

Shyness and Locus of Control as Predictors of Internet Addiction and Internet Use

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ABSTRACT

The new psychological disorder of Internet addiction is fast accruing both popular and professional recognition. Past studies have indicated that some patterns of Internet use are associated with loneliness, shyness, anxiety, depression, and self-consciousness, but there appears to be little consensus about Internet addiction disorder. This exploratory study attempted to examine the potential influences of personality variables, such as shyness and locus of control, online experiences, and demographics on Internet addiction. Data were gathered from a convenient sample using a combination of online and offline methods. The respondents comprised 722 Internet users mostly from the Net-generation. Results indicated that the higher the tendency of one being addicted to the Internet, the shyer the person is, the less faith the person has, the firmer belief the person holds in the irresistible power of others, and the higher trust the person places on chance in determining his or her own course of life. People who are addicted to the Internet make intense and frequent use of it both in terms of days per week and in length of each session, especially for online communication via e-mail, ICQ, chat rooms, newsgroups, and online games. Furthermore, full-time students are more likely to be addicted to the Internet, as they are considered high-risk for problems because of free and unlimited access and flexible time schedules. Implications to help professionals and student affairs policy makers are addressed.

INTRODUCTION

INTERNET ADDICTION is a rather new research area, which has less than 10 years of history. Research efforts have been largely focused on the examination of the concept and diagnostic methodology,¹⁻⁴ with little spared for studies on problematic use of the Internet in high-risk groups and how this addictive behavior is linked to personality traits. The current study attempted to address this research need, identifying predictors of Internet addiction with a focus on shyness and locus of control. In brief, it assessed the relationships between Internet addiction and shyness, Internet addiction and locus of control, and the significance of shyness, locus of control, online experiences, and demographics of

respondents as predictors for Internet addiction and online activities.

Internet Addiction

Internet addiction disorder made its first significant appearance in the U.S. press in 1995, when an article entitled "The Lure and Addiction of Life On Line" was published in the *New York Times*. O'Neill, the author, quoted addictions specialists and computer industry professionals and likened excessive Internet use to compulsive shopping, exercise, and gambling.⁵ The concept did not instantly gain popular interest from journalists, academics, and health professionals until the following year when Kimberly Young presented the results of her

research in a paper entitled "Internet addiction: The emergence of a new clinical disorder" at the annual meeting of the American Psychological Association.⁶

Addictive Internet use is defined as "an impulse control disorder that does not involve an intoxicant" and is akin to pathological gambling.⁶ Internet addicts exhibit signs like preoccupation with the Internet (i.e., thoughts about previous online activities or anticipation of the next online session); use of the Internet in an increasing amount of time in order to achieve satisfaction; repeated, unsuccessful efforts to control, cut back or stop Internet use; feelings of restlessness, moodiness, depression or irritability when attempting to reduce use of the Internet; staying online longer than originally intended; jeopardizing or risking loss of significant relationships, job, educational or career opportunities because of Internet use; lying to family members, therapists or others to conceal the extent of involvement with the Internet; and using the Internet as a way of escape from problems or to relieve a dysphoric mood, e.g. feeling of hopelessness, guilt, anxiety, and depression.⁴

Young characterized Internet addiction as staying online for pleasure averaging 38 hours or more per week, largely in chat rooms, and concluded that Internet addiction can shatter families, relationships, and careers.⁷ She developed an 8-item questionnaire for diagnosing addicted Internet users, which was adopted from the criteria for pathological gambling as referenced in the Diagnostic and Statistical Manual of Mental Disorders-IV.⁸ In her studies, respondents who answered "yes" to 5 or more criteria were classified as addicted Internet users and those who responded "yes" to less than 5 were classified as normal Internet users. Based on her initial research, Young further categorized five specific types of Internet addiction: (1) cybersexual addiction to adult chat rooms or cyberporn; (2) cyberrelationship addiction to online friendships or affairs that replace real-life situations; (3) net compulsions to online gambling, auctions, or obsessive trading; (4) information overload to compulsive web surfing or databases searches; and (5) computer addiction to game playing or programming.⁶

Past studies on relationships have suggested that computer or Internet dependent users gradually spend less time with real people in their lives in exchange for solitary time in front of a computer.⁹⁻¹¹ Young found that serious relationship problems were reported by 53% of the 396 case studies of Internet addicts interviewed, with marriages and intimate dating relationships most disrupted due to cyberaffairs and online sexual compulsivity.⁶ Young

et al. suggested that anonymity, convenience, and escape were the driving forces behind cybersexual addiction, which greatly increased the risk of virtual adultery.¹²

