'Internet Addiction': A Critical Review

Laura Widyanto · Mark Griffiths

Abstract It has been alleged by some academics that excessive Internet use can be pathological and addictive. This paper reviews what is known from the empirical literature on 'Internet addiction' and its derivatives (e.g., Internet Addiction Disorder, Pathological Internet Use, etc.) and assesses to what extent it exists. Empirical research into 'Internet addiction' can roughly be divided into five areas: (1) survey studies that compare excessive Internet users with non-excessive users, (2) survey studies that have examined vulnerable groups of excessive Internet use, most notably students, (3) studies that examine the psychometric properties of excessive Internet use, (4) case studies of excessive Internet users and treatment case studies, and (5) correlational studies examining the relationship of excessive Internet use with other behaviours (e.g., psychiatric problems, depression, self-esteem, etc.). Each of these areas is reviewed. It is concluded that if 'Internet addiction' does indeed exist, it affects a relatively small percentage of the online population. However, exactly what it is on the Internet that they are addicted to still remains unclear.

Keywords Addiction · Internet · Technology · Internet addiction · Pathological Internet Use

It has been alleged by some academics that excessive Internet use can be pathological and addictive and that is comes under the more generic label of 'technological addiction' (e.g., Griffiths, 1996a, 1998, 2003). Technological addictions are operationally defined as non-chemical (behavioural) addictions that involve human–machine interaction. They can either be passive (e.g., television) or active (e.g., computer games), and usually contain inducing and reinforcing features which may contribute to the promotion of addictive tendencies (Griffiths,

L. Widyanto · M. Griffiths (✉)
International Gaming Research Unit, Psychology Division,
Department of Social Sciences, Nottingham Trent University,
Burton Street, Nottingham, NG1 4BU, UK
e-mail: mark.griffiths@ntu.ac.uk

1995). Technological addictions can be viewed as a subset of behavioural addictions (Marks, 1990) and feature core components of addiction, (i.e., salience, mood modification, tolerance, withdrawal, conflict and relapse; see Griffiths, 1996b). This paper reviews what is known from the empirical literature on 'Internet addiction' and its derivatives (e.g., Internet Addiction Disorder, Pathological Internet Use, Excessive Internet Use, Compulsive Internet Use, etc.) and assesses to what extent it exists.

Young (1999a,b) claims 'Internet addiction' is a broad term that covers a wide variety of behaviours and impulse control problems. She claims this is categorized by five specific subtypes:

> *Cybersexual addiction:* compulsive use of adult websites for cybersex and cyberporn.
> *Cyber-relationship addiction:* Over-involvement in online relationships.
> *Net compulsions:* Obsessive online gambling, shopping or day-trading.
> *Information overload:* Compulsive web surfing or database searches.
> *Computer addiction:* Obsessive computer game playing (e.g., *Doom, Myst, Solitaire* etc.).

However, Griffiths (2000a) has argued that many of these excessive users are not 'Internet addicts' but just use the Internet excessively as a medium to fuel other addictions. This will be returned to later in this paper.

As we shall see. there have been a growing number of academic papers about excessive use of the Internet. These can roughly be divided into five categories:

- survey studies that compare excessive Internet users with non-excessive users,
- survey studies that have examined vulnerable groups of excessive Internet use, most notably students,
- studies that examine the psychometric properties of excessive Internet use,
- case studies of excessive Internet users and treatment case studies,
- correlational studies examining the relationship of excessive Internet use with other behaviours e.g., psychiatric problems, depression, self-esteem etc.).

Each of these areas will be briefly reviewed in turn.

Comparison Survey Studies of 'Internet Addiction' and Excessive Internet Use

The earliest empirical research study to be carried out into excessive Internet use was by Young (1996a). The study addressed the question of whether or not the Internet can be addictive, and the extent of problems associated with its misuse. The DSM-IV criteria for pathological gambling were modified to develop an eight-item questionnaire, as pathological gambling was viewed to be the closest in nature to pathological Internet use. Participants who answered 'yes' to five or more of the eight criteria were classified as addicted to the Internet (i.e., 'dependents'). A self-selected sample of 496 people responded to the questionnaire with the vast majority (n = 396) being classed as 'dependents.' The majority of respondents were also female (60%).

It was found that 'dependents' spent more time online (38.5 h per week) compared to 'non-dependents' (4.9 h per week), and mostly utilized the more interactive functions of the Internet, such as chat rooms and forums. 'Dependents' also reported that their Internet use caused moderate to severe problems in their family, social and professional lives. Young concluded that (a) the more inter-active the Internet function, the more addictive it is, and (b) while normal users reported little negative effects of Internet use, 'dependents' reported significant impairment in many areas of their lives, including health, occupational, social and financial.

However, there were many limitations to the study including the (relatively) small self-selected sample. Furthermore, the 'dependents' and 'non-dependents' were not been matched in any manner. Young also advertised for 'avid Internet users' to take part in her study which would have biased her results. There was also an assumption that excessive Internet use was akin to pathological gambling and that the criteria used to operationalize excessive Internet use was reliable and valid. Despite, the methodological shortcomings of Young's study, it could be argued that she kick-started a new field of academic enquiry.

Egger and Rauterberg (1996) also conducted an online study by asking similar questions to those asked by Young although their categorization of addiction was based purely on whether the respondents themselves felt they were addicted. Using an online survey, they gathered 450 participants, 84% of whom were males. They reached similar conclusions to Young. Respondents who self-reported as 'addicts' reported negative consequences of Internet use, complaints from friends and family over the amount of time spent online, feelings of anticipation when going online, and feeling guilty about their Internet use. Like Young's study, it suffered from similar methodological limitations. Furthermore, most of the participants were males from Switzerland.

Brenner (1997) devised an instrument called the Internet-Related Addictive Behaviour Inventory (IRABI), consisting of 32 dichotomous (true/false) items. These items were designed to assess experiences comparable to those related to Substance Abuse in the DSM-IV. Of the 563 respondents, the majority were male (73%) and they used the Internet for (a mean average) of 19 h per week. All 32 items seemed to measure some unique variance as they were all found to be moderately correlated with the total score. Older users tended to experience less problems compared to younger users despite spending the same amount of time online. No gender differences were reported. The data appeared to suggest that a number of users experienced more problems in role-performance because of their Internet usage. Brenner concluded that the skewed distribution was consistent with the existence of a deviant subgroup who experience more severe problems due to Internet use. He also claimed there was evidence of tolerance, withdrawal, and craving. The major limitation to the study was that it was not clear whether items in the IRABI really tapped into behaviours that indicated real signs of addiction (Griffiths, 1998).

In a much bigger study—the Virtual Addiction Survey (VAS)—Greenfield (1999) conducted an online survey with 17,251 respondents. The sample was mainly Caucasian (82%), male (71%), with a mean age of 33 years. The VAS included demographic items (e.g., age, location, educational background, etc.), descriptive information items (e.g., frequency and duration of use, specific Internet usage, etc.),

and clinical items (e.g., disinhibition, loss of time, behaviour online). It also included ten modified items from DSM-IV criteria for pathological gambling. Approximately 6% of respondents met the criteria for addicted Internet usage patterns. Tentative *post hoc* analysis proposed several variables that made the Internet attractive:

- intense intimacy (41% total sample, 75% dependents),
- disinhibition (43% total sample, 80% dependents),
- loss of boundaries (39% total sample, 83% dependents),
- timelessness (most of the sample replied 'sometimes,' most of the dependents replied 'almost always'),
- out of control (8% total sample, 46% dependents).

