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Internet addiction, usage, gratification, and pleasure experience: the Taiwan college students' case

Chien Chou*, Ming-Chun Hsiao

Institute of Communication Studies, National Chiao Tung University, 1001 Ta-Hsueh Road, Hsinchu, Taiwan

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Abstract

This study explores Internet addiction among some of the Taiwan's college students. Also covered are a discussion of the Internet as a form of addiction, and related literature on this issue. This study used the Uses and Gratifications theory and the Play theory in mass communication. Nine hundred and ten valid surveys were collected from 12 universities and colleges around Taiwan. The results indicated that Internet addiction does exist among some of Taiwan's college students. In particular, 54 students were identified as Internet addicts. It was found that Internet addicts spent almost triple the number of hours connected to the Internet as compare to non-addicts, and spent significantly more time on BBSs, the WWW, e-mail and games than non-addicts. The addict group found the Internet entertaining, interesting, interactive, and satisfactory. The addict group rated Internet impacts on their studies and daily life routines significantly more negatively than the non-addict group. The study also found that the most powerful predictor of Internet addiction is the communication pleasure score, followed by BBS use hours, sex, satisfaction score, and e-mail-use hours.

Keywords: Internet; Internet addiction

1. Introduction

Use of the Internet on Taiwan's college campuses and in society has increased dramatically in recent years. While the academic use of Internet is primarily intended for faculty research and communication, the Internet has also become an important part of

* Corresponding author. Tel.: +886-3-5731808; fax: +886-3-5727143.
E-mail address: cchou@cc.nctu.edu.tw (C. Chou).

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student life. However, over-involvement with the Internet has occasionally been observed on campus. For example, Chou, Chou and Tyan (1999) reported this observation: in one dorm at their science- and technology-oriented university, four roommates were busy, quietly working on their PCs. They logged on to the Internet to chat with other people, their roommates! Another observation the researchers made was that some college students flunked because they spent too much time on the Internet rather than on their studies. Some students remain connected to the Internet virtually the whole day — as long as they are awake. One researcher's student reported that she could not do anything else, and felt serious depression and irritability when her network connection was out. These observations attracted researchers' attention and led us to ask how the Internet hook them so tenaciously, leading them to produce such addiction-like behaviors? Who is actually addicted to the Internet, and why are they addicted?

Although development of Internet addiction concept is still in its infancy and academic investigations are few in number, some anecdotal data and empirical studies have accumulated in recent years. Griffiths (1998) considered Internet addiction to be a kind of technological addiction (such as computer addiction), and one in a subset of behavioral addiction (such as compulsive gambling). Brenner (1996) argued that because the Internet provides user-friendly interfaces, and a convenient medium for checking information and communicating with others, a wide range of users have become cybernetically involved with the Internet, and this has certainly changed the profile of the "computer addict." Kandell (1998) defined Internet addiction as "a psychological dependence on the Internet, regardless of the type of activity once logged on" (p. 12). He stated that college students as a group appear more vulnerable in developing a dependence on the Internet than any other segment of society, because college students have a strong drive to develop a firm sense of identity, to develop meaningful and intimate relationships, usually have free and easily accessible connections, and their Internet use is implicitly if not explicitly encouraged.

All these observations can also be applied to Taiwan's college students. In Taiwan, the first network infrastructure is called TANET, which connects all schools and major research institutes. TANET still provides convenient and free access to faculties and most students. In Taiwanese society, many students separate from their families and move toward an independent life when they enter college. Most of them live in school dormitories, and have fast and free Internet access via school network systems. More than half of them had not used the Internet before entering college, neither did their parents. However, upon their graduating from college, each one of them is well experienced with the Internet. The Internet becomes an important part of college students' lives, not only for their studies and daily routines, but also as a tool for getting to know other people and the rest of the world.

Most people use the Internet in healthy and productive ways. However, some college students develop a "pathologic" use of the Internet. Kandell (1998) gave an analogy that exercise is good and people require it, but over-exercise may have a destructively negative impact on human health. Internet use is similar. Over-involvement with the Internet, or "pathologic Internet use" (PIU) may cause users time-management or health problems, and create conflicts with other daily activities or with people around the users. The Internet may be essentially good, but as in other areas of life, too much of a good thing can lead to trouble.