At work, organizational productivity became a headache to many human resource personnel and company chiefs, as employees increasingly misused or abused Internet applications for non-productive activities such as sending and receiving personal electronic mails, browsing adult web sites, engaging in cybersex, playing online games, chatting, trading stock, and shopping online.¹³ Cases in which employees were disciplined or laid off because of inappropriate use of the Internet were reported by over 30% of companies surveyed.¹⁴⁻¹⁶

In school, a third of college students studied, who demonstrated addictive behavior, reported problems in managing social, academic, and work responsibilities; and attributed it to the overuse of the Internet.¹⁷⁻¹⁹ Both Kandell and Hall et al. emphasized that college students are a population of special concern, vulnerable to Internet addiction.^{20,21} In addressing the high-risk factors that subjected the students to such vulnerability, Young suggested that free and unlimited Internet access, huge blocks of unstructured time, newly experienced freedom from parental control, no monitoring or censoring of what they say or do online, full encouragement from faculty and administrators, adolescent training in similar activities, desire to escape college stressors, social intimidation and alienation, and a higher legal drinking age (relevant to the Americans only) are the most common.²²

Internet addiction on campus has been gaining wide attention from parents, help professionals, academics, and the media.²³⁻²⁵ Parents of failing college sons or daughters are screaming for solutions to address their children's addiction problems and save them from self-destruction. They are left in a state of helplessness as exemplified by a posting found on the message board of Netaddiction.com, a web-based resource network devoted to Internet addicts and their loved ones:

"My son is flunking out of college because he does not go to classes. He games 24/7. We have talked, begged, pleaded, bribed, punished and even went to counseling. Nothing helps. What do we do? It is hard watching your once very intelligent, happy, and never had a problem before son throw away his life." (www.netaddiction.com)

Traditional recovery services, which cater for people suffering from various kinds of addiction, obsession and compulsion such as gambling and

alcoholism, have extended their scope to include Internet addiction. Hospitals with Internet recovery services can be found in many parts of the United States (e.g., the McLean Hospital in Massachusetts and the Illinois Institute for Addiction Recovery at Proctor Hospital).²⁶ Meanwhile, Internet addiction support groups are burgeoning on and off the Internet. And youths are just one of the focus groups targeted by these professional service providers.

In Hong Kong, empirical studies on Internet addiction are rather few, if not lacking. Breakthrough Limited, a Christian youth welfare group in Hong Kong, conducted a research on Internet addiction among Hong Kong youths aged 10–29 in mid-2002 and found that nearly 15% of the respondents were addicted to the Internet.²⁷ They spent an average of 6.1 days per week and 4.6 h a day on the Internet, as compared with 5 days a week and 3.1 h per day afforded by average Internet users. These people demonstrated two or more Internet addiction symptoms, namely, spending more time on the Internet than intended, feeling an urge to instantly connect to the Internet once arriving home, receiving complaints from family members and friends about too much time on the Internet, and unsuccessful attempts to cut back on Internet use. These people were actively involved in four kinds of Internet activities, namely, listening to music online, downloading songs from the Internet, engaging in electronic communication with people, and going to Internet cafés to play online games. Above all, online games were identified as the major cause for their addiction to the Internet. Negative impacts on family ties and work concentration were reported. It is further found that Internet addiction among young people in Hong Kong is related to their weak self-control and discipline and Internet addicts are weaker at emotional control and concentration on work than average Internet users.²⁷

In another research conducted by Breakthrough in 2000, it was found that about 5% of the respondents who were secondary school students were addicted to ICQ.²⁸ These adolescents showed weaker self-esteem, parental and peer support than non-ICQ addicts. They were also weaker in self-expression, listening, and willingness to express one's viewpoints. Furthermore, the Hong Kong Federation of Youth Group reported that its hotline handled more than 200 enquiries from young people and parents in 2002, all of which were related to uncontrolled use of the Internet or frequent, long visits to Internet cafés by the youth.²⁹ However, few research on Internet usage so far paid much attention to the link between addiction and personal

traits.^{30,31} This study examines the impact of shyness on Internet addiction among a high-risk group of young adults—the Net generation—born between 1977 and 1997.

