CyberPsychology & Behavior
Volume 7, Number 4, 2004

The Psychometric Properties of the Internet Addiction Test

LAURA WIDYANTO, Ph.D., and MARY McMURRAN, Ph.D.

ABSTRACT

There is growing concern about excessive Internet use and whether this can amount to an addiction. In researching this topic, a valid and reliable assessment instrument is essential. In her survey of Internet addiction, Young[1,2] designed the Internet Addiction Test (IAT), which provides a basis for developments. The IAT has high face validity, but it has not been subjected to systematic psychometric testing. This study sought to replicate and expand Young's[1] survey, and to examine the IAT more systematically. A questionnaire that existed as a Web page was devised, consisting of the IAT and 15 other questions regarding the respondents' demographic information and Internet usage. Participants were recruited through the Internet, yielding 86 valid responses (29 males and 57 females). Factor analysis of the IAT revealed six factors—salience, excessive use, neglecting work, anticipation, lack of control, and neglecting social life. These factors showed good internal consistency and concurrent validity, with salience being the most reliable. Younger and more recent users reported more problems, mainly concerning the neglect of work and social life. We expected interactive Internet functions to be more addictive; however, this was not found to be so. Overall, the IAT is a valid and reliable instrument that may be used in further research on Internet addiction.

INTRODUCTION

In recent years, the prevalence of Internet use worldwide has increased markedly, with the current estimated number of users exceeding 500 million.[3] Along with all the benefits the Internet brings, problems of excessive use are also becoming apparent. Neglect of academic, work, and domestic responsibilities, disruption of relationships, social isolation, and financial problems have all been identified as consequences of heavy Internet usage.[1,4,5] That people should use the Internet to the extent that they experience such problems gives rise to the question of whether or not the Internet may be addictive.

The concept of addiction is not easy to define, but central to it is dependence on a substance or activity. Dependence is characterized by overindulgence, tolerance, withdrawal, craving, and loss of control.[6] Although originally linked only with substance use, there is growing recognition of behavioral addictions such as gambling,[7] overeating,[8] and exercise.[9] Included within behavioral addictions are behaviors that relate to the use of machines, such as playing video games,[10] using computers,[11] and playing amusement machines.[12] Behavioral addictions require explanations that do not rely too heavily on physiological mechanisms, and psychological explanations of addiction have come to the fore.[13]

There have been several studies of Internet use and Internet addiction. Egger and Rautenberg[4] devised a questionnaire to assess usage, feelings, and experiences of Internet use. Posting this questionnaire on the Internet attracted 454 responses, of whom 10% identified themselves as addicted. These self-styled addicts spent significantly more time on the Internet, and their usage was increasing. They felt more strongly driven to use the Internet, felt more anxious if use was restricted, and felt more guilty or depressed when they spent a long time on the Internet.

Brenner[14] received 563 complete responses to the Internet Usage Survey that he posted on the Internet. This survey instrument is a 32-item true-false questionnaire assessing respondents' experiences similar to those associated with substance abuse in DSM-IV. The mean number of items that respondents answered yes to was 11 out of the possible 32, with the most common problems relating to time management. He also found that older users experienced fewer problems, despite spending as much time online as younger users.

Petrie and Gunn[15] conducted another online study that yielded 455 valid responses. They asked 27 questions about the participants' Internet use, attitudes, and beliefs. Included was the key question of whether or not they defined themselves as Internet "addicts," with 46.1% of the respondents classifying themselves as addicted to the Internet, and these were equally likely to be female as male. Respondents also completed Beck's Depression Inventory and Eysenck's Introversion/Extroversion Scale, and a significant relationship was found between high Internet usage and both depression and introversion, indicating that those who consider themselves addicted to the Internet were more likely to be depressed and introverted.

Young[1] likened excessive Internet use most closely to pathological gambling, a disorder of impulse control in DSM-IV, and adapted the DSM-IV criteria to relate to Internet use in her Internet Addiction Test. She recruited 396 participants through announcements in newspapers, posters distributed at colleges, electronic postings on Forums geared toward Internet addiction, and search engines on the Web. Participants were interviewed either by phone or online. Consistent with the cut-off point for pathological gambling, respondents who answered "yes" to five or more of the diagnostic questions were classified as Internet dependents. In her sample, 60% were identified as dependent on the Internet.

