

A Review of the Research on Internet Addiction

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Research indicates that maladaptive patterns of Internet use constitute behavioral addiction. This article explores the research on the social effects of Internet addiction. There are four major sections. The Introduction section overviews the field and introduces definitions, terminology, and assessments. The second section reviews research findings and focuses on several key factors related to Internet addiction, including Internet use and time, identifiable problems, gender differences, psychosocial variables, and computer attitudes. The third section considers the addictive potential of the Internet in terms of the Internet, its users, and the interaction of the two. The fourth section addresses current and projected treatments of Internet addiction, suggests future research agendas, and provides implications for educational psychologists.

KEY WORDS: Internet addiction; Internet dependence; Internet abuse; pathological Internet use.

INTRODUCTION

The use of the Internet on school campuses and in society has increased dramatically in recent years. Whereas the academic use of the Internet is primarily intended for learning and research, the Internet has also become an important part of student life. However, from time to time, cases of over-involvement with the Internet have been observed on different campuses. For example, Chou *et al.* (1999) observed that in one residence hall at their

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university, four roommates were busy, quietly working on their computers. They logged onto the Internet to chat with other people, whom were no other than their roommates! Some college students remain connected to the Internet as long as they are awake. Teachers may notice that fewer and fewer students are willing to take early morning classes, and some of those who do register for morning classes regularly come in late. It has also come to the attention of some school administrators that some students get poor grades or are placed on academic probation because they spend too much time on the Internet rather than on their studies. In view of these observations, we examine why the Internet hooks students so tenaciously, leads them to new behavioral patterns, and even results in Internet addiction.

Indeed, academic attention has been given in recent years to what some researchers term "Internet addiction." Although the concept is still evolving and debated, some empirical studies have been done in recent years. The purpose of this article is to review the up-to-date academic investigations on Internet addiction. It is divided into four major sections. The Introduction section gives an overview of the definitions, key terms, and assessments of Internet addiction. The second section reviews research findings and focuses on several key factors related to Internet addiction. The third section considers the addictive potential of the Internet in terms of the nature of the Internet, its users, and the interaction of the two. The fourth addresses current and projected treatments of Internet addiction, suggests future research agendas, and provides implications for educational psychologists.

Definition and Terminology

Although some argue that the term "addiction" should be applied only to cases involving chemical substances (e.g., Bratter and Forrest, 1985), similar diagnostic criteria have been applied to a number of problematic behaviors such as pathological gambling (Young, 1996a). Popular use of the term may associate "addiction" with almost any substance or activity (Hatterer, 1994). People are said to be "addicted" to food, smoking, gambling, shopping, work, play, and sex (Truan, 1993). Early research, such as that conducted by Shotten (1991), studied the "computer addiction" of some computer scientists and technicians. The typical research participant was a young "solitary male loner" with a long-standing interest in technology and science. The explosive growth of the Internet over the past decade has almost certainly changed the profile of the "computer addict" (Brenner, 1997; Young, 1996b). With its convenient communication options and the World Wide Web, the Internet provides remote access to other people and abundant information in *all* areas of interest. It is an environment that could

be abused by virtually anyone, regardless of their interest in technology and science (Griffiths, 1998).

Although there is no standardized definition of Internet addiction, there is acknowledgement among researchers that this phenomenon does exist. As Griffiths (1998) notes, “excessive use of the Internet may not be problematic in most cases but the limited case study evidence suggests that for some individuals, excessive Internet use is a real addiction and of genuine concern” (p. 73). Griffiths (1998) further considers Internet addiction to be a kind of technological addiction (such as computer addiction), and one in a subset of behavioral addictions (such as compulsive gambling). Kandell (1998) defined Internet addiction as “a psychological dependence on the Internet, regardless of the type of activity once logged on” (p. 12). Maladaptive patterns of Internet use do indeed constitute behavioral addiction when considered in terms of these definitions (Chou *et al.*, 1999).

Terminology remains a problem, however. Some refer to particular Internet-related behaviors as *Internet addiction* (e.g., Chou and Hsiao, 2000; Young, 1996a), whereas others prefer *Internet Addiction Disorder* (Goldberg, 1996), *Internet pathological use* (e.g., Davis, 2001; Morahan-Martin and Schumacker, 2000), or *Internet dependency* (e.g., Scherer, 1997). In this article, the term *Internet addiction* is used to cover the collective phenomenon. However, the terminology preferred by the respective researchers is used in the discussion of their work.

Assessment

How can Internet addiction be assessed? Early research into the phenomenon of Internet addiction focused on articulating criteria by which Internet addiction could be described and diagnosed, such as the well-described set of diagnostic criteria provided by Goldberg (1996) and six criteria developed by Griffiths (1996, 1998). As research into Internet addiction continued, checklists were developed whereby data could be collected from willing, self-reporting respondents about their patterns of Internet use. For example, Young (1996a) developed an eight-item *Internet Addiction Diagnostic Questionnaire* (DQ) used both in online surveys as well as in telephone interviews. DQ is simply a set of eight yes/no questions about such things as the user’s preoccupation with the Internet, amount of time spent on the Internet, and effects of the Internet in the user’s life. Young asserted that five or more yes responses to the eight questions indicate a dependent user. Another example includes the checklist of 10 clinical symptoms developed by Scherer (1997).

The work to develop instruments with which computer users could be surveyed for information about their habits of Internet use continued

and became more sophisticated. The number of questions on the surveys increased and statistical analyses were applied to identify Internet addiction. For example, in Morahan-Martin and Schumacker's studies (1997, 2000), a 13-question "Pathological use scale" was developed to assess whether heavy Internet use negatively affects academic and other work, interpersonal relations, individual stress levels, social withdrawal, and mood-alteration. Brenner (1997) also developed an *Internet-Related Addictive Behavior Inventory* (IRABI). The IRABI has 32 true-false questions that assess users' Internet experiences. Further development and refinement of self-reported instruments for the identification of Internet addiction took place largely in Taiwan. Researchers there created surveys on which participants could report their Internet behaviors by degree using 4-point Likert scales rather than giving absolute yes or no responses. Taiwanese researchers there also increased the numbers of Internet users they surveyed in their respective studies. Examples included *Chinese Internet Addiction Scale* (CIAS) by Chen and Chou (1999), revised-IRABI (in Chinese) by Chou and Hsiao (2000), and *Internet Addiction Scale for Taiwan High School Students* (IAST) by Lin and Tsai (1999).

In summary, assessment instrument for Internet addiction was presented in various formats (criteria, checklists, or scales), with different item numbers (ranging from 6 to 40), using a variety of methods (paper-and-pencil survey, online survey, telephone interviews, case studies, etc.) and aimed at different types of research participants (college students, high school students, general populations). Table I provides a summary of assessment instruments detailing their item number, scale, reported reliability, and number of respondents/methods.

