Prediction of Internet Addiction
for Undergraduates in Hong Kong

By

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Information Systems Management Option

An Honours Degree Project Submitted to the
School of Business in Partial Fulfilment
of the Graduation Requirement for the Degree of
Bachelor of Business Administration (Honours)

Hong Kong Baptist University
Hong Kong

April 2006

Abstract

In a highly digitized era, people can hardly live without computers and the Internet. While we are admiring the conveniences and advantages brought by the Internet, there is growing concern about problematic Internet use and whether this can lead to an addiction. In psychological field, the concept "Internet addiction" has been used to explain uncontrollable and damaging use of the Internet.

As reviewed from some literatures, the problem of Internet addiction is widespread among local students and is expected to be deteriorating. Although some researchers have investigated such issue in Hong Kong, very few of them have concentrated on finding out the predictors of Internet addiction. Therefore, the focus of current study is to identify any predictors of Internet addiction, intending to explain the addictive behavior of Internet users.

Four hundred and ten data samples were collected through questionnaires from undergraduates of eight local universities. Using Young's Internet Addiction Test (IAT), 18% of the respondents were identified as excessive Internet users, showing the prevalence of Internet addiction among undergraduates in Hong Kong. Data collected were analyzed using Chi-square, correlation and multiple regression. Results of statistical analyses show that academic performance is the most important predictor of Internet addiction, followed by perceived behavioral control, gender, and attitude toward using the Internet. Apart from this, the study of predictors for the excessive IAT group has also been performed and the result shows that the level of Internet addiction for this group is predicted by a different combination of variables. This indicates there may be some behavioral differences that discriminates the excessive users from the others. The findings here provide explanations on some addictive behavior of the Internet users and open up new paths for further research.

Content

1. Introduction

With the advancement of information technology (IT), more people can get access to the Internet. During April to August 2005, the Census and Statistics Department (C&SD) conducted the "Household Survey on Information Technology Usage and Penetration" in Hong Kong (The Census and Statistics Department, 2005). Based on the results released on 9 December 2005, personal computers (PC) and Internet connections were very common in households. Table 1 summarizes the survey results from 2003 to 2005. As revealed from the 2005 survey in table 1, 56.9% of all persons aged 10 and over had used Internet service via various media. Regarding the usage of online purchasing services, the 2005 survey estimated that around 8.6% of all persons aged 15 and over had used one or more types of online purchasing services, being higher than the corresponding figures in 2004 (7.1%).

Table 1: Household Survey on Information Technology Usage and Penetration
(The Census and Statistics Department, 2004 & 2005)

Data Item	2003	2004	2005
Information technology penetration amongst households			
● Percentage of households with personal computer (PC) at home amongst all households in Hong Kong	67.5%	71.1%	70.1%
● Percentage of households with PC at home connected to Internet amongst all households with PC at home in Hong Kong	88.8%	91.3%	92.2%
● Percentage of households with PC at home connected to Internet amongst all households in Hong Kong	60.0%	64.9%	64.6%
Information technology usage amongst household members			
● Percentage of persons aged 10 and over who had used PC in the twelve months before the survey amongst all persons aged 10 and over	56.2%	59.5%	58.8%
● Percentage of persons aged 10 and over who had used Internet service in the twelve months before the survey amongst all persons aged 10 and over	52.2%	56.4%	56.9%
Usage of online purchasing services			
● Percentage of persons aged 15 and over who had used one or more types of online purchasing services for personal matters in the twelve months before the survey amongst all persons aged 15 and over	7.0%	7.1%	8.6%

1.1. Hong Kong: a highly digitized city

All the above figures show that Hong Kong is becoming a highly digitized city, with Internet being more and more popularized among citizens. However, while many have focused on the conveniences brought by new technology, there are also some derived problems. For example, in an increasingly technology-dependent economy, those who have less opportunity to access to IT skills and knowledge

will gradually find it difficult to participate in the society, and this has resulted in a so called "digital divide" within the knowledge-based economy (Information Technology Services Department, 2001). Besides, some critiques have attributed the increased generation gap, reduced employees' productivity, and people's deteriorating health to Internet (Beard, 2002; Chan, 2004; Charlton, 2002; Neumann, 1998; Stanton, 2002; Young, 2004). In psychological field, the concept "Internet addiction" has been used to explain uncontrollable and damaging use of the Internet.