One of the additional areas that was examined was whether 'Internet addiction' shared the same characteristics as other forms of addiction, including substance-based addictions. Early analysis revealed numerous symptoms, which Greenfield viewed as being consistent with the concept of tolerance and withdrawal in dependents, including pre-occupation with going online (58%), numerous unsuccessful attempts to cut back (68%), and feeling restless when attempting to cut back (79%). Despite the large sample size, only a very preliminary analysis was conducted. Therefore, results should be interpreted with caution.

Survey Studies of 'Internet Addiction' in Vulnerable Groups (i.e., Students)

A number of other studies have highlighted the danger that excessive Internet use may pose to students as a population group. This population is deemed to be vulnerable and at risk given the accessibility of the Internet and the flexibility of their schedules (Moore, 1995). For instance, Scherer (1997) studied 531 students at the University of Texas at Austin. Of these, 381 students used the Internet at least once per week and were further investigated. Based on the criteria paralleling chemical dependencies, 49 students (13%) were classified as 'Internet dependent' (71% male, 29% female). 'Dependent' users averaged 11 h/week online as opposed to the average of 8 h for 'non-dependents.' 'Dependents' were three times more likely to use interactive synchronous applications. The major weakness of this study appears to be that 'dependents' only averaged 11 h per week online (i.e., just over an hour a day). This could hardly be called excessive or addictive (Griffiths, 1998).

Morahan-Martin and Schumacher (2000) conducted a similar online study. Pathological Internet Use (PIU) was measured by a 13-item questionnaire assessing problems due to Internet use (e.g., academic, work, relationship problems, tolerance symptoms, and mood-altering use of the Internet). Those who answered 'yes' to four or more of the 13-item questionnaire were defined as pathological Internet users. They recruited 277 undergraduate Internet users. Of these, 8% were classed as pathological users. Pathological Internet users were more likely to be male and to use technologically sophisticated sites. On average, they spent 8.5 h per week online. It was also found that pathological users used the Internet to meet new people, for emotional support, to play interactive games, and were more

socially disinhibited. Again, an average of 8.5 h per week online does not appear excessive, although the authors argued that it was indicative of problems surfacing in relatively short periods of being online. Furthermore, the items used to measure dependency were similar to Brenner's IRABI items. The results, therefore, appear to indicate 'Internet addiction' without substantiating its existence (Griffiths, 1998).

Anderson (1998) collected data from a mixture of colleges in the US and Europe, yielding 1,302 respondents (with an almost equal gender split). On average, his participants used the Internet 100 min a day, and roughly 6% of the participants were considered as high-users (above 400 min a day). The DSM-IV substance-dependence criteria were used to classify participants into 'dependents' and 'non-dependents.' Those endorsing more than three of the seven criteria were classified as being 'dependent.' Anderson reported a slightly higher percentage of dependent student users (9.8%), most of which were those majoring in hard sciences. Of the 106 dependents, 93 were males. They averaged 229 min a day compared to non-dependents who averaged 73 min a day. The participants in the high-users category reported more negative consequences compared to the low-users participants.

Kubey, Lavin and Barrows (2001) surveyed 576 students in Rutgers University. Their survey included 43-multiple-choice items regarding Internet usage, study habits, academic performance, and personality. Internet dependency was measured with a five-point Likert-scale item, asking participants how much they agreed or disagreed with the following statement: "I think I might have become a little psychologically dependent on the Internet." Participants were categorized as 'Internet dependent' if they chose 'agree' or 'strongly agree' to the statement. Of the 572 valid responses, 381 (66%) were females and the age ranged between 18 and 45 years old with a mean age of 20.25 years. Fifty-three participants (9.3%) were classified as Internet dependent, and males were more prevalent in this group. Age was not found to be a factor, but first year students (mean age not reported) were found to make up 37.7% of the dependent group. Dependents were four times more likely than non-dependents to report academic impairment due to their Internet use, and they were significantly 'more lonely' than other students. In terms of their Internet usage, dependents who were also academically impaired were found to be nine times as likely to use synchronous functions of the Internet (MUDs and IRC/chat programs). The authors proposed that these types of application are an important outlet for lonely people (especially students who just moved away to college) as they can keep in touch with family and friend, and find someone to chat to at anytime and no other medium can offer such an opportunity.

Other studies such as those by Kennedy-Souza (1998), Chou (2001), Tsai and Lin (2001), Chin-Chung and Sunny (2003), Nalwa and Anand (2003) and Kaltiala-Heino, Lintonen and Rimpela (2004) that surveyed very small numbers of students and adolescents are simply too small and/or methodologically limited to make any real conclusions. From the studies so far discussed (in this section and the preceding one on comparison studies), it is clear that most of these 'prevalence type' studies share common weaknesses. Most utilize convenient, self-selected participants who volunteer to respond to the survey. It is therefore difficult to plan any kind of comparable groups. Most studies did not use any type of validated addiction criteria,

and those that did assumed that excessive Internet use was akin to other behavioural addictions like gambling and/or used very low cut-off scores which would increase the percentage of those defined as addicted. As Griffiths (2000a) observed, the instruments used have no measure of severity, no temporal dimension, they have a tendency to over-estimate the incidence of the problems, and they do not consider the context of Internet use, (i.e., it is possible for some people to be engaged in very excessive use because it is part of their job or they are in an online relationship with someone geographically distant).

It is perhaps worth noting that in addition to direct studies of 'Internet addiction,' there have been a number of longitudinal studies examining the relationship between general Internet use (including heavy use) and various aspects of psychosocial well-being (Kraut, Patterson, Lundmark, Kiesler, Mukophadhyay, & Scherlis, 1998; Kraut, Kiesler, Boneva, Cummings, Helgeson, & Crawford, 2002; Wästlund, Norlander, & Archer, 2001; Jackson, Von Eye, Biocca, Barbatsis, Fitzgerald, & Zhao, 2003). However, none of these studies show consistent findings and none of these studies specifically investigated 'Internet addiction' or attempted to measure it.

Psychometric Studies of 'Internet Addiction'

As can be seen from early studies, a number of differing diagnostic criteria have been used in 'Internet addiction' studies. One of the most commonly used criteria was the one used by Young (1996a) and subsequently by others. The diagnostic questionnaire consisted of eight items modified from the DSM-IV criteria for pathological gambling (see Table 1). She maintained the cut-off score of five, according to the number of criteria used to diagnose pathological gambling, although the latter had two additional criteria. Even with the more rigorous cut-off score, it was found that almost 80% of the respondents in her study were classified as 'dependents.'