RESEARCH ISSUES AND FINDINGS

Since 1996, many studies have examined Internet addiction, exploring the relationships among heavy Internet use, social-psychological factors, and computer-related factors. The following discussion focuses on the main issues and findings of the Internet addiction studies regarding: (1) Internet use and time, (2) related problems of Internet addiction, (3) gender differences in Internet addiction, (4) Internet addiction and social-psychological factors, and (5) Internet addiction and attitudes toward computers.

Internet Use and Time

The terms "overuse" and "excessive use," which appear in many Internet addiction studies, usually indicate that time online is an important

Table 1. Internet Addiction Assessment Instruments (using Criteria, Checklists, or Scales) with Information About Items, Scale, Reported Reliability, Number of Respondents, and Methods

Researchers	Instrument	Items	Scale	Reported reliability (α)	Respondents (method)
Criteria Goldberg (1996)	Internet Addiction Disorder (IAD) Diagnostic criteria	7	—	—	—
Griffiths (1996, 1998, 2000)	Criteria (core components) for addiction	6	—	—	7 case studies (in 2000 study)
Checklists Young (1996a, 1998)	Diagnostic Questionnaire (DQ)	8	Yes/no	—	396 dependents, 100 non-dependents (in 1998 study)
Scherer (1997)	Clinical symptoms of Internet dependency	10	Yes/no	—	531 college students (online survey and telephone interview)
Scales Morahan-Martin and Schumacker (1997, 2000)	Pathological use scale	13	Yes/no	.88	277 college students (paper-and-pencil survey)
Brenner (1997)	Internet-Related Addictive Behavior Inventory (IRABI)	32	Yes/no	.87	563 online survey respondents
Chen and Chou (1999)	Chinese Internet Addiction Scale (CIAS)	28	4-point Likert	.93	1336 students from National Taiwan University (paper-and-pencil survey)
Chou and Hsiao (2000)	Chinese IRABI version II (C-IRABI-II)	40	4-point Likert	.93	910 Taiwan college students (paper-and-pencil survey)
Lin and Tsai (1999)	Internet Addiction Scale for Taiwan High Schoolers (IAST)	20	4-point Likert	.85	615 Taiwan high school students (paper-and-pencil survey)

factor or index for determining Internet addiction. For example, in Young's study (1998), Internet dependents reported a striking average of 39 hr per week spent online, compared to the 5 hr of non-dependents. In other words, dependents spent the equivalent of a "full-time job" on the Internet and spent nearly 8 times the number of hours per week online than did non-dependents.

Similarly, Chen and Chou (1999) reported that the Internet addiction "high-risk" group ($n = 69$) spent significantly more time online than the non-high-risk group ($n = 1232$). Whereas the high-risk group spent an average of 20 hr per week online, the non-high-risk group spent about 9 hr online. The results also indicated that students' scores on their *Chinese Internet Addiction Scale* were significantly correlated with their weekly Internet-use hours. Similar results were found in Chou and Hsiao's study (2000): about 54 (6%) Internet addicts spent 20–25 hr per week online, almost triple the number of hours that 856 non-addicts spent online.

Online activities or applications (such as chat rooms or online games) are also an important factor used in determining Internet addiction, in Young's study (1998), dependents used predominately two-way communication functions such as chat rooms, role-playing games (e.g., Multi-User Dungeons or Multi-User Dimensions, also known as MUDs), newsgroups, or email, whereas non-dependents most likely used information-gathering functions available on the Internet such as Information Protocols and the World Wide Web (WWW). Young concludes that although the Internet itself is not addictive, specific applications appear to play a role in the development of pathological Internet use. Young's conclusion is consistent with Kandell's observation that MUD games, Internet relay chat (IRC), and chat rooms are the primary Internet activities that lead to addictive behavior. Extended Web surfing and compulsively checking email can also create overuse problems.

In an Asian culture context, Chou *et al.* (1999) reported that some Taiwan college students who were considered "addicts" most frequently used the chat and talk functions of electronic Bulletin Board Systems (BBSs), followed by use of the WWW, File Transfer Protocol, Newsgroups, email, and games. In a later study (Chou and Hsiao, 2000), researchers found that members of an addicted group spent more time on BBSs and email than did members of a non-addicted group. Furthermore, the addicted group also spent more time on the WWW than did the non-addicted group. This study reported that the number of hours spent using BBSs and email are predictors for determining Internet addiction. The work of Young (1998), Chou *et al.* (1999), and Chou and Hsiao (2000) empirically confirms that Internet addicts use two-way communication functions more than non-addicts do.

Based on the aforementioned studies, we can draw a tentative conclusion that the Internet itself is not addictive, but that some specific Internet applications, especially those with interactive functions, appear to contribute to the development of pathological Internet use.

Identifiable Problems Related to Internet Addiction

An important research focus of Internet addiction is the problems caused by the Internet. In Brenner's study (1997), 80% of nearly 600 respondents indicated at least five use-related problems such as failure to manage time, missed sleep, missed meals, etc., suggesting that such patterns are the norm. Some respondents reported more serious problems because of Internet use: trouble with employers or social isolation except for Internet friends—troubles similar to those found with other addictions.

What kinds of problems can Internet addiction inflict on students? In Scherer's study (1997), 13% of respondents reported that Internet use had interfered with either their academic work, professional performance, or social lives. Among them, about 2% perceived the Internet as having an overall negative effect on their daily lives. Similarly, in Young's study (1998), dependents reported that excessive use of the Internet resulted in personal, family, and occupational problems similar to those experienced in other addictions. Chief among these problems was time distortion, which even resulted in some physical complaints such as disrupted sleep patterns and fatigue. Students may also experience profound academic problems, eventually resulting in poor grades, academic probation, and even expulsion from universities. Other problems created by excessive Internet use include disrupted marriages, financial problems, and relationship problems (sexual/romantic, parent-child, and friendship problems).

Using Taiwan college student samples, Chou and Hsiao (2000) investigated students' self-assessment of their Internet use and its impact on their lives. They found that those deemed Internet addicts reported more negative consequences on their studies and daily routines than did those deemed non-addicts. However, there was no difference between how the addicted groups and non-addicted groups viewed the Internet's impact on relationships with friends/schoolmates, parents, and teachers. Interestingly, both the addicted group and the non-addicted group indicated that Internet use had highly positive influences on these three kinds of relationships. Lin and Tsai (1999) reported similar findings. In their study, Taiwan high school students revealed that the Internet had slightly negative influences on their school learning and daily routines, but strong positive influences on their peer relations. Therefore, heavy Internet use may result

in time-management problems but provide users with the opportunity to meet new people, provide additional, if not primary, tools for communicating with friends, and create more topics to share with them (Chou and Hsiao, 2000).

Based on the aforementioned studies, it is difficult to draw the conclusion that heavy use of the Internet results in an overall negative impact on addicts' lives; only one negative impact can be conclusively identified: time-disruption, leading to interference with academic work, professional performance, daily routines, and so on. However, findings on the impacts of heavy Internet use on addicts' social relationships are inconclusive to positive.