2. Research assumptions and questions

In this exploratory study, the researchers studied the Internet addiction issue from a communication perspective, adopting Morris and Ogan's (Morris & Ogan, 1996) argument that the Internet is essentialy a mass medium, just like television and newspapers. The researchers tried to investigate Internet addiction according to a combination of the theory of Uses and Gratifications and the Play theory in mass communication, assuming social and psychological origins of needs that generate expectations of the Internet, which lead to differential patterns of Internet exposure resulting in needs gratification and pleasurable experiences, as well as consequences such as addictive behavior (McQuail (1994), p. 318).

Based on these assumptions, the purpose of this survey study was to examine Taiwan college students' Internet addiction, Internet usage, gratification and communication pleasure. The research questions asked in this study were:

1. Who are Internet addicts and how can we screen them?
2. What are the differences in Internet usage, needs gratification degree, and pleasure experience between the addict and non-addict groups?
3. What are the differences in Internet impact on dimensions of daily life between the addict and non-addict groups?
4. What are the predictors of Internet addiction?

3. Literature review

Internet addiction as a new form of addiction has recently received much attention from researchers in sociology, psychology, psychiatry, among others. Griffiths (1998) considered Internet addiction to be a kind of technological addiction, and one in a subset of behavioral addictions. Any behavior that meets the following criteria is operationally defined as functionally addictive:

1. salience: a particular activity, such as Internet use, becomes the most important activity in the subject's life and dominates his or her thinking;
2. mood modification: subjective experiences people report as a consequence of engaging in the particular activity;
3. tolerance: the process whereby increasing amounts of the particular activity or time are required to achieve the desired effects;
4. withdrawal symptoms: unpleasant feelings, state, or physical effects when the particular activity is stopped or curtailed;
5. conflict: conflicts between addicts and those around them, with other activities, or within the individuals themselves; and
6. relapse: the tendency for repeated reversions to earlier patterns of the addictive activity to recur.

In this sense, we can suspect that college students may be addicted to Internet if (1)

use of Internet becomes the most important activity in their daily lives, and dominates their thinking; (2) use of Internet arouses in them a "high", an "escape from the real world" or other similar experiences; (3) they have to spend increasing amounts of time on-line to achieve the desired effect(s); (4) they feel irritable or moody when they are off-line; (5) Internet use causes conflicts between them and their parents, teachers or friends, and between spending time on the Internet and on studies or sleep; (6) they have tried to discontinue or decrease their Internet use, but reverted back to former use patterns after some time.

Goldberg (1996) is the first person who coined a term to describe such an addiction, Internet Addiction Disorder (IAD), and established a support group for Internet addicts — The Internet Addiction Support Group (IASG). He defined "Internet Addiction Disorder" by providing seven major diagnostic criteria: hoping to increase time on the network, dreaming about the network, having persistent physical, social, or psychological problems, and so on. Goldberg's paper (Goldberg, 1996) is the keystone cited by many other studies in this field. However, some researchers, such as Squires (1996), question the legitimacy of the therapy: using the Internet to help IAD sufferers.

Since the Internet is such a new form of addiction, how to measure Internet addiction becomes an important research issue. Egger and Rauterberg (1996) also developed on-line survey questionnaires, and studied the network addictive behaviors of 450 valid subjects. Among them, 84% were male and 16% female, and 10.6% of the respondents considered themselves addicted to or dependent on the Internet. They reported negative consequences of Internet use, such as feeling guilty about spending time on the Internet, lying to colleagues about Internet use time, and so on. His results showed a significant difference between answers from addicted and non-addicted users, and he concluded that addictive behavior does indeed exist. However, he noted that his "Internet addicts" were self-identified but not judged by any validated "addiction" checklist. In other words, the "Internet addicts" in his study may not have been bona fide addicts.