Beard and Wolf (2001) attempted to modify Young's criteria. They raised concerns with the criteria. They questioned the objectivity and reliance on self-report. Some criteria can easily be easily reported or denied by a participant, and their judgement might be impaired, thus influencing the accuracy of the diagnosis. Secondly, some of the items were deemed to be too vague and some terminologies need to be clarified (e.g., what is meant by 'preoccupation?'). Thirdly, they questioned whether or not the criteria for pathological gambling are the most accurate to use as a basis for identifying 'Internet addiction.' Beard and Wolf (2001) therefore proposed modified criteria (see Table 2). It was recommended that all of the first five criteria be required for a diagnosis, since they could be met without any impairment in the person's daily functioning. Furthermore, at least one of the last three criteria be required for diagnosis, as these criteria impact the person's ability to cope and function.

Another attempt at formulating a set of diagnostic criteria for 'Internet addiction' was made by Pratarelli, Browne and Johnson (1999). Factor analysis was employed in this research to examine possible constructs underlying 'computer/ Internet addiction.' There were 341 completed surveys with 163 male and 178 female participants (mean age of 22.8 years) recruited from Oklahoma State

Table 1 Young's (1996a) Diagnostic Criteria for Internet Addiction

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

University. A questionnaire consisting of 93 items was constructed, 19 of which were categorical demographic and Internet use questions, and 74 dichotomous items. Four factors were extracted from the 93 items, two principal and two minor factors.

- Factor One focused on problematic computer-related behaviours in heavy-users of the Internet. This factor was characterized by reports of loneliness, social isolation, missing appointments and other general negative consequences of their Internet use.
- Factor Two focused on the utilization and usefulness of computer technology in general and of the Internet in particular.
- Factor Three focused on two different constructs that concerned the use of the Internet for sexual gratification and shyness/introversion.

Table 2 Criteria for Identifying Internet Addiction (Beard & Wolf, 2001)

All the following (1–5) must be present:
1. Is preoccupied with the Internet (think about previous online activity or anticipate next online session).
2. Needs to use the Internet with increased amounts of time in order to achieve satisfaction.
3. Has made unsuccessful efforts to control, cut back, or stop Internet use.
4. Is restless, moody, depressed, or irritable when attempting to cut down or stop Internet use.
5. Has stayed online longer than originally intended.

And at least one of the following:
1. Has jeopardized or risked the loss of a significant relationship, job, educational or career opportunity because of the Internet.
2. Has lied to family members, therapist, or others to conceal the extent of involvement with the Internet.
3. Uses the Internet as a way of escaping from problems or of relieving a dysphoric mood (e.g., feelings of helplessness, guilt, anxiety, depression).

- Factor Four focused on the lack of problems related to Internet use coupled with mild aversion/disinterest in the technology.

The data collected in this study supported the idea that a mixture of obsessive-like characteristics were present in some individuals in terms of their Internet use and that they prefer online interactions rather than face-to-face. Although this study utilized a more statistically tested instrument in measuring 'Internet addiction,' some of the factors extracted did not seem to indicate components of addiction in general.

More recently, Shapira, Lessig, Goldsmith, Szabo, Lazoritz, Gold, and Stein (2003) proposed a revised classification and diagnostic criteria for problematic Internet use. Furthermore, Black, Belsare and Schlosser (1999) pointed out that Internet Addiction Disorder (IAD) seemed to have high comorbidity with other psychiatric disorders. Because of this, the criteria need to be unique so that it can evaluate the validity of Internet abuse as a distinct disorder. Shapira et al. discussed the concept of 'positive addiction' (Glasser, 1976). However, the concept has been questioned, as the criteria for positive addiction do not resemble many of the components of more established addictions, such as tolerance and withdrawal (Griffiths, 1996b). Moreover, in terms of Internet dependency, negative consequences have been reported along with the amount of time spent online.

Internet dependency has most commonly been conceptualised as a behavioural addiction, which operates on a modified principle of classic addiction models, but the validity and clinical usefulness of such claims have also been questioned. Other studies have also supported the concept that problematic Internet use might be associated with features of DSM-IV impulse control disorder (Shapira, Goldsmith, Keck, Khosla, & McElroy, 2000; Treuer, Fábián, & Fürendi, 2001).

However, other researchers have questioned the existence of PIU and IAD itself. Mitchell (2000) does not believe it deserves a separate diagnosis as it is still unclear whether it develops of its own accord or if it is triggered by an underlying, co-morbid psychiatric illness. It has become virtually impossible to make a distinction of which develops first, especially considering how integrated the Internet has become in people's lives. It is therefore difficult to establish a clear developmental pattern. In addition, behavioural patterns of individuals with problematic Internet use are varied and hard to identify. The only general agreement seem to be that it can be associated with material and psychological consequences. Shapira et al. (2003) suggested the future research should delineate problems. For example, some individuals may have problems during a manic episode only, some because of the demographics of choosing the Internet as a medium to shop or to gamble. Once these factors are extricated, the individuals who are left can be assessed of addiction and impulsivity purely in terms of their Internet use.

Based on the current (yet limited) empirical evidence, Shapira et al. (2003) proposed that problematic Internet use be conceptualised as an impulse control disorder. They admitted that although the category is already a heterogeneous one, over time, specific syndromes have been indicated as clinically useful. Therefore, in the style of DSM IV-TR's impulse control disorder criteria, and in addition to the proposed impulse control disorder of compulsive buying,

Table 3 Diagnostic Criteria for Problematic Internet Use (Shapira et al., 2003)

A. Maladaptive preoccupation with Internet use, as indicated by at least one of the following:
   1. Preoccupations with use of the Internet that are experienced as irresistible
   2. Excessive use of the Internet for periods of time longer than planned
B. The use of the Internet or the preoccupation with its use causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.
C. The excessive Internet use does not occur exclusively during periods of hypomania or mania and is not better accounted by other Axis I disorders.

Shapira et al. proposed broad diagnostic criteria for problematic Internet use (see Table 3).

Three brief clinical vignettes were then described to illustrate the use of the proposed criteria and the complexities of differentiating this 'disorder.' All the participants were college students who were heavier users (45 h a month across at least two months, with the average student using the Internet for 15 h a month as tracked by Florida's North East Regional Data Centre). Of the three vignettes described, two were diagnosed as problem users based on the criteria proposed.

Similarly, Rotunda, Kass, Sutton and Leon (2003) utilized an instrument they simply called the Internet Use Survey. It contained three formal components that explored: a) Demographic data and Internet usage, b) the negative consequences and experience associated with Internet use, and c) personal history and psychological characteristics of participants. Components b) and c) included several items from DSM-IV criteria for pathological gambling, substance use dependence, and particular personality disorder (e.g., schizoid). Their sample consisted of 393 students, 53.6% females ($n = 210$) and 46.4% males ($n = 182$). The age range was between 18 and 81 years old, with a mean of 27.6 years. The average use was 3.3 h a day with 1 h for personal usage. The most common usage was e-mail, surfing the web for information and news, and chat rooms. The negative consequences included 18% of participants reporting preoccupation with the Internet, 25% sometimes feeling excited or euphoric when online, 34% admitted to going online to escape other problems to some degree, and 22.6% reported socializing online more than in person. Staying online longer than planned and losing track of time were also found to be common reports.