Gender Differences in Internet Addiction

Are male users more subject to Internet addiction than female users? A few empirical studies have examined the stereotype of the excessive Internet user—males in their late teens, as discussed in Griffiths (1998). Although not included in Chou and Hsiao's article (2000), only three respondents were female students out of a total of 54 Internet addiction cases gleaned from more than 900 Taiwan college student respondents. Regression analysis indicates that gender is one of the predicting factors in Internet addiction, that is, males are more likely than females to become Internet addicts.

Scherer (1997) reported that dependent Internet users included a significantly larger proportion of men to women (71% men and 29% women, respectively) than the non-dependent users (50% are men and women). Morahan-Martin and Schumacker (2000) reported that males were more likely than females to be pathological users (12% vs. 3%), whereas females were more likely than males to have no symptoms (28% vs. 26%) or have limited symptoms (69% vs. 61%) of behavioral pathology. The notion that males, or at least male college students, are more subject to Internet addiction has empirical support.

However, other research findings show inconsistent results. In Brenner's study (1997), men and women did not differ in either time online or number of related problems experienced. Young (1998) used her eight-item *DQ* to assess self-selected samples and reported that her sample of Internet Dependents included 157 males and 239 females.

The difference between these two groups of studies seems to lie in the methodology used and the respondents recruited for each group. The studies showing that males are more likely addicted distributed paper-and-pencil questionnaires on college campuses. Although these studies did not

include random sampling, the sampling plans did not exhibit systematic bias. On the other hand, the studies showing no male–female differences in addiction employed self-selected samples from online solicitation, and thus the sampling bias may have been stronger. Griffiths (1998) commented that because females are generally more willing than males to discuss emotional issues and problems, or perhaps because Young is a female researcher, female respondents were more willing to take part in the study than would otherwise have been the case.

The issue of gender in regard to the question of Internet use and its effects is an important one. Do men and women use the Internet differently and engage different Internet applications? Young (1998) observed that men tend to seek out dominant activities or content online. Those interactive online games that rely particularly on power, dominance, control, and/or violence attract more men than women. Women, on the other hand, seek out close friendships and prefer anonymous communication in which they can hide their appearance(s). Virtual communities give women a sense of belonging and the ability to share their feelings and emotions in private and convenient ways. Whereas men tend to explore sexual fantasies online, women tend to look for romance in cyberspace. Young states that although it is not unusual for women to engage in random cybersex or cyber sex chat, they often prefer to form some type of relationship prior to the sexual chat. In Chen's study (2000), hierarchical regression analysis indicated that time-management problems and compulsion symptoms are common predictors for both genders' weekly time spent on the Internet. Shyness and withdrawal symptoms are predictive only for female college students, whereas experiences and tolerance symptoms are predictive only for males. Based on the aforementioned studies, tentative conclusions can be drawn that men use the Internet differently from women, and that men are more likely subject to Internet addiction.

Internet Addiction and Other Psychosocial Variables

Do people have special personality or social-psychological characteristics that lead them to become Internet addicts? A few studies have explored the relationship between Internet addiction and users' social-psychological or personality variables, such as sensation seeking, pleasure experience, use-and-gratification, loneliness, and depression.

Do people with high sensation-seeking tendencies tend to be more dependent on the Internet? Lavin *et al.* (1999) conducted a study in which more than 300 college students were assessed regarding their sensation-seeking tendencies on Zuckerman's *Sensation Seeking Scale* (SSS) (Zuckerman, 1979) as well as their attitudes and behaviors toward the

Internet. Contrary to expectations, this study found that dependent Internet users scored *lower* on the sensation-seeking scale, as well as on the thrill- and adventure-seeking, and the excitement-seeking subscales. Researchers explained that dependent Internet users tend to be quite sociable in their Internet use, but not to the point of sensation seeking. Other possible explanations were that those students' sensation-seeking traits may differ from the traditional sense of the concept, or that the SSS is more appropriate for assessing sensation seeking through various physical activities than for similar assessment through non-physical activities. However, it is worth noting that the term "dependent Internet user" in this study was used somewhat differently than in most studies in this field. The instrument termed "attitudes and behaviors toward the Internet," used to differentiate Internet dependence in this study, did not contain some of the major Internet addiction/dependency components such as tolerance, withdrawal, and related problems. Therefore, the differentiation of *dependent Internet users* and *non-dependent Internet users* in this study should be carefully re-examined.

Also focusing on Internet dependence and sensation seeking, Lin and Tsai (2002) assessed about 750 Taiwan high school students, and categorized 17% among them as dependent Internet users. These results show that dependent Internet users scored higher on a scale of overall sensation seeking and on the disinhibition subscale than did non-dependent Internet users, but there was no difference in the groups' subscale scores regarding life-experience seeking, and thrill- and adventure seeking. Researchers explained that adolescents' strong developmental needs, such as striving for personal identity, may be carried out through breaking social inhibitions, which may in turn lead to Internet dependence.

The inconsistent results from Lavin *et al.* (1999), and Lin and Tsai (2002) may be due to students' ages (college students *vs.* high school students, respectively) and cultural contexts (USA *vs.* Taiwan, respectively). The present authors also agree with the suggestion from Lavin *et al.* (1999) that a modified sensation-seeking scale is needed. Such a scale might address a greater number of non-physical activities, such as daydreaming, as well as Internet-related activities like meeting new people anonymously online and participating in character construction in chat room scenarios. These additions and more are needed to construct a more sophisticated scale that would help researchers better explore sensation seeking on the Internet.

Do people use the Internet mainly for fun, or for the gratification of needs? Chou *et al.* (1999) investigated Internet addiction on the basis of Stephenson's (1988) *Play Theory of Mass Communication*. This theory assumes that using the Internet generates some kind of pleasurable communication experience that draws users to the Internet again and again,

and that overuse of the Internet finally leads them to addiction-like behaviors. In their study, 104 valid, self-selected samples were collected online. Among them, 67% were male and 80% were students. Respondents' *Chinese Internet-Related Addictive Behavior Inventory* scores correlated positively with their escape pleasure scores, interpersonal relationship pleasure scores, and total communication pleasure scores. The Internet addiction scores also correlated positively with both BBSs use hours and total Internet use hours. Close review of this study suggests, however, that the demarcation between addicts and non-addicts should be carefully re-examined. In this study, the dichotomy was based on the mean of respondents' Internet addiction scores, in addition, the samples were self-selected but not drawn randomly from among Taiwan's Internet users. This limits the external validity of the study.

In a later study, Chou and Hsiao (2000) conducted a larger-scale investigation focused not only on pleasure experience but also on the use-gratification aspect of Internet use. This study collected 910 valid survey responses from 12 universities and colleges around Taiwan and identified about 6% of respondents as Internet addicts. The results indicated that the addict group found the Internet entertaining, interesting, interactive, and enjoyable. The study also found that the most powerful predictor of Internet addiction was the communication pleasure score, followed by BBSs use hours, gender, satisfaction (gratification) score, and email-use hours.