Compared to non-dependent users, dependent users reported more negative consequences of Internet use. They mostly used the more interactive functions, such as chat rooms, Multi User Dungeons (MUDs), and news groups, whereas nondependent users mostly use the noninteractive functions, namely E-mails, the World Wide Web (WWW), and information protocols. Interestingly, dependent users had had Internet access for a shorter period of time than nondependent users.

Later, Young[2] wrote a self-help book aimed at individuals who fear that they, or someone they know, might be addicted to the Internet. In this book, she included an expanded version of the Internet Addiction Test (IAT). The IAT uses simplified terminology and includes Young's original eight items on DSM criteria, along with 12 new items. It was designed to assess which areas of an individual's life might be affected by their excessive Internet use. The IAT has high face validity, but it has not been subjected to rigorous psychometric investigation.

One major shortcoming of previous research is the absence of a psychometrically developed assessment instrument. We sought to replicate and extend Young's findings, and to examine the properties of the 20-items IAT more systematically. There are also a number of issues raised in earlier studies that we explored further. First is the temporal dimension of addiction. Young's results showed that the majority of those addicted to the Internet were relatively new users, in contrast to non-dependents who had been using the Internet for more than 12 months. Young chose to construe this as addiction occurring quickly from the point that users were introduced to the Internet, but an alternative is to construe it as a "newbie symptom," with "newbie" being the Internet term for new users. In other words, being addicted is a temporary phenomenon for some individuals, probably relating to the initial novelty value and wearing off with increased familiarity. Data collected using the IAT will allow exploration of whether new users are more addicted to the Internet than more experienced users, and if there are any specific functions of the Internet that they use more than others. Second, it appears that specific applications are more addictive—namely, those that are more interactive. The ability to communicate with other people in real time, present oneself as desired, and develop a degree of intimacy may be "addictive" to some people, whereas simply gathering information and sending an E-mail may not.

Thus, in this study we expect to find that:

1. The higher the amount of time spent online, the greater the extent of problems as measured by the IAT.
2. More recent users spend more time online compared to longer-term users, and their extent of problems is greater.
3. The interactive functions of the Internet are more addictive and cause more problems.

MATERIALS AND METHODS

Sample

Participants for this study were recruited through the Internet. Volunteers were sought from (a) elec-

tronic postings on popular chat programs (AOL Instant Messenger, ICQ, and MSN Messenger), (b) postings on different Google psychology Newsgroups (sci.psychology.misc. and sci.psychology.announce), (c) postings on Internet related Google Newsgroup (soc.net-people and comp.internet.net-happenings), (d) posting on a major auction site (www.ebay.com), (e) posting on a big MUD (www.anguish.org), (f) individuals who searched for the keywords "Internet Addiction" and "Internet Usage Survey" on popular search engines (Google, AOL, Yahoo, and Altavista), and (g) poster advertising the site in a Cyber Café. Participants were also recruited by personal contact. The site of the online questionnaire could also be accessed through a link from the researcher's university homepage.

Materials

A 35-item questionnaire was used in this study.

Demographic information. Questions 1–4 asked about the respondent's age, sex, occupation and e-mail address (optional).

Internet use. Questions 5–15 asked about the respondent's Internet use, including estimated time per week spent online and for what purpose (business or pleasure). They were asked if their Internet use had changed over the past year, which function of the Internet they use mostly during their time online, and how much time they spend on the chosen function.

Internet Addiction Test (IAT²). This is a 20-item questionnaire on which respondents are asked to rate items on a five-point Likert scale, covering the degree to which their Internet use affects their daily routine, social life, productivity, sleeping pattern, and feelings. The minimum score is 20, and the maximum is 100; the higher the score, the greater the problems Internet use causes. Young suggests that a score of 20–39 points is an average online user who has complete control over his/her usage; a score of 40–69 signifies frequent problems due to Internet usage; and a score of 70–100 means that the Internet is causing significant problems.