Factor analysis revealed four main factors. The first was labelled 'ab- sorption' (i.e., over-involvement with the Internet, time management failure), the second 'negative consequences' (i.e., distress or problematic behaviour such as preferring to be online than spending time with the family), the third 'sleep' (i.e., sleep pattern disruption like scheduling sleep around online time), and finally 'deception' (i.e., lying to others online about identity, or how long they spend online'). Internet-related impairment was conceptualised based on user absorption and negative consequences instead of frequency of usage. The authors concluded by stating that to assume frequent Internet use was excessive, pathological or addictive was potentially misleading as it ignored contextual and dispositional factors associated with this behaviour.

'Internet Addiction,' Comorbidity, and Relationship to Other Behaviours

Previous studies have found that problematic Internet use co-occurs with other psychiatric disorders (Black et al., 1999; Shapira et al., 2000). Griffiths (2000a) has postulated that in the majority of the cases, the Internet seemed to act as a medium for other excessive behaviours, and the Internet is largely being used only to carry out these behaviours. In other words, the Internet would be acting as a medium, and not a causal factor (Shaffer, Hall, & Vander Bilt, 2000). Some of the factors that had been found to be associated with IAD are personality traits, self-esteem and other psychiatric disorders.

Young and Rodgers (1998) examined the personality traits of individuals who were considered dependent on the Internet using the Sixteen Personality Factor Inventory (16 PF). Dependent users were found to rank highly in terms of self-reliance (i.e., they did not feel a sense of alienation others feel when sitting alone, possibly because of the interactive functions of the Internet), emotional sensitivity and reactivity (i.e., they are drawn to mental stimulation through endless databases and information available online), vigilance, low self-disclosure, and non-conformist characteristics (i.e., they might be drawn to the anonymity of the Internet). The findings of this study seem to suggest that specific personality traits may predispose individuals to develop PIU. Similar findings were obtained by Xuanhui and Gonggu (2001) examining the relationship between 'Internet addiction' and the 16 PF.

Armstrong, Phillips and Saling (2000) investigated the extent to which sensation seeking and low self-esteem predicted heavier Internet use, using the Internet Related Problem Scale (IRPS). The IRPS is a 20-item scale, covering factors such as tolerance, craving, and negative impacts of Internet use. Results indicated that self-esteem was a better predictor of 'Internet Addiction' compared to impulsivity. Individuals with low self-esteem seem to spend more time online, and had higher scores on the IRPS. Although this study yielded some interesting results, it should be interpreted with caution due to the small number of participants ($n = 50$). Moreover, Armstrong et al. maintained that the 20-items indicated nine different symptoms without any statistical evidence. It would be interesting to investigate whether the items really did measure the symptoms they claimed to. Other studies have looked at the relationship between 'Internet addiction' and self-esteem (e.g., Widyanto & McMurran, 2004), but again the very low sample sizes make it hard to generalize findings.

Lavin, Marvin, McLarney, Nola and Scott (1999) also tested sensation-seeking and Internet dependence in college students ($n = 342$). Of the total participants, 43 were defined as 'dependent' and 299 'non-dependents.' Dependents had a lower score on the Sensation Seeking Scale, which contradicted their hypothesis. The authors explained by stating the dependents tended to be sociable in their Internet usage but not to the point of sensation seeking, as it differed from the traditional concept.

Petrie and Gunn (1998) examined the link between 'Internet addiction,' sex, age, depression and introversion. One key question was whether participants defined themselves as Internet 'addicts' or not. Of the 445 participants (roughly equal gender split), nearly half (46%) stated that they were 'addicted' to the Internet. This group was the Self-Defined Addicts (SDAs) group. No gender or age differences

were found between SDAs and Non-SDAs. The 16 questions that had the highest factor analytical loadings were used to construct an Internet Use and Attitudes Scale (IUAS). Respondents' scores on this scale ranged from 5 to 61, with high scores indicating high use of and positive attitudes towards the Internet. SDAs scored significantly higher than non-SDAs with SDAs having a mean IUAS score of 35.6 and non-SDAs a mean IUAS score of 20.9. SDAs were also found to have higher levels of depression and they were more likely to be introverted. The main problem with the study was the fact that addiction was self-defined and not assessed formally.

Shapira et al. (2000) employed a face-to-face standardized psychiatric evaluation to identify behavioural characteristics, family psychiatric history, and comorbidity of individuals with problematic Internet use. The study sample consisted of 20 participants (11 men and nine women), with an average age of 36 years. Problems associated with Internet use were: Significant social impairment (in 19 of the participants), marked personal distress over their behaviours (in 12 of the participants), vocational impairment (in eight of the participants), financial impairment (in eight participants), and legal problems (in two participants). It was found that every participant's problematic Internet use met DSM-IV criteria for an Impulse Control Disorder Not Otherwise Specified, while only three participants' Internet use met DSM-IV criteria for Obsessive Compulsive Disorder. All participants met criteria for at least one lifetime DSM Axis I diagnosis. The limitations to the study include the small sample size, self-reported interviews, the possible existence of experimenter's bias, lack of control group, and the possibility of overestimating certain psychiatric disorders, especially bipolar disorders.

More recently, Mathy and Cooper (2003) measured the duration and frequency of Internet use across five domains, namely, past mental health treatments, current mental health treatments, suicidal intent, as well as past and current behavioural difficulty. It was found that the frequency of Internet use was related to past mental health treatments and suicidal intent. Participants who acknowledged them spent significantly greater number of hours per week online. Duration of Internet use was related to past and current behavioural difficulties. Participants who admitted to past and current behavioural problems of alcohol, drugs, gambling, food or sex reported to being relatively new Internet users.

Black et al. (1999) attempted to examine the demographic, clinical features and psychiatric comorbidity in individuals reporting compulsive computer use ($n = 21$). They reported spending between 7 and 60 h per week on non-essential computer use (mean = 27 h per week). Nearly 50% of the participants met the criteria for current disorder with the most common being substance use (38%), mood (33%), anxiety (19%) and psychotic disorder (14%). Nearly 25% of the sample had current depressive disorder (depression or dysthimia). Results showed that eight participants (38%) had at least one disorder with the most common being compulsive buying (19%), gambling (10%), pyromania (10%) and compulsive sexual behaviour (10%). Three of the participants reported physical abuse and two reported sexual abuse during childhood. Other results showed that 11 participants met the criteria for at least one personality disorder with the most frequent being borderline (24%), narcissistic (19%), and anti-social (19%) disorder. Perhaps it was due to the sensitive nature of this particular study that there were a

very small number of participants. However, caution is advised when interpreting the results. Other studies have postulated relationships between 'Internet addiction,' shyness (Chak & Leung, 2004) and attention deficit hyperactivity disorder (Yoo et al., 2004).