It seems that some people seek pleasure on the Internet; therefore, it is possible that those who are depressed may be using the Internet to treat their depression with pleasure-seeking activities. Young and Rogers (1998) used the *Zung Depression Inventory* (Zung, 1965) and Young's *DQ* to assess 259 valid respondents out of a total of 312 survey responses on this topic. Their results indicated that increased levels of depression are associated with those who become addicted to the Internet. In particular, low self-esteem, poor motivation, fear of rejection, and the need for approval—all commonly associated with depression—contributed to increased Internet use. Although their findings did not indicate a clear cause-and-effect relationship, Young and Rogers proposed that excessive time online might increase levels of social isolation, resulting in increased depression.

A related question is, are lonely people more subject to Internet addiction? Or, do people feel lonelier as their Internet use increases? In Morahan-Martin and Schumacker's study (2000), 277 college students were assessed using the *UCLA Loneliness Scale* (Russell, 1996). Results indicated that 8% of the samples were pathological in their Internet use, and these pathological users were lonelier than non-pathological users. However, because of the study's statistical limitations, the direction of the relationship between loneliness and Internet use is hard to determine. In order

to determine causality, Morahan-Martin (1999) reviewed the related literature extensively and concluded that research has not determined whether loneliness is symptomatic of excessive Internet use, or if heavy Internet use is symptomatic of loneliness. However, she suggests that loneliness is caused by excessive Internet use. She also contends that once the Internet becomes a substitute for real-life social interaction, users may be caught in a vicious cycle.

Current research is inconclusive about the relationship between Internet addiction and sensation seeking (Lavin *et al.*, 1999; Lin and Tsai, 2002). In addition, Chou's and colleagues' studies (1999, 2000) suggest that pleasure seeking is indeed one of the major motivations for heavy Internet users; increased symptoms of depression, however, have been identified in heavy users and associated with Internet addiction (i.e., Young and Rogers, 1998), and Internet addicts report experiencing loneliness to a greater degree than non-addicts (Morahan-Martin and Schumacker, 2000). Rather than answering pressing questions regarding heavy Internet use and its effects on users, these results appear to provide researchers with more questions.

Internet Addiction and Attitudes Toward Computers

What is the relationship between Internet addiction and the users' attitudes toward computers? Morahan-Martin and Schumacker's study (2000) also investigated respondents' attitudes and behaviors toward the Internet. Their results indicated that pathological users are more likely than non-pathological users to score higher on questions regarding social confidence (e.g., escaping from pressures, having online friends) and social liberation (e.g., sharing intimate secrets online, pretending to be a potential sexual partner online). Pathological users in this study were more likely to agree that online communication is easier and more comfortable than traditional forms of personal communication, giving them control when they interact online.

Using various network attitude scales and samples, Tsai and Lin (2001) conducted a study exploring the relationship between network attitudes and addiction among Taiwan high school students. The instrument they used was adapted from the *Computer Network Attitude Inventory* (Selwyn, 1997). The adapted scale contains 18 questions in four subscales: affective, perceived usefulness, perceived control, and behavior. Their results indicated that students perceiving they can control Internet interactions and those who highly value its usefulness tend to claim they need more time online to achieve desired satisfaction.

The two studies discussed earlier in the paper (Morahan-Martin and Schumacker, 2000; Tsai and Lin, 2001) do not offer enough data to draw a valid conclusion regarding the relationship between Internet addiction and users' attitudes toward computers in general. This may be due in part to the difference between the two studies' instruments designed for assessing "computer attitudes," and the individual factors identified from these instruments (e.g., social confidence, social liberation, sense of control, computer usefulness, etc.). However, although available data hinders scholars from making statements regarding the relationships between Internet addiction and attitudes toward computers and computer networks, it makes clear the indisputable increase in global Internet use.

Table II summarizes the aforementioned empirical research studies and their findings according to the categories in this section (Internet use and time, related problems, gender differences, psychosocial variables, and attitudes toward computers). The studies are listed in the order they appear in the text, rather than in chronological order of implementation. Some studies pertained to more than one research issue, and they therefore appear under multiple issue categories.

WHAT MAKES THE INTERNET ADDICTIVE?

As discussed previously, if we assume that some people are addicted to the Internet, to what, exactly, are they addicted? Are users addicted to the technology itself? Are they addicted to particular applications only? Or are they addicted perhaps to the degree of control and/or anonymity offered by Internet use? Is it the medium or the message? Most relevant studies have tried to answer these questions from different perspectives and using different methods or inquiry. This review explores three categories of relevant literature: (1) the Internet itself including its content, (2) Internet users themselves, and (3) the user and user interactions on the Internet. Of course, although categorizing the literature in this way is useful for purposes of organization and discussion, it is reductive in that these categories, in fact, overlap and interact in complex ways.

The Nature of the Internet

Does the nature of the Internet make itself addictive? Greenfield (1999) states that the unique qualities of the Internet contribute to the potential for Internet addiction—specifically its speed, accessibility, intensity of information accessed online, and the potency (stimulation) of its

Table II. Summary of Empirical Research Studies and Their Major Findings by Issues

Study	Major findings
Internet use and time	
Chen and Chou (1999)	Students' addiction scores were correlated with their weekly Internet-use hours
Chou and Hsiao (2000)	Internet addicts spent triple the number of hours than non-addicts The addict group spent more time on Bulletin Board System and email than a non-addicted group
Morahan-Martin and Schumacker (2000)	Pathological Internet users spent more time online per week than users with limited or no symptoms
Young (1998)	Internet dependents predominately used two-way communication functions; non-dependents more used information-gathering functions
Chou <i>et al.</i> (1999)	Addicts used the chat and talk functions of electronic BBSs the most
Related problems	
Scherer (1997)	13% of respondents reported that Internet use had interfered with their academic work, professional performance, or social lives 2% of respondents perceived the Internet to have had an overall negative effect on their daily lives
Young (1998)	Dependents reported excessive use of the Internet resulted in personal, family, and occupational problems Time distortion was the major consequence of Internet use
Chou and Hsiao (2000)	Students may experience academic problems Taiwan college addicted students reported Internet has negative impacts on their studies and daily life routines No differences between addicted groups' assessment and non-addicted groups' assessment of impacts on relationships with friends/schoolmates, parents, and teachers.
Lin and Tsai (1999)	Taiwan high schools students reported that the Internet had slightly negative influences on their studies and daily routines, but strong positive influences on their peer relations
Gender difference	
Chou and Hsiao (2000)	Gender is one of the predicting factors in Internet addiction; males are more likely to become Internet addicts
Scherer (1997)	Among 49 identified Internet dependents, 35 are men and 14 are women
Morahan-Martin and Schumacker (2000)	Males were more likely than females to be pathological users
Young (1998)	Among 496 Internet dependents, 157 were males and 239 were females
Internet addiction and other psychosocial variables	
Lavin <i>et al.</i> (1999)	Dependent Internet users' scored lower on the overall sensation-seeking scale, and on the thrill- and