Brenner (1996, 1997) examined Internet over-use among a self-selected on-line sample by developing an "Internet-Related Addictive Behavior Inventory (IRABI) to survey world-wide Internet users. In the first 90 days the surveys were distributed on the WWW, 563 valid questionnaires out of 654 turn-ins from 25 countries were collected. The IRABI has 32 true–false questions such as

- I have attempted to spend less time connected but have been unable to. (85% of 563 respondents answered yes)
- I have been told that I spend too much time on the net. (55%)
- More than once, I have gotten less than 4 h of sleep in a night because I was using the net (not due to studying, deadlines, etc.). (40%)

In his study, the average person scored 11 out of a possible 32 on the IRABI with a standard deviation of 5.89. The average survey respondent spent 19 h per week on-line. Eighty percent of the respondents at least indicated problems such as failure to manage time, missed sleep, missed meals, etc., suggesting that such patterns are in fact the norm. Some respondents reported more serious problems because of Internet use: trouble with employers or social isolation except for Internet friends; troubles that are similar to those found in other

addictions. The IRABI questionnaire has a good internal consistency ($\alpha = 0.87$), and all 32 items correlate moderately with the total score, suggesting that all items measure some unique variance. Therefore, the present researchers adopted the IRABI and translated it into Chinese for a prior study (Chou et al., 1999) and made some modifications in it for this study.

Besides the IRABI, Young (1998) also developed an eight-item Internet addiction Diagnostic Questionnaire (DQ) based on the definition of Pathological Gambling from American Psychiatric Association (1995). Young stated that anyone who answered "yes" to five or more of the eight questions can be classified as a dependent Internet users; others may be nondependent users. The major concepts underlying these criteria are similar to Griffiths' (Griffiths, 1998). Young's 8-item questionnaire seems the simplest and easiest instrument to use.

Young used this instrument to collect 596 valid, self-selected responses out of 605 total responses in a 3-month period. Among 596 responses, 396 dependents and 100 nondependents were classified from the DQ. The dependent sample included 157 males and 239 females. Most striking was that dependents reported an average of 38.5 h (with a standard deviation of 8.04 h) per week spent on-line, compared with the 4.9 h reported by nondependents (with a standard deviation of 4.70). This study also found that time distortion is the major consequence of Internet use. Students may experience significant academic problems, eventually resulting in poor grades, academic probation, and even expulsion from universities. Other problems created by excessive use of the Internet included disrupted marriages, dating relationships, parent–child relationships, and close friendships.

Young concluded from this study that the Internet itself is not addictive, however, specific applications appeared to play a significant role in the development of pathological Internet use. Dependents predominately used two-way communication functions such as chat rooms, MUDs, newsgroups, or e-mail, while nondependents used functions available on the Internet to gather information, such as Information Protocols, and the World Wide Web. Young's conclusion is consistent with Kandell's observation that the MUD games, Internet relay chat (IRC), and chat rooms are the major activities that may lead people to addiction; extended Web surfing and compulsive e-mail checking can also create overuse problems. Chou et al. (1999) reported that some Taiwan college students who were considered as "addicts" used BBSs (similar to chat rooms) most, and then the WWW, FTP, newsgroups, e-mail, and games.

The first study on Taiwan students' Internet addiction was by Chou et al. (1999). It investigated Internet addiction on the basis of Stephenson's Play Theory of Mass Communication (Stephenson, 1988), assuming that using the Internet generates some kind of pleasurable communication experience that draws users to the Internet again and again, and that over-use of the Internet finally leads them to addiction-like behaviors. In this study, 104 valid, self-selected samples were collected on-line. Among them, 68 (66.7%) were male, and 80% were students. The results indicated that Internet addiction does indeed exist among some of Taiwan's Internet users. The Internet addiction scores correlated positively with escape pleasure scores, interpersonal relationship pleasure scores, and total communication pleasure scores. The Internet addiction scores also correlated positively with both BBS use hours and total Internet use hours. This study found that the addict group (52 respondents) spent significantly more hours on BBSs and IRCs than the non-addict group (47 respondents), and had significantly higher communication pleasure scores than the non-addict group.

Close review of this study suggests, however, that the demarcation between addicts and non-addicts should be re-examined carefully. In this study, the dichotomy was based on the mean of respondents' Internet addiction scores. In addition, the samples were self-selected but not drawn randomly from Taiwan's Internet users. This places the limitation on the external validity of the study. Therefore, we decided to use a larger sample drawn systematically from the target population: college students. Moore (1995) stated that college students are considered at high risk for Internet problems because of their ease of access and flexible time schedules. Taiwan's Internet originated at the higher education level and still provided almost free of charge for students. Therefore, we decided to examine excessive Internet use among Taiwan's college students.