Shyness

Shyness is the fear to meet people and the discomfort in others' presence.³² At its core is anxiety about being evaluated by others and consequently rejected.³³ It is associated with excessive monitoring of behavior and takes the form of hesitation in making spontaneous utterances, reluctance to express opinions, and making responses to the overtures of others that reduce the likelihood of further interaction. Shy people suffer numerous disadvantages. Compared with others, they more likely regard their networks (i.e., offline networks) as less supportive and less satisfying and are happy to be by themselves or to participate minimally in social encounters.³⁴ Jones and Carpenter found that shy people had less social support, smaller friendship networks, and fewer, more passive interactions in their offline lives than the non-shy people.³⁵

The Internet offers an alternative for people to gratify their social and emotional needs, which might be unmet in their traditional offline networks.³⁶ In the faceless cyberspace, people can create online personas where they alter their identities and pretend to be someone other than themselves.³⁷ They can enjoy aspects of the Internet that allow them to meet, socialize, and exchange ideas through the use of e-mail, ICQ, chat rooms and newsgroups, which in turn allow the person to fulfill unmet emotional and psychological needs that are more intimate and less threatening than real life relationships.²⁶

Shyness or anxiety does not pose an obstacle to the use of e-mail and chat rooms.³⁸ Research has proposed that the computer-mediated medium is the perfect environment for shy people because of their greater perceived control over the communication process, such as the absence of time constraints in preparing messages and the absence of direct observation by others.³⁹ Young et al. found that the anonymity in virtual environments provides shy individuals with a safe and secure environment for social interaction.⁴⁰ In fact, as it has been said, "in the Internet, no one knows you're an introvert."⁴¹ Roberts et al. suggested that shy individuals were less inhibited in their behavior and social interaction in text-based virtual environments online than in their offline lives and, as a result, were able to develop a range of relationships.⁴² The Internet provides virtual environments that free

individuals from shyness-related inhibitions they experience in offline settings. It is possible that computer-mediated communication particularly appeals to shy people who have an unmet need for sociability in their offline lives.

Past research has investigated the relationship between Internet dependency and shyness and found that problematic Internet use was significantly correlated to increased shyness.^{43–45} Other anecdotal accounts also suggested that reduced shyness in social synchronous virtual environments, such as Internet Relay Chat and Multi-User Dimensions, might also influence the level of Internet use.^{22,46,47} Based on this brief review of the literature, we expect:

- H1: The higher the level of shyness (i.e., discomfort and inhibition in the presence of others), the higher the likelihood one will be addicted to the Internet.

In addition to examining the relationship between shyness and Internet addiction, this study also investigated another personality trait—locus of control—to see how it is linked to Internet dependency behavior.

Locus of control

Locus of control refers to a set of beliefs about how one behaves and the relationship of that behavior to how one is rewarded or punished.⁴⁸ Rotter defined locus of control as the degree to which a person believes that control of reinforcement is internal versus the degree to which it is external.⁴⁹ If one believes that rewards are the results of one's own behavior, this would be an internal locus of control. On the other hand, if one believes that rewards occur as a result of intervention by others, one believes in an external locus of control. Levenson created a multidimensional scale which is comprised of three independent components, namely, internality, powerful others, and chance, wherein one can regard oneself as internal and yet also believe in the power of luck.⁵⁰

Individuals with a strong belief in personal control would gain great satisfaction from playing video, computer or online games, as successful completion of and advancement to the next level of games entails mastery of a winning strategy which is a combination of the intuition of the game designers' intent and the skills of manipulating the objects, symbols and languages inside the artificial world of games. Online game players are seduced by the pleasure of being able to control the simulated world inside the computer.⁵¹ Leung found in his re-

cent study that heavy users of the Internet enjoyed the illusory power of being able to control the world inside the computer when playing online games.³⁶ However, as Young suggested, an online game is a kind of Internet activity that draws behavior out to the extreme of addiction.⁶

Research has demonstrated that an increased sense of personal control over the environment was found to be positively correlated with successful experiences of computer use.⁵² Santa-Rita found that subjects who used computers and completed the SUCCESS assignments (a series of interactional programs that allow a substantial opportunity for entering college freshmen to operate a computer in an environment of personal control and autonomy) changed their perception of the importance of luck in the attainment of goals from what it had been prior to the study.⁵³ This shift might represent the subjects' beliefs that greater personal control was responsible for their success. The study further suggested that learning with SUCCESS might facilitate in students a greater awareness of themselves as being the controlling agents of their environment.