Table II. Continued

Study	Major findings
Lin and Tsai (2002)	adventure-seeking and the excitement-seeking subscales Internet dependents users scored higher on overall SSS and the disinhibition subscale than non-dependents
Chou <i>et al.</i> (1999)	Students' addiction scores correlated positively with their escape pleasure scores, interpersonal relationship pleasures scores, and total communication pleasure scores
Chou and Hsiao (2000)	Addict group found the Internet entertaining, interesting, interactive, and satisfactory The communication pleasure scores are the most powerful predictors of Internet addiction
Young and Rogers (1998)	Increased levels of depression were associated with those who became addicted to the Internet
Morahan-Martin and Schumacker (2000)	22 pathological users were more lonely than 251 non-pathological users
Attitude toward computers Morahan-Martin and Schumacker (2000)	Pathological users were more likely than non-pathological users to have higher social confidence and social liberating scores
Tsai and Lin (2001)	Students perceiving that they can control Internet interactions and those who highly value its usefulness claimed they needed more time online to achieve desired satisfaction

content. In Chou's study (2001), 83 heavy Internet users were interviewed and reported that the Internet features they most appreciated included interactivity, ease of use, availability, and breadth of information accessed online. Interactivity has two aspects: human-computer and interpersonal. Most Internet applications such as the WWW are simple to use, and thus enhance human-computer interactions; furthermore, some applications, such as chat rooms and email, are especially good at facilitating interpersonal interactions. Availability means easy, low-cost access for users. Abundant and rapidly updated information is another major feature that attracts users to participate online. The diversity of ideas, subjects, attitudes, and opinions presented on the Internet continuously changes users' perspectives.

Indeed, the popularity of the Internet is increasing. In addition to ease of access and low cost, the Internet's continuously expanding bandwidth continues to deliver multimedia resources in greater amounts and higher quality. The development of friendlier interfaces allows even those with low network literacy to use the Internet more easily and comfortably.

If we understand the Internet as a kind of mass medium, then the possibility surfaces that the Internet is in the process of replacing or

substituting for a part of traditional media (e.g., television, radio, newspapers, magazines, books, and so on) (Chou, 2001). Grohol (1999) suggests that societal acceptance and promotion of the Internet must also be considered. If most of the information we need in our daily lives (e.g., from mass media) can be easily and cheaply obtained from the Internet, and if activities (e.g., writing letters, making phone calls) can also be carried out from the Internet, then it is no leap to predict that more and more people will spend more and more time online.

Young (1998) concludes that the Internet itself is not addictive, but specific applications embedded within interactive features play a significant role in the development of pathological Internet use. Griffiths (1997, 1998) argues that the *structural characteristics* of particular activities are responsible for reinforcement, may satisfy users' needs, and may actually facilitate excessive or pathological use. Structural characteristics, in his words, refer to the features that manufacturers design into their products. For example, the high degree of "interactivity" embedded in chat rooms and games may create alternative realities for their users. The "anonymity" of some BBSs may encourage the verbal disinhibition of many high school students (Lin and Tsai, 2002). Similarly, the "redo" button, which allows gamblers to click on the screen and then automatically redo the last bet, may draw more and more gamblers to "virtual casinos" (King and Barak, 1999). Griffiths (2000) argues that by examining such structural characteristics, we may gain a better understanding of what users' needs are, how information is presented or misrepresented, and how users' cognition is influenced and distorted.

The Nature of Internet Users

In addition to examining the Internet itself and its contents, it is also important to examine what user's needs are, and how the Internet meets those needs. Suler (1999) argues that understanding such needs can illuminate how and why some people become pathologically involved with the Internet. The six needs he identifies include the need for (1) sex, (2) an altered state of consciousness, (3) achievement and mastery, (4) belonging, (5) relationships, and (6) self-actualization and the transcendence of self. In this section, sexual needs, the need for achievement and mastery, and the need for pleasure are discussed. The need for belonging and the need for relationships are discussed in a later section.

Sex is always a popular topic in mass media; sex on the Internet—"cybersex" or netsex"—is no exception. Suler (1999) claims that people become preoccupied with online sexual activities for the same two basic

reasons people exhibit obsessive behavior regarding sex in any context: satisfaction of biological needs, and satisfaction of a variety of purely psychological and social needs. Sexual pursuits on the Internet can be both social and non-social. Social cybersex can become addictive because it is an easily accessed, anonymous, and a medically safe way to satisfy one's biological drive and psychological needs. In a non-social sexual situation, Internet users can easily and anonymously obtain pornographic images, animations, and video clips; the Internet offers an almost infinite supply of such materials. Morahan-Martin and Schumacker (2000) report that pathological users are more likely than others to use the Internet's adults-only resources. Young (1997) also suggests that sexual fulfillment is one of the potential explanations for pathological Internet use. However, Delmonico and Garnes (1999) argue that the process of becoming sexually addicted is a complex one, and although the Internet provides a powerful way for sex addicts to act out their addictions, researchers have yet to provide conclusive evidence to support a claim that Internet use and sexual addiction are causally related.

The Internet also seems to have the ability to fulfill users' needs for achievement and mastery. Suler (1999) claims that for many users who enjoy mastering the various technical features of software applications, computers and networks offer a motivating and rewarding cycle of challenge, experimentation, mastery, and success. For users who are less motivated by technological mastery, the challenges of discovering and becoming familiar with the various cultures and people represented on the Internet can be a never-ending source of fulfillment of curiosity and self-esteem. However, problems occur, as Suler notes, when obsessions with Internet achievement and mastery become a never-ending pursuit, but underlying needs are not fully met by Internet use. Kandell (1998) also works with the concept of users' desire to exercise control over the computer and the Internet. This sense of control can be realized in human-computer contexts by a series of command-actions, as well as in interpersonal contexts wherein the user decides what, when, where, and with whom to communicate, and how to proceed with such communication.

Suler's (1999) notion of the need for an altered state of consciousness is akin to Young's (1997b) concepts of *unlocked personalities* and creating *online persona*. Suler argues that people have an inherent need to alter their consciousness, to experience reality from different perspectives, and that cyberspace may be a new and important arena in which to satisfy that need. For example, one's sense of time, space, and personal identity can be changed on the Internet. Moreover, online personas, according to Young, offer individuals an outlet for experimenting with

accessing different parts of their personality, and allowing individuals to expand the range of emotions experienced and expressed toward others. Morahan-Martin (1999) also believes that the ability to change oneself online—an ability enhanced by the Internet—can be liberating. The ability to alter self-presentation, for example, to change the way other people perceive you, allows users to try out different ways of presenting themselves and interacting with others. These experiments are healthy most of the time; however, problems emerge when people have difficulty in “logging off” from their online personas as well as from the Internet.