4. Methods

4.1. Instruments

The present study developed a survey questionnaire with five parts. The first part, "Chinese-IRABI version II" (C-IRABI-II), after Brenner's "Internet-Related Addictive Behavior Inventory" (IRABI) (Brenner, 1996, 1997) with some revised questions designed to fit Taiwan's particular network environment. Unlike Brenner's true/false questionnaire, this part contained 40 Likert-scale questions; subjects were required to read the statement and indicate the extent of their agreement or disagreement using one of the options on a 4-point scale: SA (Strongly agree), A (Agree), D (Disagree), and SD (Strongly disagree).

The second part of the survey questionnaire was based on Young's DQ (Young, 1998) eight yes–no questions on Internet addiction:

1. Do you feel preoccupied with the Internet (think about previous on-line activity or anticipate next on-line 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 on-line longer than originally intended?
6. Have you jeopardized or risked the loss of a significant relationship, job, educational, or career opportunity because of the Internet?
7. Have you lied to family members, a 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 relieving a dysphoric mood (e.g. feelings of helplessness, guilt, anxiety, depression)?

Young suggested that those who scored five or more can be considered Internet addicts. The reason why this study used two instruments is to increase the criterion-related validity, that is, to provide concurrent evidence of validity of this study.

The third part asked subjects to mark their motivation and gratification levels on 12

listed motivation items, such as communication with other people, searching for information and so on. These items were identified from related literature and prior interviews. Subjects were required to respond to any item which they thought of as their motivations and then use a 5-point scale after each marked item: very satisfied, satisfied, neutral, dissatisfied, and very dissatisfied to indicate the strength of the motivation.

The fourth part of the survey questionnaire was "the pleasure experience from Internet Usage II" (PEIU-II) developed by the authors. PEIU-II was based on Stephenson's (Stephenson, 1988) concepts of communication pleasure, which assumes Internet users experience some kind of "communication pleasure" when they use the Internet, and the more pleasure they experience, the more they use it. The first edition of PEIU was presented in Chou et al. (1999), and identified five factors:

- escape: the pleasure of relieving worries, or responsibility;
- interpersonal relationship: the pleasure of communicating with other people on-line;
- use behavior: the pleasure of using the Internet;
- intertext: the pleasure from interacting with the text/information;
- anonymity: the pleasure of being anonymous on-line.

PEIU-II included the items from the user behavior and the intertext, and five extra items added to "anonymity", such as "Because of the anonymity, I can say what I really want to say on the Internet," "I feel free and easy because nobody knows who I really am on the Internet," "It is fun to play roles on the Internet other than my role in real life." The version this study administered consisted of 27 items on a 5-point Likert scale: SA (Strongly agree), A (Agree), N (Neutral), D (Disagree), and SD (Strongly disagree).

The fifth part of the survey questionnaire had 13 questions concerning subjects' demographic data and network usage. Subjects were asked to rate Internet impact on five dimensions of their lives: studies, daily life routines, relationships with friends/schoolmates, relationships with parents, and relationships with teachers on an 8-point scale ranging from positive to negative.

The entire questionnaire was pre-tested, and revisions, such as re-wordings, question ordering, instructions, and so on made according to the pretest results.

4.2. Subjects and distribution process

The target subjects were all Taiwan college students. The stratified sampling plan was based on the "Educational Statistics of Republic of China, Taiwan" (Administration of Education of Taiwan, Republic of China, 1997) and conducted according to majors and geographic areas. One thousand two hundred and nine paper-and-pencil survey questionnaires were distributed to 26 departments and graduate programs in 12 universities and colleges around Taiwan. From mid-May to late June 1998, a total of 910 valid data samples were collected. Among them, 60% (546) were from male respondents, and 40% (364) were from female respondents. Eighty-one percent of the respondents were in the 20–25 age range, with a mean age of 21.11 and a standard deviation of 2.10.

5. Results

5.1. Factor analysis of C-IRABI-II and PIEU-II

The purpose of the exploratory analysis used in this study was to reduce items by deleting invalid ones. Factor analysis of C-IRABI-II revealed six factors: problems related to Internet addiction, compulsive Internet use and withdrawal from Internet addiction, Internet use hours, the Internet as a social medium, Internet interpersonal relationship dependence, and the Internet as replacement for daily activity, contributed a total of 52.14% explained variances, and the reliability α was 0.925. Three items were dropped from the original 40 items due to their low validity. Thus, the final version of C-IRABI-II, consisted of 37 items; the total scores for 37 items (ranging from 37 to 148) for each respondent were their "Internet Addiction Scores." Table 1 shows the names of the C-IRABI-II factors, number of items, explained variances, and reliability of factors.