1.2.   Internet addiction in the world

Several researches have been carried out to explore the situation of Internet addiction in different places. Chou and Hsiao explored Internet addiction in 910 Taiwanese college students with IRABI (Brenner, 1996) and YDQ (Young, 1998a). They recognized 5.9% as Internet addicted (Chou & Hsiao, 2000). In Xuanhui and Gonggu's study, 9.6% of the Chinese college students were identified as Internet dependent (Xuanhui & Gonggu, 2001). At the same time, Wang in his Australian study found that there were 9.6% of the students defined as Internet Addictive Disorder (Wang, 2001). Morahan-Martin and Schumacher found that 8.1% of their 283 US students had four or more symptoms on Internet addiction (Morahan-Martin & Schumacher, 2000). Also, when Johansson and Götestam applied Young's Diagnostic Questionnaire (YDQ) to study Internet addictive behaviors among Norwegian youth, they found out that 10.66% of the respondents had problematic Internet use (Johansson & Götestam, 2004).

According to a survey done by Breakthrough in 2002 (Breakthrough Youth Research Archives, 2003), the youth in Hong Kong have high tendency towards Internet addiction with the latest rate standing at 15%. Among the 1,058 interviewed Hong Kong youths, 14.7% of them had two or more Internet addicted symptoms, for example, longer online time than intended, arguments arisen because of long time spent on Internet activities, attempts to reduce Internet activities but failure to do so etc. Besides, the survey showed that the Internet addiction rate has increased by five times since 2000. Table 2 summarizes the researches of Internet addiction done in different places.

Table 2: Internet Addiction in Different Places

Year of Study	Country	Subjects	Measurement	Findings
2000	Taiwan	910 Taiwanese college students	IRABI	5.9% of the respondents were identified as Internet addicted; high communication pleasure score to be a high predictor of Internet dependence.
2000	U.S.	283 US students	PIU	8.1% of the respondents had four or more symptoms on PIU
2001	Mainland China	Chinese College students	IRABI	9.6% of the respondents were identified as Internet addicted.
2001	Australia	293 Australian college students	IAD	9.6% of the respondents were defined as Internet Addictive Disorder; Internet dependency was independent of the psychosocial maturity and the general self-efficacy.
2002	Hong Kong SAR	1,058 Hong Kong youths	YDQ	14.7% of the respondents had two or more Internet addicted symptoms defined in YDQ.
2004	Norway	3,237 Norwegian youth	YDQ	10.66% of the respondents had problematic Internet use; predictors for Internet dependence are factors such as home use, use habits, but not demographic variables.

1.3.   Research Objective

As revealed in the referred studies, Internet addiction does exist and this problem is estimated to be deteriorating in Hong Kong (Breakthrough Youth Research Archives, 2003). Despite the prevalence of Internet addiction, there is nearly no research about this topic locally. Even there are some studies (Auyeung & Chow, 2005) investigating the situation of Internet addiction among Hong Kong students, they are not as in-depth as those researches done in other countries. In short, local studies in this field are too brief and lack the investigation of predictors of Internet addiction.

Having heard about some news about Hong Kong students' infatuation with online entertainment and at the same time, stimulated by the concept "Internet addiction", a research has been carried out to find out the extent of Internet addiction among local students and which kinds of people are more vulnerable to it. As the rationale behind such research is to advocate the healthy browsing habit to Internet users, the focus of this study will be to identify the types of people who are candidates for Internet addiction so that they can pay more attention to their browsing habits and avoid being Internet

addicted.