Procedure

The questionnaire existed as a Web page implemented in a UNIX-based server that captured the responses into a text file and sent it to the researcher's electronic mailbox for analysis. The Web site of the questionnaire was then submitted to several popular search engines as well as Newsgroups. On each electronic posting, a link to the site of the questionnaire was provided, along with a brief explanation of the study. Once a participant was transferred to the site of the questionnaire, she/he was able to read the instructions and complete the survey in his/her own time. Data were collected over a 7-week period. All responses were entered into a standard statistical database for analysis. Scores for each variable were checked to ensure that there were no errors made when transferring survey responses into the database.

RESULTS

Participants

Over a 7-week period, 92 responses were collected. Due to incomplete questionnaires, only 86 of the responses were used in analysis. The sample was made up of 29 (33.7%) males and 57 (66.3%) females. The mean age was 25.45 for males (SD = 8.91) and 31.44 for females (SD = 10.34). Female participants are found to be significantly older than the male participants ($t(84) = -2.66$, $p < 0.01$). The ages of the participants ranged between 13 and 67 years old. Of all respondents, 51 (59.3%) stated that their professions required them to use the Internet. Interestingly, 82 (95.3%) participants have Internet access from home. Out of the 86 responses, 48 (55.8%) supplied their e-mail address for the researcher to be able to contact them for further studies.

General Internet use and the IAT

The duration of Internet use among the respondents ranged from 2 to 125 months (10 years and 5 months), with a mean of 47.76 months (SD = 34.81). An average of how many hours they stay on the Internet per week in general, for professional use only and for personal use only, is shown in Table 1.

Factor-analysis of the 20-item IAT

First of all, measures of sampling adequacy was carried out on the 20-items IAT to see whether it was suitable for factor-analysis. Bartlett's test of sphericity indicated a chi square value of 746.34, $p < 0.0001$; while Kaiser-Meyer-Olkin measure of sampling adequacy indicates a value of 0.83. When a basic scree-test and eigenvalue at >1.0 criteria were used, six factors were generated from the IAT. These six factors, which were rotated to position of maximum orthogonality in nine iterations, explain

TABLE 1. MEAN HOURS/WEEK OF INTERNET USE

Hours/Week	*Male (n = 29)*	*Female (n = 57)*	*Total (n = 86)*
Overall Internet use	31.62 (24.57)	26.61 (20.39)	28.03 (21.88)
Professional use	8.83 (11.89)	6.79 (11.03)	7.48 (11.30)
Personal use	21.93 (20.63)	19.82 (19.17)	20.53 (19.58)

Standard deviations are given within parentheses.

68.16% of the variance (Table 2). Factor 1 (five items) accounts for 35.80% of the variance and measures salience (e.g., "How often do you choose to spend more time online over going out with others?", "How often do you snap, yell, or act annoyed if someone bothers you while you are online?"). Factor 2 (five items) accounts for 9.02% of the variance and measures excessive use (e.g., "How often do you find that you stay online longer than you intended?", "How often do you try to hide how long you've been online?"). Factor 3 (three items) accounts for 6.51% of the variance and measures neglect of work (e.g. "How often does your job performance or productivity suffer because of the Internet?", "How often do you become defensive or secretive when anyone asks you what you do online?"). Factor 4 (two items) accounts for 6.02% of the variance and measures anticipation (e.g., "How often do you find yourself anticipating when you will go online again?"). Factor 5 (three items) accounts for 5.55% of the variance and describes lack of control (e.g., "How often do you try to cut down the amount of time you spend online and fail?"). Factor 6 (two items) accounts for 5.21% of the variance and measures neglect of social life (e.g., "How often do you prefer the excitement of the Internet to intimacy with your partner?"). In order to measure internal consistency within the items in each factor, Cronbach's alphas were calculated and all were highly to moderately reliable.