Factor analysis of PIEU-II revealed six factors: Entertainment, Escape, Anonymity, Alternative identification, Interpersonal communication, and Use behavior/Intertext. Two factors (groups of items): anonymity and alternative identification were emerged from items designed to test for anonymity. Close examination revealed that items pertaining to anonymity revealed the pleasure of hiding oneself on the Internet, while items pertaining alternative identification revealed the pleasure of playing another role (e.g. males becoming females). Therefore, the researchers accepted that the anonymity pleasure experience is actually two separate factors: anonymity and alternative identification. Six factors contributed a total of 56.01% of the explained variance. Three items were omitted from the original 27 items due to their low validity. Table 2 shows the names of the PIEU-II factors, number of items, explained variances, and reliability of the factors.

5.2. Questionnaire scores, usage hours, and impact ratings

Table 3 lists subjects' Internet addiction scores, communication pleasure scores, Internet usage hours and impact ratings. The mean score for C-IRABI-II from 910 valid responses was 80.4 out of a possible total of 148, with standard deviation of 16.10. The mean score for Young's 8 yes/no questions was 2.06 out of a possible total of 8 (SD = 1.95). The mean score

Table 1
C-IRABI-II factor analysis results

Factor name	Number of items	Variance explained	Reliability
1. Internet-addiction-related problems	9	13.08	0.848
2. Compulsive Internet use and withdrawal from Internet addiction	8	10.04	0.845
3. Internet use hours	6	9.93	0.833
4. Internet as a social medium	7	9.36	0.818
5. Internet interpersonal relationship dependence	3	5.02	0.534
6. Internet as a replacement for daily activity	4	4.72	0.481
Total	37	52.15	0.925

for PIEU-II was 74.09 out of a possible total of 120 (SD = 11.20). The mean of subject satisfaction score was 40.14 out of a possible total of 60 (SD = 8.80).

Subjects spent an average of 5–10 h per week on the Internet. They spend about 7.22 h on BBSs, 4.09 h on the WWW, 1.53 h on e-mail, 2.07 h on games, and 1.85 h on FTP. On an average, they spent less than one hour on newsgroups and IRC.

In this study, subjects rated Internet impact on various dimensions of their daily lives on an 8-point scale. Internet impact on their studies was rated at 4.88, daily life routines, 4.35, relationships with friends/schoolmates, 5.58, relationship with parents, 4.95, relationships with teachers, 4.98.

5.3. Internet addicts versus non-addicts

Two criteria were selected to distinguish addicts from non-addicts in this study. Those meeting the two criteria were identified as "Internet addicts." Egger and Rauterberg (1996) and Moreahan-Martin and Schumacher (1997) set 10.6% and 8.1% of their respective samples as the addiction levels, accordingly, we set as our first criteria that those who scored in the top 10% (110 and above) of the C-IRABI-II were possible addicts. Thus, 89 subjects were screened out as addicts by the present study. Our second criteria followed Young's suggestion that respondents answering "yes" to five or more of her eight questions be considered addicts. Our second criteria screened 125 out of 910 respondents (about 13.7%) out as addicts. We used the conservative judgement that the intersection of the two groups be considered as Internet addicts by this study, that is, 54 respondents, actually were so identified. The other 856 subjects were classified as non-addicts. Fig. 1 shows the numbers of subjects screened out by the two criteria mentioned above.

A Pearson correlation analysis was conducted to check the relationship between C-IRABI-II and Young's questionnaire scores. The results indicate that these two measurements significantly positively correlated, $r = 0.643$, $p < 0.01$. This means these two questionnaires have shared ground in assessing these subjects' addiction level.