Although past research has examined the effects of shyness, anxiety, loneliness, depression, and self-consciousness on the level of Internet use,^{25,45,54} this study explored one other personality trait—locus of control—and assessed its relationship to Internet addiction. Based on these theoretical frameworks, this exploratory study poses the following hypotheses and research questions:

- H2: The more subjects expect to have control over their own life, the less likely they will be addicted to the Internet.
- H3: The more subjects expect powerful others to have control over their life, the more likely they will be addicted to the Internet.
- H4: The more subjects expect chance to have control over their life, the more likely they will be addicted to the Internet.
- RQ1: To what extent can shyness, locus of control, and demographics of respondents predict Internet addiction?
- RQ2: To what extent can Internet addiction, shyness, locus of control, online experience, online activities, and demographics predict Internet use?
- RQ3: To what extent can Internet addiction, shyness, locus of control, online experience, and demographics predict online activities?

MATERIALS AND METHODS

Sample and sampling procedure

Data for this exploratory study were collected in a convenience sample, using a combination of on-line and offline methods during the period of March 20–April 3, 2003. An online questionnaire was created and distributed to the social contacts of the authors, and in turn reached a wider audience through snowballing on the Internet. A total of 340 online submissions were received. At the same time, printed questionnaires were distributed to students of three secondary schools. In this way, 382 completed questionnaires were collected. One requirement for questionnaires to be included in the study sample is that respondents must have used the Internet within the three months leading to the survey. As a result, the sample comprised 722 respondents, with 36% males. In terms of age, over 78% were 12–26 years old and belonged to the so-called Net-generation. (The Net-generation is people who were born between 1977 and 1997.) With regard to education, about 66% had completed high school, 28.1% were college graduates, and 5.8% were post-graduates. Meanwhile, a majority of the participants (63.4%) were full-time students.

Questionnaire and measures

The questionnaire was designed in English, conducted in Chinese, and pilot tested for ambiguity and clarity before fielding. It comprised questions concerning five aspects of the respondents. They were: (1) Internet addiction tendency, (2) tendency to be anxious and inhibited in social encounters due to shyness, (3) locus of control (i.e., belief or disbelief in internal and external control over respondents' own life), (4) Internet use (i.e., online experience and activities), and (5) demographics of respondents.

Internet addiction. The short version of the Internet Addiction Test by Young was used.³ The test consisted of eight items and respondents were asked to draw reference to their Internet experience in the previous three months prior to the survey. Respondents were assigned "1" if they answered "yes" to the statements, and "0" if they responded "no." A composite Internet addiction score was created by summing the items, ranging from 0 (no tendency to Internet addiction) to 8 (high tendency to Internet addiction). According to Young's definition of Internet addiction, respondents who scored 5 points or above were addicted to the Internet. Young stated

that the cut off score of "five" was consistent with the number of criteria used for pathological gambling and was seen as an adequate number of criteria to differentiate normal from pathological addictive Internet use.⁶

Shyness. The revised Cheek and Buss Shyness Scale, with 13 items, was used.⁵⁵ Respondents were asked to rank their agreement with the 13 statements using a five-point Likert scale, namely, "1" = "strongly disagree" and "5" = "strongly agree." Scale scores were obtained by reverse-scoring four items and summing all responses. Scale scores on the 13-item scale ran from 13 (exhibiting the lowest shyness) to 65 (highest shyness).

Locus of control. The Internality, Powerful Others, and Chance Scales were used.⁵⁰ The scales represent three separate components of the locus of control construct, namely, *internality*, which measures the extent to which people believe that they have control over their own lives; *powerful others*, which concerns the belief that other persons control the events in one's life; and *chance*, which measures the degree to which a person believes that chance affects his or her experiences and outcomes. Each of the three subscales comprises eight items that are presented as a unified scale of 24 items. A five-point Likert scale was used in rating the items, namely, "1" = "strongly disagree" and "5" = "strongly agree" with the statements. The range of scores per subscale was 8 (lowest expectation) to 40 (highest expectation).

Internet use and online experience. Internet use was measured by asking respondents (a) the number of days per week they used the Internet and (b) the number of hours and minutes spent on each Internet session. Online experience was assessed by recording (a) the primary Internet access location (i.e., at home = 1 and not at home = 0) and (b) the number of aliases used on the Internet.