'Internet Addiction' Case Studies

Griffiths (2000a,b) mentioned the importance of case studies in the study of 'Internet addiction.' Griffiths' own research on 'Internet addiction' has attempted to address three main questions: (1) What is addiction? (2) Does 'Internet addiction' exist? (3) If it does, what are people addicted to? He adopted an operational definition of addictive behaviour as any behaviour (including Internet use) that included six core components of addiction, namely salience, mood modification, tolerance, withdrawal symptoms, conflict and relapse. Using these criteria, Griffiths asserts that 'Internet addiction' exists in only a very small percentage of users, and most of the individuals who use the Internet excessively just use the Internet as a medium in which they could engage in a chosen behaviour. He also claims that Young's (1999a,b) 'Internet addiction' classification does not really refer to explicit types of 'Internet addiction' as the majority of the behaviours use the medium of the Internet to fuel other non-Internet addictions. In conclusion, Griffiths stated that most studies to date have failed to show that 'Internet addiction' exists outside a small minority of users. He therefore suggested that case studies might help in indicating whether or not 'Internet addiction' exists even if these are unrepresentative.

Griffiths' (2000b) outlined five case studies of excessive users that were gathered over the space of six months. Griffiths concluded that out of the five case studies discussed, only two were 'addicted' according to the components criteria. In short, these two case studies ('Gary' and 'Jamie'—both adolescent males) demonstrated that the Internet was the most important thing in their life, that they neglected everything else in their lives to engage in the behaviour and that it compromised most areas of their lives. They also built up tolerance over time, suffered withdrawal symptoms if they were unable to engage in using the Internet, and had showed signs of relapse after giving up the behaviour for short periods.

In the other cases of very excessive Internet use, Griffiths claimed that the participants had used the Internet as a way to cope with, and counteract other inadequacies (e.g., lack of social support in real life, low self-esteem, physical disability, etc.). Griffiths also observed that it was interesting to note that all of the participants seemed to be using the Internet mainly for social contact and he postulated that it was because the Internet could be an alternative, text-based reality where users are able to immerse themselves by taking on another social persona and identity to make them feel better about themselves, which in itself would be highly rewarding psychologically (Griffiths, 2000b).

Young (1996b) highlighted the case of a 43-year old home-maker who appeared to be addicted to the Internet. This particular case was chosen because it was contrary to the stereotype of a young, computer-savvy male online user as an Internet addict. The woman was not technologically oriented, had reported a

contented home life, and had no prior psychiatric problems nor addictions. Due to the menu-driven and user-friendly nature of the web browser provided by her service provider, she could navigate the Internet easily despite referring to herself as being 'computer-phobic and illiterate.' She initially spent a few hours per week in various chat-rooms but within three months, she reported the need to increase her online time to up to 60 h per week. She would plan to go online for 2 h, but she often stayed online longer than she intended, reaching up to 14 h a session. She started withdrawing from her offline social involvements, stopped performing household chores in order to spend more time online, and reported feeling depressed, anxious and irritable when she was not online.

She denied that the behaviour was abnormal as she did not see it as a problem. Regardless of her husband's protests about the financial cost and her daughter's complaints that she was ignoring them, she refused to seek treatment and had no desire to reduce her online time. Within a year of getting her computer, she was estranged from her two daughters and was separated from her husband. An interview took place six months later and she admitted that the loss of her family resulted in her successfully cutting down her online time without any therapeutic intervention. However, Young stated that she could not eliminate her online use completely nor re-establish relationship with her family without intervention. It was also suggested that this case indicated that certain risk factors (i.e., the type of function used and the level of excitement experienced while being online), may be associated with the development of addictive Internet use.

Black et al. (1999) also outlined two case studies. The first was of a 47-year old man who reported spending 12 to 18 h a day online. He owned three personal computers and he was in debt from purchasing the associated paraphernalia. He admitted to developing several romantic relationships online despite being married with three children. He had been arrested several times for computer hacking, he spent little time with his family, and reported feeling powerless over his usage. The second case was of a 42-year old divorced man who admitted to wanting to spend all day online. He admitted to spending 30 h per week online, most of which he spent in chat-rooms to make new friends and meet potential partners. He had dated several women he met online, and he had made no attempt to cut back despite his parents' complaints over his 'addiction.' While these may be excessive, they do not seem to be addicted but use the Internet excessively for functional purposes (e.g., to engage in online relationships). However, it could also be argued there is still a possibility to be addicted to something even it is used functionally.

More interestingly, Leon and Rotunda (2000) reported two contrasting case studies of individuals who used the Internet for 8 h or more a day. Both were college students and neither was seeking treatment. The first case was a 27 year-old white male who was described as being outgoing and sociable by his college friends. He discovered an online computer game called *Red Alert* during his third year of college. The game began to replace his social activities and he changed his sleeping patterns so he could play online with the other 'good players.' He also reported dropping all but two of his classes and spending up to 50 h per week online. Friends reported that his personality changed. He became short-tempered and overly sensitive, especially when it came to the time he spent online.

Eventually, he stopped all his social activities, he skipped classes, his grades deteriorated, he slept all day and played all night. He did not go out to buy food as he used his grocery money to buy a faster modem. The connection speed was extremely important to him, and he would become upset and angry if the game server went offline. Due to his excessive online time, he was also close to being evicted from his apartment and he constantly lied about the extent of his involvement with the Internet. All this happened within a year of the person discovering the online game.

The second case was a 25 year-old male foreign exchange student from Asia and had very few friends. He stated that it was due to cultural differences, and the lack of other Asian students in college. He bought a personal computer, and he used the Internet to make contact with people globally, read news about his home country, and listened to radio broadcasts from Asia. He also used Internet-Relay Chat (IRC) to keep in touch with friends and family in China. He stated that the Internet occupied his life outside of study and college time, spending 8 h a day online. He said that being able to contact his family and friends daily relieved his depression and homesickness. He claimed that he was not addicted to the Internet—it had simply became an important of his life and routine. He admitted feeling uncomfortable when he was offline but he said that it was due to feeling disconnected and out of touch about what was happening at home. Overall, he rated his experience on the Internet as being positive.

Leon and Rotunda concluded that only the first case seemed to be dependent on the Internet as his personal and occupational life was problematic due to the time he spent online. Moreover, it was argued that he met the criteria for Schizoid Personality Disorder and Circadian Rhythm Disorder. Both of these were the result of his Internet use. In contrast, Internet use in the second case could be seen as a remedy for his homesickness. His online time seemed to make him a happy and functional individual although it could also be seen as the mechanism that caused him further isolation. In summary, Leon and Rotunda contended that to assume that frequent Internet use is excessive, pathological or addictive was simplistic and ignored the contextual and dispositional factors associated with the behaviour. Griffiths (2000a) would argue that the first case was a computer game addict and not an Internet addict, as the Internet was clearly being used to fuel his gaming behaviour. Finally, it is worth mentioning that there are other case study reports in the literature (e.g., Catalano, Catalano, Embi, & Frankel, 1999) but it is clear from reading these that they have little to do with excessive Internet use and/or 'Internet addiction.'