Correlations between the six IAT factors, age, and Internet use

Correlations (Pearson's *r*) between the six factors extracted from the 20 item IAT and age, duration of Internet use, average, professional and personal use are presented in Table 3. Factor 1, salience, was found to be positively correlated with average Internet use ($r = 0.26$, $p < 0.05$, two-tailed) and personal Internet use ($r = 0.32$, $p < 0.01$, two-tailed). Factor 2, excess use, was also found to correlate positively with average use ($r = 0.27$, $p < 0.05$, two-tailed) and personal use ($r = 0.34$, $p < 0.01$, two-tailed). A negative correlation was found between Factor 3, neglecting work, and age ($r = -0.27$, $p < 0.05$, two-tailed). Factor 4, anticipation, did not correlate with age or Internet use. Factor 5, lack of self control, was found to correlate positively with personal internet use ($r = 0.22$, $p < 0.05$, two-tailed). Factor 6, neglecting social life, was found to correlate negatively with duration of use ($r = -0.26$, $p < 0.05$, two-tailed) and positively with personal use ($r = 0.22$, $p < 0.05$, two-tailed). No significant correlations were found between the factors and gender and different types of applications use.

Correlations were calculated between the total IAT scores, duration of Internet use, average length of overall, professional and personal Internet use. As expected, a small but significant, negative ($r = -0.18$, $p < 0.05$, one-tailed) was found between duration of use and total IAT scores indicating that newer users experience more problems. Internet usage was measured in three categories; overall, professional, and personal use. Positive correlations were found between overall Internet use and total IAT score ($r = 0.22$, $p < 0.05$, one-tailed) and between Personal Internet use and total IAT score ($r = 0.3$, $p < 0.01$, one-tailed); no significant correlation was found between Professional Internet use and total IAT score. However, this is not true for professional use. A negative correlation between participants' duration of use and how much time they spend online was also found ($r = -0.18$, $p < 0.05$, one-tailed) as expected.

Correlations between the six IAT factors

The six IAT factors all significantly correlated (Pearson's *r*) with each other, with the correlations ranging from $r = 0.62$ to $r = 0.226$ (Table 4). The strongest correlation was found between F1 (salience) and F2 (Excessive Use) and the weakest between F3 (Neglecting Work) and F6 (Neglecting Social Life).

Specific functions of the Internet

Participants were asked about which specific function of the Internet they use mostly during their time online. For analysis, the various functions of the In-

TABLE 2. ROTATED COMPONENT MATRIX

Question	*How often . . .*	*1*	*2*	*3*	*4*	*5*	*6*
Q19	Do you choose to spend more time online over going out with others?	0.71					
Q13	Do you snap, yell, or act annoyed if someone bothers you while you are online?	0.62					
Q12	Do you fear that life without the Internet would be boring, empty and joyless?	0.60					
Q15	Do you feel preoccupied with the Internet when off-line or fantasise about being online?	0.56					
Q10	Do you block disturbing thoughts about your life with soothing thoughts of the Internet?	0.55					
Q2	Do you neglect household chores to spend more time online?		0.78				
Q14	Do you lose sleep due to late night log-ins?		0.65				
Q20	Do you feel depressed, moody, or nervous when you are offline, which goes away once you are back online?		0.63				
Q1	Do you find that you stay online longer than you intended?		0.60				
Q18	Do you try to hide how long you've been online?		0.40				
Q6	Does your work suffer (e.g., postponing things, not meeting deadlines, etc.) because of the amount of time you spend online?			0.85			
Q8	Does your job performance or productivity suffer because of the Internet?			0.83			
Q9	Do you become defensive or secretive when anyone asks you what you do online?			0.64			
Q11	Do you find yourself anticipating when you go online again?				0.74		
Q7	Do you check your E-mail before something else that you need to do?				0.71		
Q17	Do you try to cut down the amount of time you spend online and fail?					0.87	
Q5	Do others in your life complain to you about the amount of time you spend online?					0.67	
Q16	Do you find yourself saying "Just a few more minutes" when online?					0.61	
Q4	Do you form new relationships with fellow online users?						0.81
Q3	Do you prefer excitement of the Internet to intimacy with your partner?						0.65
Cronbach's standardized alpha		0.82	0.77	0.75	0.61	0.76	0.54
Eigenvalue		7.17	1.8	1.3	1.2	1.11	1.04
Percentage of variance explained		35.8	9.02	6.51	6.02	5.55	5.21