2. Literature Review

Although several psychological professionals have studied pathological Internet use, there is still no standardized definition for Internet addiction. The term "Internet addiction", coined by Goldberg, was originally used to describe the negative effects of excessive Internet use on personal lives. It is similar to substance abuse, such as chemical addiction, that addicts can suffer physically or emotionally from such dependency (Goldberg, 1995).

Among the literatures talking about addiction, some have suggested the coexistence of negative and positive addictions while the latter one may produce healthy and even beneficial effects on personal lives (Glasser, 1976; Shaffer, 1996). Chen, Tarn and Han applied the concept of positive addiction to Internet addiction. In their research, they recognized the possibility of beneficial Internet addiction and investigated the characteristics of three kinds of Internet users: positive dependency, little dependency, and negative dependency (Chen, Tarn & Han, 2004).

As early as 1996 and 1997, Young used the term "Pathological Internet Use" when presenting a paper at the American Psychological Association's (APA) meeting. But later, she used the phrase "Internet Addiction" when talking with the general public. Young defined Internet addiction as "an impulse-control disorder which does not involve an intoxicant", and used criteria adapted from those for the impulse-control disorder of pathological gambling to operationalize the concept of Internet addiction (Young, 1998a):

1. Do you feel preoccupied with the Internet (think about previous online activity or anticipate next online session)?

2. Do you feel the need to use the Internet with increasing amounts of time to achieve satisfaction?

3. Have you repeatedly made unsuccessful efforts to control, cut back, or stop Internet use?

4. Do you feel restless, moody, depressed, or irritable when attempting to cut down or stop Internet use?

5. Do you stay online longer than originally intended?

6. Have you 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, therapists, or others to conceal the extent of involvement with the Internet?

8. Do you use the Internet as a way of escaping from problems or of relieving a dysphonic mood (e.g., feelings of helplessness, guilt, anxiety, depression)?

Beard has proposed a model to conceptualize Internet addiction (Beard, 2005). This model was built on the foundation of biopsychosocial model of addiction, integrating biochemical, genetic, psychological, familial, environmental, and cultural dynamics. In the proposed model, Beard said that "the biological view recognizes that biological or neurochemical changes may occur in a person engaging in an addictive behavior… Therefore, engaging in excessive Internet use may alter physiological states and help the body maintain homeostasis or create a sense of euphoria." On the other hand, "the psychological view recognizes that classical conditioning may play a part in initiating, maintaining, and changing behavior of those addicted to the Internet." while "the social view recognizes that there may be familial, social, and cultural dynamics that prompt excessive Internet use." (Beard, 2005)

2.1.   Types of Internet Addiction

In the paper "Exploring Internet addiction: demographic characteristics and stereotypes of heavy Internet users", Soule and Kleen organized Internet addiction into five types (Soule & Kleen, 2003):

1. Cybersexual addiction – addiction to adult chat room or cyberporn

2. Cyberrelationship addiction – online friendships made in char rooms or cyberporn

3. Net compulsion – compulsive gambling, day trading, or auction shopping

4. Information overload – compulsive Web or database surfing

5. Computer addiction – compulsive game playing or programming

2.2.   Symptoms of Internet Addiction

Internet addiction is similar to substance addiction. Prior studies (Beard & Wolf, 2001; Goldberg, 1995; Neumann, 1998; Soule & Kleen, 2003; Stanton, 2002; Young, 1998a) have identified the following

symptoms which can be organized into three groups: behavioral, physical and mental, and social effects.

The symptoms of Internet addiction are summarized in Table 3:

Table 3: Symptoms of Internet Addiction

Group	Symptom
Behavioral	• Tolerance: a need for markedly increased amount of time online. • The Internet is accessed more and for longer periods than was intended. • A great deal of time is spent in activities related to the Internet. • Lying about the level of use • Preoccupation with the Internet • Using the Internet to escape other problems • Internet use is continued despite knowledge of having a persistent physical, social, occupational, or psychological problem that is probably caused by Internet use.
Physical and Mental	• Withdrawal syndrome: a reduction of Internet use results in anxiety, obsessive thinking about the Internet, and dreams about the Internet. • A persistent desire exists to cut down or control Internet use. • Increases in blood pressure, cardiovascular stress, memory difficulties, lack of concentration, headaches, stomach and muscle pain, and weakened vision • Lethargy, listlessness, sleeplessness, panic, irritability, and anger
Social Effect	• Important social, occupational, or recreational activities are given up because of Internet use. • Increased tension and competition in the workplace; lowered productivity. • Longer working days and less leisure time