Another indirect indicator that 'Internet addiction' may exist from a case study perspective, comes from the few reports of its treatment. Most of these have utilized a cognitive–behavioural approach therapy to treat IAD although these accounts usually contain some commonsense elements (e.g., Orzack & Orzack, 1999; Young, 1999a, Hall & Parsons, 2001; Yu & Zhao, 2004). None of these treatment accounts definitely show that the people treated were definitely addicts although all those under treatment definitely felt they had a problem with their excessive Internet use. Young, Pistner, O'Mara and Buchanan (1999) also conducted a survey on therapists who had treated clients suffering from cyber-related disorders. The sample consisted of 23 female and 12 male therapists, with an average of 14 years of clinical practice experience. They reported an average caseload of

nine clients that they would classify as an Internet addict treated within the past year, with a range of 2 to 50 patients. The patients were more likely to complain about direct compulsive Internet use (CIU) along with its negative consequences and prior addictions rather than psychiatric illness. Almost all the therapists (95%) felt that the problem of CIU was more widespread than the number of cases indicated.

Why Does Excessive Internet Use Occur?

Most of the research that has been discussed appears to lack theoretical basis as surprisingly few researchers have attempted to propose a theory of the cause of 'Internet addiction' despite the number of studies conducted on the field. Davis (2001) proposed a model of the etiology of pathological Internet use (PIU) using the cognitive–behavioural approach. The main assumption of the model was that PIU resulted from problematic cognitions coupled with behaviours that intensify or maintain maladaptive response. It emphasized the individual's thoughts/ cognitions as the main source of abnormal behaviour. Davis stipulated that the cognitive symptoms of PIU might often precede and cause the emotional and behavioural symptoms rather than *vice versa*. Similar to the basic assumptions of cognitive theories of depression, it focused on maladaptive cognitions associated with PIU.

Davis described Abramson, Metalsky and Alloy's (1989) concepts of *necessary, sufficient*, and *contributory* causes. A *necessary* cause is an etiological factor that must be present or must have occurred in order for symptoms to appear. A *sufficient* cause is an etiological factor whose presence/occurrence guarantees the occurrence of symptoms, and a *contributory* cause is an etiological factor that increases the likelihood of the occurrence of symptoms, but that is neither necessary nor sufficient. Abramson also distinguished between *proximal* and *distal* causes. In an etiology chain that result in a set of symptoms, some causes lie toward the end of the chain (proximal), while others in the beginning (distal). In the case of PIU, Davis claimed that distal cause was underlying psychopathology (e.g., depression, social anxiety, other dependence, etc.), while the proximal cause was maladaptive cognitions (i.e., negative evaluation of oneself and the world in general). The main goal of the paper was to introduce maladaptive cognitions as proximal sufficient cause of the set of symptoms for PIU.

Distal contributory causes of PIU were discussed. It was explained in a diathesis–stress framework, whereby an abnormal behaviour was caused by a predisposition/vulnerability (diathesis) and a life event (stress). In cognitive–behavioural model of PIU, existing underlying psychopathology was viewed as the diathesis, as many studies had shown the relationship between psychological disorders such as depression, social anxiety and substance dependence (Kraut et al., 1998). The model suggested that psychopathology was a distal necessary cause of PIU (i.e., psychopathology must be present, or must have occurred in order for PIU symptoms to occur). However, in itself, the underlying psychopathology would not result in PIU symptoms, but was a necessary element in its etiology.

The model assumed that although a basic psychopathology might predispose an individual to PIU, the set of associated symptoms was specific to PIU and therefore should be investigated and treated independently. The stressor in this model was the introduction of the Internet, or the discovery of a specific function of the Internet. Although it might be difficult to trace back an individual's encounter with the Internet, a more testable event would be the experience of a function found online (e.g., the first time the person used an online auction, found pornographic material online, etc.).

Exposure to such functions was viewed as a distal necessary cause of PIU symptoms. In itself, this encounter did not result in the occurrence of symptoms of PIU. However, as a contributory factor, the event could be a catalyst for the developmental process of PIU. A key factor here was the reinforcement received from an event (i.e., operant conditioning, whereby positive response reinforced continuity of activity). The model proposed that stimuli such as the sound of a modem connecting or the sensation of typing could result in a conditioned response. Thus, these types of secondary reinforcers could act as situational cues that contributed to the development of PIU and the maintenance of symptoms.

Central to the cognitive–behavioural model was the presence of maladaptive cognitions that were viewed to be proximal sufficient cause of PIU. Maladaptive cognitions were broken down into two subtypes—perceptions about one's self, and bout the world. Thoughts about self are guided by ruminative cognitive style. Individuals who tend to ruminate would experience a higher degree in severity and duration of PIU, as studies have supported that rumination is likely to intensify or maintain problems, partly by interfering with instrumental behaviour (i.e., taking action) and problem solving. Other cognitive distortions include self-doubt, low self-efficacy and negative self-appraisal. These cognitions dictate the way in which individuals behave, and some cognitions would cause specific or generalized PIU. Specific PIU referred to the over-use and abuse of a specific Internet function. It was assumed to be the result of a pre-existing psychopathology that became associated with an online activity (e.g., compulsive gamblers might realize that they could gamble online and ultimately showed symptoms of specific PIU as the association between need and immediate reinforcement became stronger). However, it should be noted that not every compulsive gambler showed symptoms of PIU.

On the other hand, generalized PIU involved spending excessive amounts of time online with no direct purpose, or just wasting time. The social context of the individual, especially the lack of social support they received and/or social isolation, was one key factor that played a role in the causality of general PIU. Individuals with general PIU were viewed as being more problematic, as their behaviour would not even exist in the absence of the Internet.

Based on Davis' model, Caplan (2003) further proposed that problematic psychosocial predispositions caused individuals to excessive and compulsive Computer-Mediated (CM) social interaction, which in turn increases their problems. The theory proposed by Caplan and then examined empirically, had three main propositions:

• Individuals with psychosocial problems (e.g., depression and loneliness) hold more negative perceptions of their social competence compared to others.

- They would prefer CM interactions rather than face-to-face ones as the latter was perceived to be less threatening and they perceived themselves to be more efficient in an online setting.
- This preference would in turn lead to excessive and compulsive use of CM interactions that would then worsen their problems and create new ones at school, work and home.

In Caplan's (2003) study, the participants consisted of 386 undergraduates (279 females and 116 males), with the age ranging from 18 to 57 years old (mean age = 20 years). This study utilized the Generalized Problematic Internet Use Scale (GPIUS; Caplan, 2002), a self-report assessing the prevalence of cognitive and behavioural symptoms of pathological Internet use along with the degree to which negative consequences affected the individual. The GPIUS had seven subscales—mood alteration, perceived social benefits, perceived social control, withdrawal, compulsivity, excessive Internet use, and negative outcomes. Also included in this study were validated depression and loneliness scales.

It was found that depression and loneliness were significant predictors of preference for online social interaction, accounting for 19% of the variance. In turn, participants' preference for online social interaction was found to be a significant predictor of their scores on pathological Internet use and negative outcomes. The data also suggested that excessive use was one of the weakest predictors of negative outcomes whereas preference for online interaction, compulsive use, and withdrawal were among the strongest. Overall, loneliness and depression were not found to have large, independent effects on negative outcomes. The result of this study appeared to support the proposition that preference for online socialization was a key contributor to the development of problematic Internet use.