Extraction method: principal component analysis.
Rotation method: varimax with Kaiser normalization:
a. Rotation converged in nine iterations
F1—Salience
F2—Excessive use
F3—Neglect work
F4—Anticipation
F5—Lack of control
F6—Neglect social life

TABLE 3. CORRELATIONS BETWEEN IAT FACTORS AND INTERNET USE

	Age	*Duration of use (months)*	*Average use (h/wk)*	*Personal use (h/wk)*
Factor 1: Salience	−0.20	−0.16	0.263[a]	0.321[b]
Factor 2: Excess use	−0.63	−0.075	0.274[a]	0.344[b]
Factor 3: Neglect work	−0.272*	−0.142	0.022	0.004
Factor 4: Anticipation	−0.082	−0.099	−0.007	0.063
Factor 5: Self-control	−0.184	−0.12	0.107	0.223[a]
Factor 6: Neglect social life	−0.048	−0.261[a]	0.159	0.216[a]
Total IAT Score	−0.192	−0.18	0.217[a]	0.299[b]

[a]Correlation is significant at the 0.05 level (two-tailed).
[b]Correlation is significant at the 0.01 level (two-tailed).

ternet were divided into four categories. The first category, Non-Interactive, included information search, surfing the Web, downloading programs, playing computer games and MUD games. Of all the participants, 29 (33.7%) were included in this category. The second is Asynchronous Interactive, which included functions whereby users were able to interact with other users although they did not get an immediate reply. This category includes e-mails, auctions, and discussion forums. There were 41 (47.7%) participants in this category. The third category is Synchronous Interactive, which included chat rooms and MUD chat. The functions listed in this category allowed user to interact with other users in real time. There were 12 (14%) participants in this category. The final category was labelled Non-Specified for the participants who chose not to specify which function they use the most during their online time. Only 4 (4.7%) of the participants were included in this group. Anova was used to examine the different categories against duration of use, personal, professional and overall Internet use, the six IAT factors and the total IAT score. No significant differences were found.

DISCUSSION

This study sought to explore the psychometric properties of the IAT. Six factors were extracted from the 20 items questionnaire. Factor 1 (five items) measures salience, Factor 2 (five items) measures excessive use, Factor 3 (three items) measures neglect of work, Factor 4 (two items) measures anticipation, Factor 5 (three items) describes lack of control, and Factor 6 (two items) measures neglect of social life. These scales show good to moderate internal consistency (alpha coefficients (0.54–0.82). Factor 1, salience, explained most of the variance. It was also found to be the most reliable as indicated by its highest Cronbach's Alpha. This factor was validated by its positive correlations with average general and personal Internet usage.

The factors themselves were found to be positively correlated with each other. The strongest relationship was found between salience (F1) and excessive use (F2). There were also strong correlations between salience (F1) and lack of control (F5), as well as excess use (F2) and lack of control (F5).

TABLE 4. CORRELATIONS BETWEEN THE 6 IAT FACTORS

	Salience	*Excess use*	*Neglecting work*	*Anticipation*	*Lack of self-control*	*Neglecting social life*
Salience	1					
Excess Use	0.62[b]	1				
Neglecting work	0.422[b]	0.401[b]	1			
Anticipation	0.552[b]	0.447[b]	0.337[b]	1		
Lack of self-control	0.584[b]	0.559[b]	0.334[b]	0.431[b]	1	
Neglecting social life	0.461[b]	0.439[b]	0.226[a]	0.323[b]	0.435[b]	1

[a]$p < 0.05$ (two-tailed).
[b]$p < 0.01$ (two-tailed).

Salience and excess use were both associated with higher weekly general and personal Internet use of the participants. Neglect of work has only been found to be associated with one factor, which is age. The negative correlation would suggest that younger participants were experiencing more problems related to work neglect. Besides being consistent with Brenner's[14] previous finding whereby younger users were found to be having more problems, the result of this study suggests that neglecting work might be the one area that younger users are having difficulties with. Lack of control and neglect of social life are found to be associated with higher personal Internet use. The latter is also found to have a negative association with how long participants have been using the Internet (duration of use), which indicates that users who had only started using the Internet were neglecting their social lives more compared to longer term users.