2.3. Assessment of Internet Addiction

In the field of Internet addiction research, there are different instruments existed to assess problematic Internet use. However, just as Beard said, "there are limited numbers of standardized tests" for the assessment (Beard, 2005). Table 4 summarizes several common measurements for Internet addiction. Currently, the most well-known measurement should be considered as Young's Diagnostic Questionnaire, which was introduced by Dr. Kimberly Young, a licensed psychologist and the executive director of the Centre for Online Addiction (Young, 1998b).

Goldberg was the first to empirically focus on the addictive and dependence-producing potential of Internet use (Goldberg, 1995). He constructed a rating scale, IAD (Internet Addictive Disorder) with seven diagnostic criteria, mainly adapted from DSM-IV (1994). Also, Brenner developed a scale,

IRABI (Internet-Related Addictive Behavior Inventory), with 32 true-false questions about excessive Internet use, to survey world-wide Internet users (Brenner, 1996). Morahan-Martin and Schumacher introduced their scale PIU (Pathological Internet Use), with 13 questions, mainly similar to the DSM-IV criteria (Morahan-Martin & Schumacher, 2000). Young introduced a Diagnostic Questionnaire (YDQ) for 'Internet addiction' with eight items (Young, 1998a), partly adapted from DSM-IV.

Later, based on the original YDQ, Young developed a larger instrument called Internet Addiction Test (IAT). The IAT, which consists of 20 diagnostic questions, is an expanded version of YDQ. Young has written a self-help book called "*Caught in the Net*" and included the IAT in her book (Young, 1998b). Moreover, other assessment instruments have been developed to assess Internet addiction: Caplan has described the Generalized Problematic Internet Use Scale (GPIUS) (Caplan, 2002) while Davis has mentioned the use of the Online Cognition Scale (OCS) and a study that focused on procrastination, impulsivity, and social rejection as key elements of problematic Internet use (Davis, 2002).

Besides, as reported by King, there were some Internet addiction questionnaires found on the Internet (King, 1996). For instance, Steve Thompson's McSurvey addressing things such as the level of the respondents' physical distress, whether the Internet had a negative impact on their lives, and if they perceived a real life deficit in personal relationships. Apart from this, the researcher also discussed a 6–7-point Likert scale questionnaire developed by Egger. Questions included items related to the urge to use the Internet when off-line, anticipation of his or her next Internet usage, feeling guilty over his or her Internet usage, and lying to friends about how much time they spent on-line (Egger, 1996). However, these instruments, as compared with those mentioned in the previous paragraphs, are less widely used. Thus, their reliability and validity still need for further investigation.

Table 4: Common Assessment Instruments for Internet Addiction

Year of Introduction	Instrument	Rating Scale	Diagnostic Criteria / Description	Diagnosis
1994 (APA, 1994)	(DSM-IV) Diagnostic and Statistical Manual of the American Psychiatric Association	It provides empirically-based, clear definitions of all recognized mental disorders.	Published by the American Psychiatric Association, is the handbook used most often in diagnosing mental disorders in the United States and internationally. This classification system is widely used in psychiatry and mental health settings.	The various criteria and diagnostic discussions based on the DSM are provided for information. Any reader who believes that they or someone close to them could be diagnosed with one of the conditions mentioned is advised to consult with a specialist in the field (a psychiatrist or psychologist) for further clarification.
1995 (Goldberg, 1995)	IAD (Internet Addictive Disorder)	Seven diagnostic criteria, mainly adapted from DSM-IV (1994)	1. Tolerance: the need for increasing amounts of time on the Internet 2. Withdrawal: distress or impair social, personal or occupational functioning which are caused by reduction or cessation of Internet use 3. Internet is often accessed for longer periods of time than was intended 4. Persistent desire or unsuccessful efforts to cut down or control Internet use 5. A significant amount of time is spent in activities related to Internet use 6. Important activities are given up or reduced because of Internet use 7. The individual risks the loss of a significant relationship, job, educational or career opportunity because of excessive use of the Internet	Individuals fulfilling three or more of the seven criteria (at any time during a twelve month period) are considered as having Internet addictive disorder
1996 (Brenner, 1996)	IRABI (Internet-Related Addictive Behavior Inventory)	32 true-false questions about excessive Internet use	Extracted items from Brenner's IRABI (True/False) 1. I have spent at least three hours on the Internet at least twice 2. More than once, I have gotten less than four hours sleep at night because I was using the Internet.	Not clearly defined