Caplan noted two unexpected results in the data. Firstly, loneliness played a more significant role on the development of problematic Internet use compared to depression. He attempted to explain this finding by stating that loneliness was theoretically the more salient predictor, as negative perception about social competence and communication skills were more pronounced in lonely individuals. On the other hand, a wide variety of circumstances that might not be related to a person's social life, could result in depression (e.g., traumatic experiences). Secondly, using the Internet to alter mood was found to be lacking in influence on negative outcomes. However, an explanation could be that the Internet had a wide variety of functions outside interpersonal CM interactions (e.g., game-playing, reading news, etc.). Therefore, in itself, using the Internet to alter mood might not necessarily lead to negative consequences associated with preference for online social interaction, excessive and compulsive use, and experiencing psychological withdrawal.

The limitations to this study included the need for future empirical evidence pertaining to causality of specific CM communication characteristics that could lead to the preference for online social interaction. Also, the data were collected from a sample that did not display very high degrees of problematic Internet use (median for preference was 1.28 on a scale ranging from one to five; most participants did not prefer online over face-to-face social interactions). Finally, the study did not take into account the role that an individual's actual social skill and com-

munication preference played in the development of problematic Internet use despite the theory's emphasis on perceived social competence.

Concluding Remarks

The labels 'Internet Addiction,' 'Internet Addiction Disorder,' 'Pathological Internet Use,' 'Problematic Internet Use,' 'Excessive Internet Use' and 'Compulsive Internet Use' have all been used to describe more or less the same concept, i.e., that an individual could be so involved in their online use as to neglect other areas of their life. However, it would seem premature at this stage to use one label for the concept, as most of the studies conducted in the field so far had presented varying degrees of differences and conflicting results.

Griffiths (2000a) had argued that most of the individuals who use the Internet excessively are not addicted to the Internet itself, but use it as a medium to fuel other addictions. Griffiths (2000a) says that there is a need to distinguish between addictions *to* the Internet and addictions *on* the Internet. He gives the example of a gambling addict who chooses to engage in online gambling, as well as a computer game addict who plays online, stressing that the Internet is just the place where they conduct their chosen (addictive) behaviour. These people display addictions *on* the Internet. However, there is also the observation that some behaviours engaged on the Internet (e.g., cybersex, cyberstalking, etc.) may be behaviours that the person would only carry out on the Internet because the medium is anonymous, non-face-to-face, and disinhibiting (Griffiths, 2000c, 2001).

In contrast, it is also acknowledged that there are some case studies that seem to report an addiction to the Internet itself (e.g., Young, 1996b; Griffiths, 2000b). Most of these individuals use functions of the Internet that are not available in any other medium, such as chat rooms or various role playing games. These are people addicted *to* the Internet. However, despite these differences, there seem to be some common findings, most notably reports of the negative consequences of excessive Internet use (neglect of work and social life, relationship breakdowns, loss of control, etc.), which are comparable to those experienced with other, more established addictions. In conclusion it would appear that if 'Internet addiction' does indeed exist, it affects only a relatively small percentage of the online population. However, exactly what it is on the Internet that they are addicted to still remains unclear and that further research is needed.

References

Abramson, L. Y., Metalsky, G. I., & Alloy, L. B. (1989). Hopeless depression: A theory-based subtype of depression. *Psychological Review, 96*, 358–372.

Anderson, K. J. (1998). Internet use among college students: An exploratory study. Available at: http://www.rpi.edu/~anderk4.research.html.

Armstrong, L., Phillips, J. G., & Saling, L. L. (2000). Potential determinants of heavier internet usage. *International Journal of Human Computer Studies, 53*, 537–550.

Beard, K., & Wolf, E. (2001). Modification in the proposed diagnostic criteria for internet addiction. *CyberPsychology and Behavior, 4*, 377–383.

Black, D., Belsare, G., & Schlosser, S. (1999). Clinical features, psychiatric comorbidity, and health-related quality of life in persons reporting compulsive computer use behavior. *Journal of Clinical Psychiatry, 60*, 839–843.

Brenner, V. (1997). Psychology of computer use: XLVII. Parameters of internet use, abuse, and addiction: the first 90 days of the Internet Usage Survey. *Psychological Reports, 80*, 879–882.

Caplan, S. E. (2002). Problematic internet use and psychosocial well-being: Development of a theory-based cognitive-behavioral measurement instrument. *Computers in Human Behavior, 18*, 553–575.

Caplan, S. E. (2003). Preference for online social interaction: A theory of problematic internet use and psychosocial well-being. *Communication Research, 30*, 625–648.

Catalano, G., Catalano, M., Embi, C., & Frankel, R. (1999). Delusions about the internet. *Southern Medical Journal, 92*, 609–610.

Chak, K., & Leung, L. (2004). Shyness and locus of control as predictors of internet addiction and internet use. *CyberPsychology and Behavior, 7*, 559–570.

Chin-Chung, T., & Sunny, L. (2003). Internet addiction of adolescents in Taiwan: An interview study. *CyberPsychology and Behavior, 6*, 649–652.

Chou, C. (2001). Internet heavy use and addiction among Taiwanese college students: An online interactive study. *CyberPsychology and Behavior, 4*, 573–585.

Davis, R. (2001). A cognitive-behavioral model of pathological internet use. *Computers in Human Behavior, 17*, 187–195.

Egger, O., & Rauterberg, M. (1996). Internet behaviour and addiction. Zurich: Swiss Federal Institute of Technology. Available at: www.ifap.bepr.ethz.ch/~egger/ibq/res.html.

Glasser, W. (1976). *Positive addictions*. New York: Harper & Row.

Greenfield, D. N. (1999). Psychological characteristics of compulsive internet use: A preliminary analysis. *CyberPsychology and Behavior, 2*, 403–412.

Griffiths, M. D. (1995). Technological addictions. *Clinical Psychology Forum, 76*, 14–19.

Griffiths, M. D. (1996a). Internet addiction: An issue for clinical psychology? *Clinical Psychology Forum, 97*, 32–36.

Griffiths, M. D. (1996b). Behavioural addictions: An issue for everybody? *Journal of Workplace Learning, 8(3)*, 19–25.

Griffiths, M. (1998). Internet addiction: Does it really exist? In J. Gackenbach (Ed.), *Psychology and the internet: Intrapersonal, interpersonal and transpersonal applications* (pp. 61–75). New York: Academic Press.

Griffiths, M. D. (2000a) Internet addiction—Time to be taken seriously? *Addiction Research, 8*, 413–418.

Griffiths, M. D. (2000b) Does internet and computer "addiction" exist? Some case study evidence. *CyberPsychology and Behavior, 3*, 211–218.

Griffiths, M. D. (2000c). Excessive internet use: Implications for sexual behavior. *Cyber Psychology and Behavior, 3*, 537–552.

Griffiths, M. D. (2001). Sex on the internet: Observations and implications for sex addiction. *Journal of Sex Research, 38*, 333–342.