Online activities. Finally, online activities were measured by gauging the frequency of various online activities, namely, (a) online communications including e-mail, ICQ, newsgroups, and chat rooms, (b) information search on the Internet, and (c) online games. A five-point Likert scale was used to rate their frequency of use, namely, "1" = "rarely" to "5" = "very often."

Demographics. Social demographic variables were included in the present study as control variables. They were: gender (male = 1), age, education (high-

est level of formal schooling), and employment status (with 1 = "full-time employment," 2 = "part-time employment," 3 = "full-time student," and 4 = "unemployed").

RESULTS

Hypotheses testing

To test the hypotheses, Pearson correlation analyses were run to examine the relationship between shyness and Internet addiction; and the relationships between Internet addiction and the separate components of locus of control. Results in Table 1 showed that the higher the tendency of one being addicted to the Internet, the shier the person is (shyness: $r = 0.20$, $p \leq 0.001$); the less faith the person has in his or her control over his or her own life (internality: $r = -0.13$, $p \leq 0.001$); the firmer belief

the person holds in the irresistible power of others on his or her own life (powerful others: $r = 0.17$, $p \leq 0.001$); and the higher trust the person places on chance in determining his or her own course of life (chance: $r = 0.27$, $p \leq 0.001$). Based on these results, shyness, locus of control, and Internet addiction appear intricately linked. Thus, H1, H2, H3, and H4 are all supported.

Predicting Internet addiction

According to Young's definition of Internet addiction, only 14.7% of the respondents were considered addicted in the sample because there were only 106 from 722 subjects who scored 5 points or above on the Internet addiction scale.⁸ More specifically, Internet addicts are on average 0.21 age categories younger ($t = 3.82$, $p < 0.001$) and have 0.35 aliases more ($t = -4.18$, $p < 0.001$) than the non-

TABLE 1. REGRESSION OF SHYNESS, LOCUS OF CONTROL, ONLINE EXPERIENCE, ONLINE ACTIVITIES, AND DEMOGRAPHICS ON INTERNET ADDICTION

<i>Predictor variables</i>	<i>Internet addiction</i>	
	<i>Simple r</i>	β
Shyness	0.20***	0.12**
Locus of control		
Internality	-0.13**	-0.09*
Powerful others	0.17***	n.s.
Chance	0.27***	0.16**
Internet use		
Internet use (days/week)	0.23***	0.11*
Internet use (min/session)	0.33***	0.21***
Online experience		
Online location (home = 1)	0.11**	n.s.
Number of aliases	0.19***	n.s.
Online activities		
E-mail, ICQ, chat	0.26***	0.11**
WWW information search	n.s.	n.s.
Online games	0.23***	0.10*
Demographics		
Gender (female = 1)	n.s.	n.s.
Age	-0.23***	n.s.
Education	-0.16***	n.s.
Occupation (full-time student = 1)	0.23***	0.17**
R^2		0.29
Final adjusted R^2		0.27

$p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$;
 N = 722.

Figures are standardized beta coefficients.

addicts. In terms of Internet usage, addicts use the Internet averaging 1.08 days more per week ($t = -5.2, p < 0.001$) and 0.64 hours more per session ($t = -5.63, p < 0.001$) than the non-addicts.

To determine the predictors of Internet addiction tendency, simple regression analysis was used. Results in Table 1 indicated that "Internet use in minutes per session" ($\beta = 0.21, p \leq 0.001$), "occupation being a full-time student" ($\beta = 0.17, p \leq 0.01$), "chance" ($\beta = 0.16, p \leq 0.01$), "shyness" ($\beta = 0.12, p \leq 0.01$), "Internet use in days per week" ($\beta = 0.11, p \leq 0.05$), "e-mail, ICQ, newsgroups, and chat rooms" ($\beta = 0.11, p \leq 0.01$), "online games" ($\beta = 0.10, p \leq 0.05$), and "internality" ($\beta = -0.09, p \leq 0.05$) were significant predictors for "Internet addiction." This reveals that people who are easily subject to the influence of the Internet and become addicted are often full-time students. They are heavy users of the Internet and stay online for a prolonged pe-

riod of time in every session, they also believe in chance and its control over one's fate, and they do not believe in their ability to control their own life. Addicted individuals are generally shy and indulge themselves regularly in e-mail, ICQ, newsgroups, chat rooms, and online games. The regression equation explained 27% of the variance.