5.4. Addicts' versus non-addicts' Internet use hours and questionnaire scores

Statistical results indicated that the 54 Internet addicts spent abut 20–25 h per week on the

Table 2
PIEU-II factor analysis results

Factor name	Number of items	Variance explained	Reliability
1. Entertainment	6	11.84	0.797
2. Escape	5	11.26	0.739
3. Anonymity	3	9.28	0.746
4. Alternative identification	4	9.14	0.758
5. Interpersonal communication	3	8.19	0.663
6. Use behavior/intertext	3	6.31	0.408
Total	24	56.01	0.843

Internet, while non-addicts spent abut 5–10 h. Internet addicts spent an average of 17.66 h on BBSs (SD = 18.30), 6.58 h on the WWW, 3.47 h on e-mail (SD = 4.48), and 5.47 on games (SD = 9.2). By contrast, non-addicts spent an average of 6.6 h on BBSs (SD = 7.9), 3.94 h on the WWW (SD = 5.26), 1.42 h on e-mail (SD = 2.6). The two tailed t-test indicated that the addict group spent significantly more hours on BBSs, the WWW, e-mail, and games than the non-addict group ($t = 4.03$, $p = 0.00$; $t = 2.32$, $p = 0.025$; $t = 2.85$, $p = 0.006$; $t = 2.57$, $p = 0.013$, respectively). Table 4 lists the means and standard deviations for each Internet application for each group, and the associated t-values.

Note that the addict group's PIEU-II scores were significantly higher than the non-addict group, and their satisfaction scores were also significantly higher than the non-addicts group ($t = 9.13$, $p = 0.000$; $t = 4.29$, $p = 0.000$, respectively). Table 5 shows the PIEU-II score means, standard deviations and satisfaction scores, along with their respective t- and p-values. Table 5 also includes the C-IRABI-II means, standard deviations, t- and p-values, and Young's criteria for each group.

Table 3
Questionnaire scores, usage hours, and impact ratings

Scores	Number of subjects	Means	Standard deviation	Note
Internet addiction scores (C-IRABI-II)	910	80.40	16.10	Possible total 148
Young's 8 addiction questions	910	2.06	1.95	Possible total 8
Communication pleasure scores (PIEU-II)	910	74.09	11.20	Possible total 120
Satisfaction scores	902	40.14	8.80	Possible total 60
Total Internet use hours	910	5–10 hours per week		
BBS use hours per week	910	7.22	9.20	
WWW use hours per week	910	4.09	5.44	
E-mail use hours per week	910	1.53	2.76	
Game use hours per week	910	2.07	6.00	
FTP use hours per week	910	1.85	6.11	
Newsgroup use hours per week	910	0.61	2.28	
IRC use hours per week	910	0.89	2.96	
Internet impact ratings on studies	910	4.88	1.81	Possible score range from 1 to 8; the higher the score, the more positive the impact was rated
Daily life routines	910	4.35	1.68	
Relationship with friends/ schoolmates	910	5.58	1.36	
Relationship with parents	910	4.95	1.28	
Relationship with teachers	910	4.98	1.29	

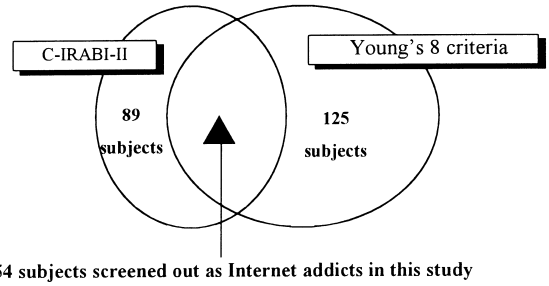

Fig. 1. The numbers of subjects screened out by two criteria.

Comparing the self-ratings of Internet impact on students' lives revealed that the addict group rated Internet impact on their studies and daily life routines significantly lower than the non-addict group ($t = -4.723$, $p = 0.00$; $t = -3.586$, $p = 0.001$). There were no significant differences between addict groups' ratings and non-addict groups' ratings of impacts on relationships with friends/schoolmates, parents and teachers. It is worth noting that the addict group expressed negative Internet impacts on their studies and daily life routines (means = 3.64 and 3.5, respectively, both were below the median score of 4.5). On the other hand, the addict group and the non-addict group both indicated highly positive impacts on their relationships with friends/schoolmates. Table 6 lists the Internet impact ratings of the addict group and the non-addict group.

5.5. Regression analysis of internet addiction

One of the research question of this study was, What are the predictors of Internet addiction? Therefore, a stepwise regression analysis was conducted in which C-IRABI-II scores

Table 4
Means and standard deviations for Internet applications and respective *t*-values

Application use hours per week	Addict group (n = 54)		Non-addict group (n = 856)		t-value	p
	Mean	SD	Mean	SD		
BBS	17.66	18.30	6.60	7.96	4.03	0.000[a]
WWW	6.58	7.50	3.94	5.26	2.32	0.025[b]
E-mail	3.47	4.48	1.42	2.59	2.85	0.006[a]
Games	5.47	9.28	1.87	5.69	2.57	0.013[b]
FTP	1.72	3.76	1.86	6.23	−0.14	0.889
Newsgroup	1.44	4.63	0.56	2.05	1.26	0.215
IRC	2.77	9.41	0.78	1.97	1.42	0.162

[a] $p < 0.01$.
[b] $p < 0.05$.