Griffiths, M. D. (2003). Internet abuse in the workplace—Issues and concerns for employers and employment counselors. *Journal of Employment Counseling, 40*, 87–96.

Hall, A. S., & Parsons, J. (2001). Internet addiction: College student case study using best practices in cognitive behavior therapy. *Journal of Mental Health Counselling, 23*, 312–327.

Jackson, L. A., Von Eye, A., Biocca, F. A., Barbatsis, G., Fitzgerald, H. E., & Zhao, Y. (2003). Personality, cognitive style, demographic characteristics and internet use—Findings from the HomeNetToo project. *Swiss Journal of Psychology, 62*, 79–90.

Kaltiala-Heino, R., Lintonen, T., & Rimpela, A. (2004). Internet addiction? Potentially problematic use of the internet in a population of 12–18 year-old adolescents. *Addiction Research and Theory, 12*, 89–96.

Kennedy-Souza, B. (1998). Internet addiction disorder. *Interpersonal Computing and Technology: An Electronic Journal for the 21st Century, 6(1–2)*. Available at: http://www.emoderators.com/ipct-j/1998/n1-2/kennedy-souza.html.

Kraut, R., Patterson, M., Landmark, V., Kiesler, S., Mukophadhyay, T., & Scherlis, W. (1998). Internet paradox: A social technology that reduces social involvement and psychological well being? *American Psychologist, 53*, 1017–1031.

Kraut, R., Kiesler, S., Boneva, B., Cummings, J., Helgeson, V., & Crawford, A. (2002). Internet paradox revisited. *Journal of Social Issues, 58*, 49–74.

Kubey, R. W., Lavin, M. J., & Barrows, J. R. (2001). Internet use and collegiate academic performance decrements: Early findings. *Journal of Communication, 51*, 366–382.

Lavin, M., Marvin, K., McLarney, A., Nola, V., & Scott, L. (1999). Sensation seeking and collegiate vulnerability to internet dependence. *Cyber Psychology and Behavior, 2*, 425–430.

Leon, D., & Rotunda, R. (2000). Contrasting case studies of frequent internet use: Is it pathological or adaptive? *Journal of College Student Psychotherapy, 14*, 9–17.

Marks, I. (1990). Non-chemical (behaviourial) addictions. *British Journal of Addiction, 85*, 1389–1394.

Mathy, R., & Cooper, A. (2003). The duration and frequency of internet use in a nonclinical sample: Suicidality, behavioural problems, and treatment histories. *Psychotherapy: Theory, Research, Practice, Training, 40*, 125–135.

Mitchell, P. (2000). Internet addiction: Genuine diagnosis or not? *The Lancet, 355*, 632–633.

Moore, D. (1995). *The Emporor's virtual clothes: The naked truth about the internet culture*. Chapel Hill, North Carolina: Alogonquin.

Morahan-Martin, J., & Schumacher, P. (2000). Incidents and correlates of pathological internet use among college students. *Computers in Human Behavior, 16*, 13–29.

Nalwa, K., & Anand, A. P. (2003). Internet addiction in students: A cause of concern. *CyberPsychology and Behavior, 6*, 653–656.

Orzack, H., & Orzack, D. (1999). Treatment of computer addicts with complex co-morbid psychiatric disorders. *CyberPsychology and Behavior, 2*, 465–473.

Petrie, H., & Gunn, D. (1998, December). Internet "addiction": The effects of sex, age, depression and introversion. Paper presented at the British Psychological Society London Conference, London.

Pratarelli, M., Browne, B., & Johnson, K. (1999). The bits and bytes of computer/internet addiction: A factor analytic approach. *Behavior Research Methods, Instruments and Computers, 31*, 305–314.

Rotunda, R. J., Kass, S. J., Sutton, M. A., & Leon, D. T. (2003). Internet use and misuse: Pre-liminary findings from a new assessment instrument. *Behavior Modification, 27*, 484–504.

Scherer, K. (1997). College life on-line: Healthy and unhealthy internet use. *Journal of College Student Development, 38*, 655–665.

Shaffer, H., Hall, M., & Vander Bilt, J. (2000). "Computer addiction": A critical consideration. *American Journal of Orthopsychiatry, 70*, 162–168.

Shapira, N., Goldsmith, T., Keck, P. Jr., Khosla, D., & McElroy, S. (2000). Psychiatric features of individuals with problematic internet use. *Journal of Affective Disorders, 57*, 267–272.

Shapira, N., Lessig, M., Goldsmith, T., Szabo, S., Lazoritz, M., Gold, M., & Stein, D. (2003). Problematic internet use: Proposed classification and diagnostic criteria. *Depression and Anxiety, 17*, 207–216.

Tsai, C-C., & Lin, S. S. J. (2001). Internet addiction of adolescents in Taiwan: An interview study. *CyberPsychology and Behavior, 4*, 649–652.

Treuer, T., Fabian, Z., & Furedi, J. (2001). Internet addiction associated with features of impulse control disorder: Is it a real psychiatric disorder? *Journal of Affective Disorders, 66*, 283.

Wästlund, E., Norlander, T., & Archer, T. (2001). Internet blues revisited: Replication and extension for an internet paradox study. *CyberPsychology & Behavior, 4*, 385–391.

Widyanto, L., & McMurran, M. (2004). The psychometric properties of the internet addiction test. *CyberPsychology and Behavior, 7*, 443–450.

Yoo, H. J., Cho, S. C., Ha, J., Yune, S. K., Kim, S. J., Hwang, J., Chung, A., Sung, Y. H., & Lyoo, I. K. (2004). Attention deficit hyperactivity symptoms and internet addiction. *Psychiatry & Clinical Neurosciences, 58*, 487–494.

Young, K. (1996a). Internet addiction: The emergence of a new clinical disorder. *Cyber Psychology and Behavior, 3*, 237–244.

Young, K. (1996b). Psychology of computer use: XL. Addictive use of the internet: A case that breaks the stereotype. *Psychological Reports, 79*, 899–902.

Young, K., & Rodgers, R. (1998, August). Internet addiction: Personality traits associated with its development. Paper presented at the 69th annual meeting of the Eastern Psychological Association.

Young, K. (1999a). The research and controversy surrounding internet addiction. *Cyber Psychology and Behavior, 2*, 381–383.

Young, K. (1999b). Internet addiction: Symptoms, evaluation and treatment. In L. VandeCreek & T. Jackson (Eds.), *Innovations in clinical practice: A source book*, 17 (pp. 19–31). Sarasota, Florida: Professional Resource Press.

Young, K., Pistner, M., O'Mara, J., & Buchanan, J. (1999) Cyber disorders: The mental health concern for the new millennium. *CyberPsychology and Behavior, 2*, 475–479.

Yu, Z. F., & Zhao, Z. (2004). A report on treating internet addiction disorder with cognitive behavior therapy. *International Journal of Psychology, 39*, 407.

Xuanhui, L., & Gonggu, Y. (2001). Internet addiction disorder, online behavior and personality. *Chinese Mental Health Journal, 15*, 281–283.