Predicting Internet use

As shown in Table 2, the profiles of heavy Internet users (in terms of days per week), according to Young's criteria, are generally Internet addicts.⁸ They use e-mail, ICQ, newsgroups, and chat rooms ($\beta = 0.36, p \leq 0.001$) frequently and seek information on the WWW regularly ($\beta = 0.13, p \leq 0.01$). They are usually not full-time students ($\beta = -0.19, p \leq 0.01$), but are well-educated females ($\beta = 0.13, p \leq 0.05, \beta = 0.15, p \leq 0.00$, and $\beta = 0.13, p \leq 0.01$

TABLE 2. REGRESSION OF INTERNET ADDICTION, SHYNESS, LOCUS OF CONTROL, ONLINE EXPERIENCE, ONLINE ACTIVITIES, AND DEMOGRAPHICS ON INTERNET USE

<i>Predictor variables</i>	<i>Frequency of Internet use</i>			
	<i>Days per week</i>		<i>Minutes per session</i>	
	<i>r</i>	β	<i>r</i>	β
Internet addiction	0.23***	0.13***	0.35***	0.23***
Shyness	n.s.	n.s.	n.s.	n.s.
Locus of control				
Internality	n.s.	n.s.	n.s.	n.s.
Powerful others	n.s.	-0.09#	n.s.	n.s.
Chance	n.s.	n.s.	0.12**	n.s.
Online Experience				
Online location (home = 1)	n.s.	n.s.	n.s.	n.s.
Number of aliases	0.13**	0.10*	0.14***	n.s.
Online activities				
E-mail, ICQ, chatrooms	0.42***	0.36***	0.37***	0.30***
WWW information search	0.27***	0.13**	0.23***	0.11*
Online games	n.s.	n.s.	0.18***	0.16**
Demographics				
Gender (female = 1)	0.08*	0.15***	n.s.	n.s.
Age	0.07#	n.s.	-0.15***	n.s.
Education	0.30***	0.13*	0.08*	n.s.
Occupation (full-time student = 1)	-0.23***	-0.19**	n.s.	-0.12*
R ²		0.34		0.27
Final adjusted R ²		0.31		0.25

$p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; $N = 722$.

Figures are standardized beta coefficients.

respectively), and possess a large number of aliases ($\beta = 0.10, p \leq 0.05$). A total of 31% of the variance was accounted for in this regression equation. Similarly, heavy users of the Internet who spend long hours per session tend to be Internet addicts ($\beta = 0.23, p \leq 0.01$) and not full-time students ($\beta = -0.12, p \leq 0.01$). They engage themselves regularly with others in e-mail, ICQ, newsgroups, and chat rooms ($\beta = 0.30, p \leq 0.001$), playing online games ($\beta = 0.16, p \leq 0.01$), and seeking information on the Web frequently ($\beta = 0.11, p \leq 0.05$). The R^2 for this regression equation was moderate at 0.25.

Predicting online activities

Analyses on influences of Internet addiction, shyness, locus of control, Internet use, online experience, and demographics on online activities showed that "Internet use in days per week" ($\beta = 0.35, p \leq 0.001$),

"Internet use in minutes per session" ($\beta = 0.18, p \leq 0.001$), "gender (male)" ($\beta = -0.18, p \leq 0.001$), "Internet addiction" ($\beta = 0.11, p \leq 0.01$), "number of aliases" ($\beta = 0.09, p \leq 0.01$), and "shyness" ($\beta = -0.08, p \leq 0.05$) were significant predictors for the use of "e-mail, ICQ, newsgroups, and chat rooms." This means that these four forms of Internet usage are favorite activities for female Internet addicts who have many online aliases. They are not shy individuals and are frequent users both in terms of days per week and minutes per session. Heavy seekers of information on the WWW are not necessary addicts, but they use the Internet heavily every day of the week ($\beta = 0.18, p \leq 0.001$) and spend many hours in each session ($\beta = 0.12, p \leq 0.01$). This means that information search on WWW is a favorite Internet activity for these highly educated young females ($\beta = 0.25, p \leq 0.001, \beta = -0.15, p \leq 0.01$, and $\beta = -0.09, p \leq 0.01$) who are not withdrawn or reserved.