Four studies in particular have emphasized users’ need for pleasure and their pursuit to fulfill that need from the Internet. Scherer (1997) found that dependent Internet users report more personal or leisure time online ($M = 7.8$ hr) than did non-dependent users ($M = 3.7$ hr). In other words, Internet-dependent students spend twice as much time online for leisure activities than do other students. Chou *et al.*’s study (1999) found that Taiwan college students’ Internet addiction scores were positively correlated with their total communication pleasure scores and, in particular, with the “escape pleasure” scores and the “interpersonal relationship pleasure” scores. Internet addicts seem to agree that they experience more pleasure in escaping from real-life worries and responsibility through the pleasures of communicating with others online.

Similarly, Chou and Hsiao’s study (2000) found that the addicted group’s pleasure experience scores were higher than those of the non-addicted group. Morahan-Martin and Schumacker (2000) report similar findings: the Internet provides a place to relax, escape pressures, and seek excitement. In their study, those with Internet-related problems were more likely than others to use the Internet for recreation and relaxation, wasting time, and gambling. Before the Internet gained its present popularity (when computers were mostly stand-alone), Griffith (1991) had already observed that some people used computer games for arousal or excitement, whereas others used them as a form of escape. Problems arose when people gave up almost all other leisure time and activities to pursue online pleasures, exhibiting an intense preoccupation with the Internet.

The Nature of User Interactions on the Internet

The Internet, in many ways, is not only an information superhighway, but is also a powerful social domain that connects its users around the world. As mentioned earlier, Suler (1999) argues that whether Internet

use is healthy, pathologically addictive, or somewhere in between is determined by users' multiple needs and how the Internet meets those needs. In particular, he addresses two interpersonal needs: *the need to belong* and *the need for relationships*. Everyone needs interpersonal contacts, social recognition, and a sense of belonging to live healthy and balanced lives. Young (1997) also provides an explanation of online "social support" for Internet addiction. She claims that social support is formed by groups of people who engage in regular computer-mediated communication with one another over extended periods of time. With routine or frequent visits to a particular newsgroup, chat room, or Bulletin Board System, familiarity and a sense of belonging can be established. As Morahan-Martin (1999) observed, the more time users spend online, the more likely they are to use the Internet for emotional support, meeting new people, and interacting with others. Young (1997) argues that the experience of the online social support group meets a deep and compelling need in people, especially those whose real lives lack social supports.

Two of the leading factors underlying pathological use of the Internet are the "anonymity" and the "interactivity" of online interpersonal communications. Young *et al.* (1999) suggest that anonymity is associated with four general areas of dysfunction. Among them, two are interpersonal, the first being that the Internet provides a virtual context in which overly shy or self-conscious individuals are allowed to interact in a socially safe and secure environment. However, over-dependence on online relationships may result in significant problems with real-life interpersonal and occupational functioning. The second dysfunction involving the anonymity of the Internet is cyberaffairs or extramarital relationships formed online that negatively impact marital or family stability. Scherer (1997) also argues that the anonymous nature of some Internet services and the elimination of visual cues may decrease social anxieties in online relationships for college students.

As mentioned earlier, another leading factor underlying pathological Internet use is "interactivity," which has two aspects of particular importance: human-computer interactions and human-human interactions. The Internet not only provides its users with the opportunity to encounter new people, it also provides additional—if not primary—communication tools for coping with existing relationships. This is frequently observed on college campuses. Scherer (1997) found that 98% of college students use the Internet weekly in order to maintain relationships with family and friends. Chou and Hsiao (2000) provide similar findings: one student noted that, "You know somebody is always out there, you are not alone." The authors observed that this "accompaniment" function is more desirable for many

users than that of a television set or a radio, because the interactive feature of the Internet enables college students to connect with others reciprocally at any time; they do not just passively receive broadcasted information from outside.

Because a large portion of Internet users—and abusers—may be found on college campuses, Kandell (1998) discusses the unique vulnerability of college students to Internet addiction. He argues that late adolescents and young adults contend with strong psychological and developmental dynamics. College-age students, therefore, face two tasks: developing a sense of identity and developing meaningful and intimate relationships. In some cases, addictive behavior serves as a coping mechanism for adolescents having trouble negotiating these developmental challenges. Kandell notes that college students frequently overuse the Internet's two-way communication applications such as chat rooms, email, and Multi-User Dimension games. The danger for college students lies in the possibility that their Internet use may become the central focus of their campus lives—particularly because most students are already negotiating the difficult terrain of identity and relationships.

IMPLICATIONS

In this final section, treatment of Internet addiction is discussed and various counseling techniques are presented. Then, needs for future research on Internet addiction and its treatments are suggested. Last, concluding remarks, aimed especially at educators, are made.

Treatment For Internet Addiction

Over the past years, since the term “Internet addiction” first appeared in mass media and academic literature, research studies have gone a long way toward defining, exploring, investigating, describing, and predicting the phenomenon. A review of this research begs the following question: How should Internet addiction be treated?

Can stopping all Internet usage cure Internet addiction? Young (1999a) claims that many people believe the only way to cure Internet addiction is to stop using the Internet, to unplug or to throw out the computer. However, not all scholars agree with this “all or nothing” treatment plan. Orzack and Orzack (1999), for example, argue that the treatment of Internet addiction cannot be total abstinence; it should be treated like an eating disorder where the goal is to normalize network use in order to survive. As

an alternative to abstinence, Young (1999a) provides seven possible treatment techniques:

1. Practice the opposite: After reorganizing one's excess use time on-line, construct a new reduced schedule or time pattern for using the Internet.
2. External stoppers: Use concrete things (e.g., time to work, to meet boss, etc.) the addict needs to do, or places to go, as prompts to help log off.
3. Setting goals: Set clear and achievable goals to help develop new tangible Internet-use schedules; prevent cravings, withdrawal, and relapse; and give the addict a sense of control.
4. Reminder cards: Use tangible, portable reminders of what addicts want to avoid (e.g., lost time with family) and what they want to do (e.g., improved productivity at work).
5. Personal inventory: Generate a list of every activity or practice that has been neglected or curtailed since the online habit emerged.
6. Social support: Organize support groups tailored to addicts' particular life situations to decrease their dependence on online cohorts.
7. Family therapy: Arrange therapy for those addicts whose marriages and family relationships are disrupted and negatively influenced by Internet addiction. Treatment should focus on moderation and controlled use, according to Young (1998).

The first three interventions are simple time-management techniques. More aggressive intervention is required when time management alone does not ameliorate pathological Internet use.

There are few empirical studies on Internet addiction treatment other than Stein's (1997), and Orzack and Orzack's (1999). Stein (1997) conducted a survey of subscribers to one obsessive-compulsive disorder mailing list and found that subscribers were generally positive about the benefits of being listed. Subscribers described the list as a useful source of information and a helpful source of support. Stein consequently argues that further study of other Internet newsgroups for psychiatric disorders may be warranted.

Two treatment techniques are offered by Orzack and Orzack (1999). The first is *Cognitive Behavior Therapy*, which is based on the premise that thoughts determine feelings. If addicts can be taught to recognize their thoughts, then they can identify the trigger points for their Internet abuse. The second one is *Motivational Enhancement Therapy*, which allows addicts and their therapists to collaborate on treatment plans and set

attainable goals. This approach is less confrontational and more innovative than the first one. Citing three cases studies, the authors demonstrate the validity of the team approach and suggest that a combination of both intervention methods works best.

