, 2001). This model suggests that the treatment of PIU, namely cognitive-behavioral therapy (CBT), should focus on the underlying adverse cognitive symptoms that promote the condition. Huang et al. (2010) describe some of the CBT strategies that have been applied. These include recognizing maladaptive cognitions, identifying triggers that lead to excessive use, learning how to control impulses and to (p. 595) manage time, and learning relaxation techniques. This approach could also reduce the symptoms that co-occur with the

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condition, such as depression and anxiety. A demonstration study by Young (2007) using CBT to treat adults with Internet addiction provided initial support for this approach.

Several studies have tested the efficacy of various therapeutic interventions for persons with Internet addiction. For example, a study that provided 8 weeks of stimulant medication to children with ADHD who also displayed excessive use of Internet videogames found reductions in Internet use (Han et al., 2009). A meta-analytic review by Winkler et al. (2013) reached a somewhat optimistic conclusion that CBT as well as pharmacological treatments could reduce symptoms of Internet addiction, such as time spent online, as well as associated depression and anxiety; however, they also concluded that CBT was more effective than pharmacotherapy in reducing Internet addiction. The review did not find that age moderated the effectiveness of the therapies studied.

A somewhat less optimistic review by King and Delfabbro (2014) with a focus on Internet gaming disorder primarily in adolescents noted that studies to date have not examined the effects of therapeutic interventions with sufficient follow-up periods to conclude that therapy produces lasting benefit. As noted above, Internet addiction may resolve within a year's time (Ko et al., 2007). Nevertheless, based on current evidence, there is reason to be optimistic that CBT may be an effective treatment approach for adolescents with Internet addiction. Przepiorka et al. (2014), in their recent review of treatment for Internet addiction, suggested that use of both pharmacological and psychological approaches may be most effective in treating this very heterogeneous disorder. Future research with youth displaying different forms of Internet overuse and receiving different forms of placebo-controlled therapy will be needed to identify the most effective treatment modalities. To be useful, these studies will require the use of consistent measures of outcomes and long-term evaluations of treatment success.

Conclusion



Evidence is gradually accumulating regarding the various forms of Internet addiction. Although several related yet different measurement tools have been used across various populations, making it difficult to generalize findings, evidence suggests that Internet addiction (and its various manifestations) is a real phenomenon that is associated with many adverse outcomes among youth. Whether Internet addiction is truly a form of addiction or the attempt to cope with other problems is, at this point, still a matter of dispute. Nevertheless, irrespective of the theoretical approach to the condition, the symptoms appear to be the same, suggesting that some form of poor impulse control is involved. In addition, the condition may exhibit high rates of remission, perhaps reflecting the heterogeneous nature of its genesis, with some sources reflecting more serious and chronic influence (e.g., impulse control problems) and others reflecting more transient factors (e.g., weak social support). The methodological rigor of the studies on this topic is not sufficient to draw causal conclusions or to elucidate the etiological pathways that lead to the condition. Nevertheless, research to answer these questions is quite active, with greater understanding imminent. (p. 596)