TABLE 3. REGRESSION OF INTERNET ADDICTION, SHYNESS, LOCUS OF CONTROL, ONLINE EXPERIENCE, AND DEMOGRAPHICS ON ONLINE ACTIVITIES

Predictor variables	Online activities					
	E-mail, ICQ, and chatroom		WWW information search		Online games	
	<i>r</i>	β	<i>r</i>	β	<i>r</i>	β
Internet addiction	0.26***	0.11**	n.s.	n.s.	0.23***	0.10*
Shyness	n.s.	-0.08*	n.s.	-0.07#	n.s.	n.s.
Locus of control						
Internality	n.s.	n.s.	0.08*	n.s.	0.11*	0.09**
Powerful others	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Chance	0.13**	n.s.	n.s.	n.s.	0.08#	n.s.
Internet use						
Internet use (days/week)	0.42***	0.35***	0.27***	0.18***	n.s.	n.s.
Internet use (min/session)	0.37***	0.18***	0.23***	0.12**	0.18***	0.15**
Online experience						
Online location (home = 1)	n.s.	n.s.	n.s.	n.s.	0.14***	n.s.
Number of aliases	0.15***	0.09**	n.s.	n.s.	0.28***	0.19***
Demographics						
Gender (male = 1)	-0.12**	-0.18***	n.s.	-0.09*	0.24***	0.18***
Age	-0.13**	n.s.	n.s.	-0.15**	-0.25***	-0.12*
Education	n.s.	0.09#	0.23***	0.25***	-0.37***	-0.32***
Occupation (full-time student = 1)	n.s.	0.10#	-0.12**	n.s.	0.27***	n.s.
R^2		0.31		0.17		0.30
Final adjusted R^2		0.30		0.15		0.28

$p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; $N = 722$.

Figures are standardized beta coefficients.

Finally, "education" ($\beta = -0.32, p \leq 0.001$), "number of aliases" ($\beta = 0.19, p \leq 0.001$), "gender" ($\beta = 0.18, p \leq 0.001$), "Internet use in minutes per session" ($\beta = 0.15, p \leq 0.01$), "age" ($\beta = -0.12, p \leq 0.05$), "Internet addiction" ($\beta = 0.10, p \leq 0.05$), and "internality" ($\beta = 0.09, p \leq 0.01$) were significant predictors for "online games." This indicates that heavy online game players are generally less educated young males who use the Internet regularly with many online aliases. When they are online, they usually use it for extensive periods of time. Most important, heavy users of online games expect high self-control over their own life but are often Internet addicts (Table 3).

DISCUSSION

The findings of this research support all the hypotheses we posed. A higher level of shyness (i.e., discomfort and inhibition in the presence of others experienced by the individual) was associated with a moderate but statistically significant increase in Internet addiction, as measured by an eight-item Internet addiction scale developed by Young.⁸ However, contrary to previous research that shyness did not specifically predispose people to lower or higher levels of use of the Internet's communicative functions,²³ it is worth noting that shy males use e-mail, ICQ, and chat rooms less. Despite the fact that shy people tend to have problems with social interaction offline,⁵⁷ shy males did not find it much easier to communicate online than offline. This finding could mean that shy people are most likely to be addicted to other applications of the Internet such as recreational or leisure searches.

Furthermore, greater dependent use of the Internet was also found significantly linked to psychologically mediating variables—locus of control. Specifically, internality, a measure of whether one believes that one has control over one's life, was negatively associated with Internet addiction. This means that a person will be less likely to be addicted to the Internet when one believes he/she is in control of his/her life. Moreover, two measures assessing whether a person believes that powerful others and/or chance have control over one's life, were found to be positively related to Internet addiction. These results imply that internally-oriented individuals or individuals who believe that powerful others and/or chance have no effect on their lives, attempt to manipulate or influence their environment, and believe that they themselves are the master of their destinies. They strongly believe in their ability to influence the world and their own

lives. They can control, cut back, or stop Internet use at will. They would not have the feelings of restlessness, moodiness, depression or irritability when attempting to reduce their use of the Internet. Externally-oriented people or people who believe that powerful others or chance have control over their lives were found to be less successful in controlling their Internet use. As a result, they often have problems of staying online longer than originally intended or jeopardizing loss of significant relationships, job, educational or career opportunities because of Internet use.