Total IAT scores were used to measure the extent of problems participants were having due to their Internet use. In keeping with findings of previous studies,[1] a negative correlation was found to exist between duration of use and the total IAT score, indicating that newer users experience more problems. Of the three different categories of Internet use (overall, professional and personal use), higher general and personal use were associated with more problems. However, there is no association between professional use and reported problems. A negative correlation between participants' duration of use and how much time they spend online was also expected, but no significant correlation was found. This suggests that more recent users do not necessarily spend more time on the Internet compared to the longer duration users.

Another hypothesis that was tested in the current study was whether interactive Internet functions were more addictive. Young[1] found that the more interactive an Internet function was, the more addictive it would be to the users. However, no correlation was found between the type of functions and participants' total IAT scores in the current investigation. It should be taken into account that the function each participant chose to nominate as his/her most utilized could be a reflection of the way that the participants were recruited. In other words, the larger percentages of users seem to mirror the applications in which the site of this survey was announced (i.e., search engines, Auction site, Forums, and Chat rooms). As it was announced in a limited number of Internet functions, only individuals who used those specific functions regularly would see these announcements. Only 12 participants (14%) were users of the Synchronous Interactive functions as it was more difficult to recruit participants through these types of functions. An additional question asking how the participants reached the questionnaire site would have indicated whether or not this was true.

One major drawback of this study was found is sampling of participants. First of all, as Azar [16] pointed out, individuals who volunteered to take part in an on-line experiment are self-selected. They are not random samples of population in general. This study suffered from inherent methodology biases of using a convenient and self-selected group of Internet users. Moreover, the result should be interpreted with caution due to the relatively small number of participants.

The IAT seem to be measuring some key factors in addiction. Its reliability and validity need to be further tested using a larger sample. Once a valid and reliable measure has been devised, more can then be researched about the nature of Internet addiction. Despite the methodological limitations of the study, the IAT shows potential to be a good basis for developing a valid instrument.

REFERENCES

1. Young, K. (1996). Internet addiction: the emergence of a new clinical disorder. *CyberPsychology & Behavior* 3:237–244.
2. Young, K. (1998). *Caught in the Net*. New York: John Wiley & Sons.
3. NUA. (2002). Nielsen NetRatings: Worldwide Internet population grows slightly [On-line]. Available: www.nua.ie/surveys/index.cgi?f=VS&art_id=905358274&rel=true.
4. Egger, O., & Rauterberg, M. (1996). Internet behavior and addiction [On-line]. Available: www.ifap.bepr.ethz.ch/~egger/ibq/res.html.
5. Griffiths, M.D. (2000). Does Internet and computer "addiction" exist? Some case study evidence. *CyberPsychology & Behavior* 3:211–218.
6. American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders IV*. Washington, DC: Author.
7. Mobilia, P. (1993). Gambling as a rational addiction. *Journal of Gambling Studies* 9:121–151.
8. Lesieur, H.R., & Blume, S.B. (1993). Pathological gambling, eating disorders, and the psychoactive substance use disorders. *Journal of Addictive Diseases* 12:89–102.
9. Yates, A. (1991). *Compulsive exercise and eating disorders: toward an integrated theory of activity*. New York: Brunner/Mazel.
10. Keepers, G.A. (1990). Pathological preoccupation with video games. *Journal of the American Academy of Child and Adolescent Psychiatry* 29:49–50.

11. Shotton, M. (1991). The costs and benefits of "computer addiction." *Behaviour and Information Technology* 10:219–230.
12. Griffiths, M.D. (1992). Pinball wizard: the case of a pinball machine addict. *Psychological Reports* 71:160–162.
13. McMurran, M. (1994). *The psychology of addiction*. London: Taylor & Francis.
14. 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.
15. Petrie, H., & Gunn, D. (1998). Internet "addiction": the effects of sex, age, depression and introversion. Presented at the British Psychological Society London Conference.
16. Azar, B. (2000). Online experiments: ethically fair or foul? *Monitor on Psychology* 3:4.

Address reprint requests to:
Mary McMurran
School of Psychology
Cardiff University
Cardiff, CF10 3YG, U.K.

E-mail: McMurranM@cardiff.ac.uk