Future Research Directions

Future research should focus on the evolving concept and related assessments of Internet addiction. As we come to better understand Internet addiction, we are less likely to consider it a single phenomenon but rather an intersection of multiple physical, psychological, and technological phenomena. Young *et al.* (1999) have already begun categorizing Internet addictions and have suggested five subtypes: (1) cybersexual addiction, (2) cyberrelationship addiction, (3) Net compulsions, (4) information overload, and (5) computer addiction. Each subtype has its own definition, criteria, assessment instruments, and appropriate treatments.

Indeed, improvement of the assessment instruments themselves is essential to future studies. As discussed earlier, time spent on the Internet and different applications are frequently used as correlates of Internet addiction. However, assessments of these two factors are somewhat unreliable in many survey studies. In most studies, respondents were asked to report how long they spent on the Internet in general and also on particular applications (e.g., WWW, email, chat room, games, etc.) each day or each week. The veracity of respondents' answers to these and other questions is suspect because many also answered "Yes" when asked "Have you lied to family members, a therapist, or others to conceal the extent of your involvement with the Internet?" Beyond this paradox is the impossibility of measuring time on tasks. Although any transaction time on the Internet can be traced and recorded theoretically, there seems to be no program available to help users record the time they spend on each task on a daily or weekly basis.

Future research should also focus on the treatment of Internet addiction. Although Orzack and Orzack (1999), and Young *et al.* (1999) have already provided workable treatment approaches and techniques, few successful cases of treatment have been reported. Young (1998) observes that the greatest difficulty in treating Internet addicts is breaking through their denial of the addiction itself. Successful treatment especially requires a team approach in which psychiatrists, school counselors, social workers, faculty, parents, spouses, and so on are made aware of this new disorder and where to look for help. Scherer (1997) notes that college students may lack knowledge about Internet dependency symptoms or available services to address these problems, whereas mental health professionals must

understand underlying factors that cause or worsen Internet dependency and search for effective treatments.

Finally, research should also consider Internet addiction among younger users. Brenner (1997), Tsai and Lin (2003) all report that younger users are more likely to report Internet addiction-related problems and that they deserve more attention. Indeed, as the Internet becomes more and more popular and available, people in a wider age range will be drawn to it. Some anecdotal cases have been presented in the mass media, showing that elementary or junior high school students have special talents for Internet application development and online gaming. However, attention should be focused on the inappropriate and indecent use of the Internet and its impacts on youngsters' psychological and physical development. For example, does the disinhibition (e.g., using dirty words, flaming, etc.) that exists in some chat room cultures, in turn, affect users' verbal style in real life? Do erotic pictures/videos shape users' attitudes toward sex? Do virtual casinos give those who are not yet of legal age their first exposure to gambling? The list of questions maybe endless; so, too, may be educators' and parents' anxiety.

Concluding Remarks

As Rudall (1996) remarks, most psychologists have told us that we should not be surprised at the evolution of new behavioral conditions when technological advances are changing our society so rapidly and in such revolutionary ways. Indeed, we should not be surprised, but we must be prepared to face the notion that the Internet is changing the way we live, and not always for the better. Young (1999b) notes that the study of Internet addiction is often complicated by the perceived value of technological growth, by the societal promotion of Internet use, and by the positive image of the Internet. However, as Kandell's analogy (1998) suggests, although exercise is good and people require it, overexercise may have a destructive impact on human health. Internet use may be similar in the disparity of its impact, determined almost exclusively by the amount and type of use.

The earlier review of studies on Internet addiction can be viewed from different perspectives. From one perspective, the findings in this article suggest that overuse or abuse of technology can have negative influences on our lives. From another perspective, existing findings lead to reflection on how to appropriately and safely use technology. As Stern (1999) states, technologies, by definition, increase our capacities and abilities. However, at the same time, they may also lead to maladaptive behavior and expose both our frailties and inabilities. It is crucial for us to recognize that technologies

are bound to impact us in both positive and negative ways. Research on Internet addiction is one step toward understanding and evaluating the effects of these impacts.

As educators and educational psychologists, we should not be surprised by the onset of new behavioral conditions when technological advances are changing our students' lives so rapidly and in such revolutionary ways. Kandell (1998) stated that college students as a group appear more vulnerable in developing a dependence on the Internet than any other segment of society. Therefore, this article offers some implications for school psychologists and student affairs administrators. As Scherer (1997) suggests, administrators should play a primary role in promoting awareness of Internet abuse or addiction on campus. They can promote such awareness by being in a position to both assess the needs of students and implement preventive programs to decrease the potential dangers of excessive Internet use. Besides promoting diagnostic and preventive strategies, Chou (2001) suggests more effective management of students' dormitory life to prevent excessive late-night Internet use.

For student affairs administrators, Chou (2001) suggests they play a crucial role in informing other campus professionals (such as teachers, teaching-assistants, residence hall superintendents, school computer center administrators, etc.) of the risks of Internet abuse or addiction. Campus professionals are often the first to identify those students with potential or manifest academic problems (difficulty in completing assignments, lateness for morning classes, poor grades, academic probation, etc.). Residence hall superintendents may easily observe students with late-night living patterns and sleep deprivation. If faculty and others are made aware of warning signs and symptoms, they can more readily identify those students who might benefit from treatment or other interventions. A team approach is required in which student affairs administrators and faculty, as well as psychiatrists, parents, and others, are made aware of this new disorder and where to look for help—and this holds true for high school campuses as well. Chou contends that a team approach may be an efficient and effective way to undertake both research and treatment because the phenomenon of Internet addiction touches upon the expertise of multiple fields of academic and health professionals. By working together to investigate and address its related problems, we can keep up with the development of Internet technology, rather than be overtaken by it.