Although shyness was a significant predictor for Internet addiction and level of e-mail, ICQ, and chat room use, the negative relationship between shyness and use of e-mail, ICQ, and chat rooms may suggest that shy males may not always seek out online communication, as an alternative to satisfy their social and emotional needs which might be unmet in their traditional offline network, but pursue other interests. It is also interesting to note that the lack of a significant relationship between shyness and level of Internet use suggests that shy individuals may employ the same amount of time on the Internet as the non-shy people. This finding seems to be in line with previous research.^{23,58} Similarly, the observation that locus of control was not a predictor of level of Internet use, despite being a significant predictor for Internet addiction and playing online games, may reflect a greater penetration and acceptance of the Internet for the Net-generation regardless of whether they are internally or externally oriented.

Meanwhile, the significant relationship between online games and internality seems to confirm previous findings that heavy users of the Internet enjoyed the illusory power or pleasure of being able to control the world inside the computer when playing online games.³⁷ People who believe in their own ability to influence the world and their own lives are particularly drawn to online games through which they experience a sense of being in control. This finding is in keeping with what Turkle argued, that the major appeal of interactive games is that players are able to extend their mind and to control the artificial world inside the computer.⁴⁰ She further pointed out that "television is something you watch, but video games are something you do, something you do with your head, a world that you enter, and, to a certain extent, they are something you 'become.' "

As expected, people who are addicted to the Internet obviously make intense and frequent use of the Internet measuring in both days per week and length of each session, especially for online communication via e-mail, ICQ, chat rooms, newsgroups,

and for online games. However, Internet addiction was not found to be a significant predictor of information search on the WWW in this study. This is an interesting finding and one possible contributing factor to this may have been that "dependents" of the Internet spend most of their time in the synchronous communication environment engaging in interactive online games, chat rooms, the MUDs (multi-user dungeons), and ICQ but not in information search.⁸

Furthermore, the number of online aliases was also a significant predictor for level of Internet use and online activities, including e-mail, ICQ, newsgroups, chat rooms, and online games. This finding supports Turkle's suggestion that the fluid nature of the identity in online life is a major seductive property of the Internet.³⁷ Indeed, you can be whoever you want to be when online; you can completely redefine yourself. In fact, MUDs make possible the construction of a persona that is so "fluid" and "multiple" that we can have unlimited identities using different aliases.³⁶ However, the observation that online location was not a predictor of addictive Internet behavior, level of Internet use, nor online activities suggests that Internet has become an ubiquitous tool and the Internet is a medium of choice for the Net-generation regardless where and when they need it.

Finally, full-time students do not use the Internet as frequently and intensely as non-full-time students. However, full-time students are more likely to be addicted to the Internet. This seems to be consistent with previous findings that students are considered high-risk for problems because of ready access and flexible time schedules.²² Implications of this finding should help parents, educators, help professionals, and social workers in the formulation of policies to prevent excessive non-productive use of the Internet. Gender differences also exist in the Internet activities they frequently take part in, with males being drawn to online games and females being attracted to online communication. Young people are more active in Internet activities such as online communication, information search on the WWW and online games as compared with their seniors. People who are well educated frequently engage themselves in the online search for information. On the contrary, people who have received a lower education frequently participate in online games.

As theoretical constructs, both shyness and locus of control performed reasonably well in predicting addictive Internet behavior. However, there are limitations in this study. First, adopting a conve-

nience sample is certainly a weakness. Application or generalization of these results of this study to other populations may not be justified. With greater use of the Internet likely in the future by all population groups, future studies should extend to other cohorts, in addition to the Net-generation, examining other personality traits using probability samples. Second, online activity that measures an amount of time spent on e-mail, ICQ, and chat rooms without relating to the context of use is another weakness. Defining e-mail, ICQ, and chat room use as merely in hours per week and length per session ignores the reasons for use. The amount of time spent on these Internet usage forms may change depending on context. Content- and purpose-specific online activities could possibly relate differently to shyness and locus of control. Previous research has indicated that shy males were more likely than non-shy males to use the Internet for recreation and leisure.²³ As this is an exploratory study, it still raises many avenues regarding the cause and effect in terms of shyness, locus of control and Internet addiction. Research on the impact of the Internet is just beginning to emerge but to this point it has neglected issues such as Internet addiction revolving around children and adolescents. It is important that possible benefits of better, faster, and more available services on the Internet do not blind society to the potential harmful effects to young people inherent in their use.

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