Table 5
The addict groups' and non-addict groups' scores of individual measures

Scores	Addict group (n = 54)		Non-addict group (n = 856)		t-value	p
	Mean	SD	Mean	SD		
PIEU-II	85.63	9.49	73.36	10.90	9.13	0.000[a]
Satisfaction score	44.70	7.07	39.87	8.83	4.29	0.000[a]
C-IRABI-II	108.09	7.44	78.67	14.87	25.98	0.000[a]
Young's 8 criteria	6.39	1.25	1.78	1.64	25.72	0.000[a]

[a] $p < 0.01$.

were the dependent variables, while subject sex, BBS use hours, WWW use hours, e-mail use hours, game use hours, satisfaction scores, and PIEU-II scores were the independent variables. The analysis generated the following formula:

$$\text{C-IRABI-II score} = 0.45\ \text{PIEU-II score} + 0.301\ \text{BBS use hour} + 0.106\ \text{sex} + 0.106\ \text{satisfaction score} + 0.082\ \text{e-mail use hour},$$

indicting that the most powerful predictor of Internet addiction was the PIEU-II score, followed by BBS use hours, sex, satisfaction score, and the e-mail use hours. Note that game use hours and WWW use hours were not included in this regression formula due to their low prediction powers. Table 7 shows the regression model of Internet addiction.

6. Discussions and conclusion

The purpose of this study was to investigate Taiwan's college students' Internet addiction, their Internet usage patterns, and gratification and communication pleasures. Therefore, a

Table 6
The ratings of Internet impacts on students' lives

Internet impacts on	Addict group (n = 54)		Non-addict group (n = 856)		t-value	p
	Mean	SD	Mean	SD		
Studies	3.56	1.98	4.95	1.77	−4.72	0.000[a]
Daily life routines	3.50	1.79	4.40	1.65	−3.58	0.001[a]
Relationships with friends/schoolmates	5.22	1.86	5.60	1.32	−1.46	0.151
Relationships with parents	4.70	1.71	4.97	1.25	−1.10	0.274
Relationships with teachers	4.72	1.66	5.00	1.26	−1.22	0.229

[a] $p < 0.01$.

paper questionnaire was administered to a stratified sample of 1209 college students and 910 valid responses were collected. The results indicate that Internet addiction does exist among some Taiwan college students. In this study, 54 Internet addicts were screened out by the C-IRABI-II and Young's criteria. The percentage of addicts in this study's sample was about 5.9%, lower than Brenner's (Brenner, 1997) 10.6 and Morahan-Martin and Schemacher's (Morahan-Martin & Schemacher, 1997) 8.1%, probably because we used two criteria simultaneously to screen for possible addicts.

Our results indicate that Internet addicts spent almost triple the number of hours on the Internet as a group than the non-addicts. In particular, Internet addicts spent significantly more time on BBSs, the WWW, e-mail and games than non-addicts. This result differs a bit from the results of previous study (Chou et al., 1999) in which the only significant differences were BBS and IRC use hours between the addict group and non-addict group. In fact, BBS, WWW, e-mail and games are four popular applications among Taiwan college students. BBS as its name suggests, was originally designed only to distribute information. However, because of the interactivity inherent in electronic BBSs, college students can not only post information, but also respond to the postings of others. Gradually BBSs have become forums for discussions on various topics, similar to newsgroups. Taiwan's BBSs also allow users to chat with many people, or to talk to particular users and groups of users, similar to general "chatrooms." Therefore, BBSs have become important social tools for students to communicate with other people. Informal follow-up interviews with some of our respondents indicated that BBSs were indeed the most popular Internet application on Taiwan's campuses, followed by the WWW and e-mail. This study's results indicate that college Internet addicts spent about 17 h per week on BBSs, about 6.5 h on the WWW and about 3.47 h on e-mail, which were significantly higher than the non-addicts' 6.6, 3.94, and 1.42 h. This is consistent with Kandell's (Kandell, 1998) observation that frequent e-mail checking is also a major activity that may lead people to addiction.