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REFERENCES

- Bratter, T. E., and Forrest, G. G. (1985). *Alcoholism and Substance Abuse: Strategies for Clinical Intervention*, Free Press, New York.
- Brenner, V. (1997). Psychology of computer use: XLVII. Parameters of Internet use, abuse and addiction: The first 90 days of the Internet usage survey. *Psychol. Rep.* 80: 879–882.
- Chen, S. H. (2000, August). *Gender differences of Internet addiction in Taiwan*. Poster presented at the 108th American Psychology Association Annual Convention, Washington, DC, USA.
- Chen, S. H., and Chou, C. (1999, August). *Development of Chinese Internet addiction scale in Taiwan*. Poster presented at the 107th American Psychology Annual convention, Boston, USA.
- Chou, C., Chou, J., and Tyan, N. N. (1999). An exploratory study of Internet addiction, usage and communication pleasure—The Taiwan's case. *Int. J. Educ. Telecommun.* 5(1): 47–64.
- Chou, C., and Hsiao, M. C. (2000). Internet addiction, usage, gratifications, and pleasure experience—The Taiwan college students' case. *Comput. Educ.* 35(1): 65–80.
- Chou, C. (2001). Internet abuse and addiction among Taiwan college students: An online interview study. *Cyberpsychol. Behav.* 4(5): 573–585.
- Davis, R. A. (2001). A cognitive-behavioral model of pathological Internet use. *Comput. Human Behav.* 77: 187–195.
- Delmonico, D. L., and Carnes, P. J. (1999). Virtual sex addiction: When cybersex becomes the drug of choice. *Cyberpsychol. Behav.* 2(5): 457–463.
- Goldberg, I. (1996). *Internet Addiction Disorder*. Retrieved November 24, 2004 from <http://www.rider.edu/~suler/psyber/supportgp.html>.
- Greenfield, D. N. (1999). Psychological characteristics of compulsive Internet use: A preliminary analysis. *Cyberpsychol. Behav.* 2(5): 403–412.
- Griffiths, M. D. (1991). Amusement machine playing in childhood and adolescence: A comparative analysis of video games and fruit machines. *J. Adolescence* 14: 53–73.
- Griffiths, M. D. (1997). Psychology of computer use: XLIII. Some comments on 'addictive use of the Internet' by Young. *Psychol. Rep.* 80: 80–82.
- Griffiths, M. D. (1998). Internet addiction: Does it really exist? In Gackenbach, J. (ed.), *Psychology and the Internet: Intrapersonal, Interpersonal, and Transpersonal Implications*, Academic Press, New York.
- Griffiths, M. D. (2000). Does Internet and computer "addiction" exist? Some case study evidence. *Cyberpsychol. Behav.* 3(2): 211–218.
- Grohol, J. M. (1999). Too much time online: Internet addiction or healthy social interactions. *Cyberpsychol. Behav.* 2(5): 395–401.
- Hatterer, L. J. (1994). Addictive process. In *Encyclopedia of Psychology*, Wiley, New York.
- Kandell, J. J. (1998). Internet addiction on campus: The vulnerability of college students. *Cyberpsychol. Behav.* 1(1): 11–17.
- King, S. A., and Barak, A. (1999). Compulsive Internet gambling: A new form of an old clinical pathology. *Cyberpsychol. Behav.* 2(5): 441–456.
- Lavin, M., Marvin, K., McLarney, A., Nola, V., and Scott, L. (1999). Sensation seeking and collegiate vulnerability to Internet dependence. *Cyberpsychol. Behav.* 2(5): 425–430.
- Lin, S. S. J., and Tsai, C. C. (1999, August). *Internet Addiction among High Schoolers in Taiwan*. Poster presented at the 107th American Psychology Association (APA) Annual Convention, Boston, USA.

- Lin, S. S. J., and Tsai, C. C. (2002). Sensation seeking and internet dependence of Taiwanese high school adolescents. *Comput. Human Behav.* 18(4): 411–426.
- Morahan-Martin, J. M. (1999). The relationship between loneliness and Internet use and abuse. *Cyberpsychol. Behav.* 2(5): 431–439.
- Morahan-Martin, J. M., and Schumacker, P. (2000). Incidence and correlates of pathological Internet use. *Comput. Human Behav.* 16: 13–29.
- Orzack, M. H., and Orzack, D. S. (1999). Treatment of computer addicts with complex comorbid psychiatric disorders. *Cyberpsychol. Behav.* 2(5): 465–473.
- Rheingold, H. (1993). *The Virtual Community*, Addison-Wesley, Reading, MA.
- Rudall, B. H. (1996). Internet addiction syndrome. *Robotica* 14: 510–511.
- Russell, D. (1996). UCLA Loneliness Scale (Version 3): Reliability, validity, and factor structure. *J. Personal. Assess.* 66: 20–40.
- Scherer, K. (1997). College life online: Healthy and unhealthy Internet use. *J. College Stud. Dev.* 38(6): 655–665.
- Selwyn, N. (1997). Students' attitudes toward computers: Validation of a computer attitude scale for 16–19 education. *Comput. Educ.* 25(1): 35–41.
- Shotten, M. A. (1991). The costs and benefits of computer addiction. *Behav. Inform. Technol.* 10: 219–230.
- Stephenson, W. (1988). *The Play Theory of Mass Communication*, Transaction Books, New Brunswick, NJ.
- Stern, D. J. (1997). Internet addiction, Internet psychotherapy. *Am. J. Psychiatry* 154(6): 890.
- Stern, S. E. (1999). Addiction to technologies: A social psychological perspective of Internet addiction. *Cyberpsychol. Behav.* 2(5): 419–424.
- Suler, J. R. (1999). To get what you need: Healthy and pathological Internet use. *Cyberpsychol. Behav.* 2(5): 355–393.
- Truan, F. (1993). Addiction as a social construction: A postempirical view. *J. Psychol.* 127(5): 489–499.
- Tsai, C. C., and Lin, S. S. J. (2001). Analysis of attitudes toward computer networks and Internet addiction of Taiwanese adolescents. *Cyberpsychol. Behav.* 4(3): 373–376.
- Tsai, C. C., and Lin, S. S. J. (2003). Internet addiction of adolescents in Taiwan: An interview study. *Cyberpsychol. Behav.* 6(6): 649–652.
- Young, K. S. (1996a, August). *Internet addiction: The emergence of a new clinical disorder*. Poster presented at the 104th American Psychological Association Annual Convention, Toronto, Canada.
- Young, K. S. (1996b). Psychology of computer use: XL. Addictive use of the Internet: A case that breaks the stereotype. *Psychol. Rep.* 79: 899–902.
- Young, K. S. (1997, August). *What makes the Internet addictive: Potential explanations for pathological Internet use*. Paper presented at the 105th American Psychological Association Annual Convention, Chicago, IL, USA.
- Young, K. S. (1998). Internet addiction: The emergence of a new clinical disorder. *Cyberpsychol. Behav.* 1(3): 237–244.
- Young, K. S., and Rogers, R. C. (1998). The relationship between depression and Internet addiction. *Cyberpsychol. Behav.* 1(1): 25–28.
- Young, K. S. (1999a). Internet addiction: Symptoms, evaluation, and treatment. In Vandecreek, L., and Jackson, T. (eds.), *Innovations in Clinical Practice: A Source Book*, Vol. 17, pp. 19–31, Professional Resource Press, Sarasota, FL.
- Young, K. S. (1999b). The research and controversy surrounding Internet addiction. *Cyberpsychol. Behav.* 2(5): 381–383.
- Young, K. S., Pistner, M., O'Mara, J., and Buchanan, J. (1999). Cyber disorders: The mental health concern for the new millennium. *Cyberpsychol. Behav.* 2(5): 475–479.
- Zuckerman, M. (1979). *Sensation Seeking Behavior: Beyond the Optimal Level of Arousal*, Erlbaum, Hillsdale, NJ.
- Zung, W. K. (1965). *Self-Rating Depression Scale*, Springer-Verlag, New York.

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