According to the theories of Usage and Gratification, and the theory of Communication Play, students have a variety of needs (social, academic work, etc.) to use the Internet, which lead to different degrees of exposure to Internet applications (BBS, e-mail, WWW, etc.) and result in varying degree of gratification and pleasure experience. Some students may tend towards over-involvement with or pathological use of the Internet, and gradually develop

Table 7
The regression model of Internet addiction[a]

Dependent variable	Predicting variables	B	S.E.	β	Significance
C-IRABC-II	PIEU-II scores	0.659	0.044	0.450	0.000
	BBS use hour	0.517	0.054	0.301	0.000
	Sex	3.449	0.945	0.106	0.000
	Satisfaction score	0.193	0.055	0.106	0.000
	E-mail use hour	0.493	0.184	0.082	0.008

[a] $R^2 = 0.469$.

addictive tendencies. Comparing the addict group's and the non-addict group's scores of their self-reported pleasure experience and satisfaction showed that the addict group scored significantly higher on PIEU-II and satisfaction measurements. This means that the addict group felt that the Internet is more entertaining, fun, and interactive; they thought the Internet could help them escape from their real-world responsibilities and identification, and so they were more satisfied with their Internet usage.

Can we predict who is more likely to become addicted to the Internet? Based on the measurements in this study, it was found that the self-reported communication pleasure experience was the most powerful predictor, and the next most powerful predictors were BBS use hours, sex, satisfaction score, and the e-mail use h. In other words, the more one experiences the pleasure of using the Internet and BBSs, reports high satisfaction with using the Internet, and uses e-mail, the more likely he or she is to become addicted to the Internet. Males are also more likely to become Internet addicts.

What impact does the Internet have on addicts' daily lives? On an average, the addict group in this study rated impacts toward the negative end in two dimensions: study and daily life routines, such as meals, sleep, appointments and classes. The addict group rated impacts on these two dimensions significantly more negatively than the non-addict group. However, both the addict and non-addict groups rated the Internet impacts on their relationships with friends/schoolmates positively. The interviewed students explained that the Internet gives them chances to meet new people, provides extra, if not the major, tools for communicating with old friends, and creates more topics to share with them. "You know somebody is always out there, you are not alone," one of our interviewees said. This "accompany" function is even better than that of a television set or a radio, because the interactive feature of the Internet enables them to connect with others at any time, and they do not just passively receive the information from outside. The Internet is indeed the window through which students communicate and interact with the world.

How about the worlds of their parents and teachers? The results showed that the addict and non-addict groups both rated these two dimensions in the middle-to-positive range. One respondent said her family was proud of her ability to use the Internet. "They think I use my computer because I am working hard on my studies." Parents may only know that their children are on the net, but do not know what they are actually doing with it. Taiwan's parents may not be aware of the Internet's possible negative impacts on their children, partially because the majority of college students use the Internet when they are on campus, and the Internet itself is highly appraised and promoted by society in general. Young's study (Young, 1998) reported that Internet dependents gradually spent less time with family and friends in exchange for solitary time in front of their computers. This may be true of some of Taiwan Internet users, however, the data in this study did not report disrupted relationships with parents, due to time conflicts or others reasons.

As to teacher-relationship aspect, some students said that the Internet gives them an extra channel to communicate with teachers. "If teachers answer my e-mail, I think they are in my group, and I will appreciate them more," one interviewed student said. This is an interesting topic worthy of further study. Should teachers use the Internet more to communicate with their students and to enter "students groups"? Should teachers encourage students to use the Internet to communicate with teachers? How about those students who are already over-

involved with the Internet? For instance, when I conducted the interview for this study, one student even rejected me because she believed I would reduce her time on the net! Therefore, I was forced to interview her in an on-line chatroom. I really "joined her group," but I wondered whether I implicitly encouraged her, a heavy user, to use the Internet more?

This study discussed the recent research focus on Internet addiction, collected empirical data from Taiwan college students, and raised more questions unanswered. Although the Internet seems beneficial to most of the students, some addictive cases were found among the samples. There are no doubts that Internet usage among the general population and on college campuses will grow at an exponential rate, and the Internet addiction issue will become more and more obvious and perhaps serious. More research on this topic is needed to understand the full scope of Internet addiction and its solutions.

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