			3. I have never made arrangements to rendezvous with someone I knew only from the Internet. 4. I have voluntarily gone more than three days without connecting in the past month. 5. I have been told that I spend too much time on the Internet. 6. I have used Internet resources intended for adults only. 7. If it has been a while since I last logged on, I find it hard to stop thinking about what will be waiting for me when I do. 8. I have attempted to spend less time connected but have been unable to. 9. I have gotten into hot water with my employer/school for Internet-related activities. 10. I routinely cut short sleep to spend more time on-line. 11. If it weren't for my computer, I wouldn't have any fun at all. 12. My work and/or performance have not deteriorated since I started using the Internet. 13. I know most of my friends from the Internet. 14. Given the choice between living where I do now but not having computer access and moving somewhere strange and far away but having a modem, I would choose to move.	
1998 (Young, 1998a)	YDQ (Young's Diagnostic Questionnaire)	Eight diagnostic criteria, partly adapted from DSM-IV (1994)	1. Do you feel preoccupied with the Internet (think about previous online activity or anticipate next online session)? 2. Do you feel the need to use the Internet with increasing amounts of time to achieve satisfaction? 3. Have you repeatedly made unsuccessful efforts to control, cut back, or stop Internet use? 4. Do you feel restless, moody, depressed, or irritable when attempting to cut down or stop Internet use? 5. Do you stay online longer than originally intended? 6. Have you jeopardized or risked the loss of a significant relationship, job, educational or career opportunity because of	Individuals fulfilling five or more of the eight criteria are considered as Internet addicts

			the Internet?	
			7. Have you lied to family members, therapists, or others to conceal the extent of involvement with the Internet? 8. Do you use the Internet as a way of escaping from problems or of relieving a dysphonic mood (e.g., feelings of helplessness, guilt, anxiety, and depression)?	
1998 (Young, 1998b)	IAT (Internet Addiction Test)	20 diagnostic questions	IAT is an expanded version of YDQ. It 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 scores calculated from IAT ranges from 20 to 100. The higher the score, the higher the level of Internet addiction.	Individuals having a score of: ● 20-39 points ~ an average online user who has complete control over his/her usage; ● 40-69 points ~ signifies frequent problems due to Internet usage; ● 70-100 points ~ significant problems are caused by Internet addiction
2000 (Morahan-Martin & Schumacher, 2000)	PIU (Pathological Internet Use)	13 diagnostic criteria	Mainly similar to the DSM-IV criteria (1994)	Pathological use was determined by responses to 13 questions which assessed evidence that Internet use was causing academic, work or interpersonal problems, distress, tolerance symptoms, and mood-altering use of the Internet.

3. Methodology

3.1. Subject

The population of interest in this study was Internet users in eight local universities: the University of Hong Kong (HKU), Chinese University of Hong Kong (CUHK), Hong Kong University of Science and Technology (UST), Hong Kong Polytechnic University (POLY), Hong Kong Baptist University (HKBU), City University of Hong Kong (CITY), Lingnan University (LU), and Hong Kong Institute of Education (HKIED).

3.2. Materials

A 35-item questionnaire was used in this study. Among the 35 items, 20 questions were adopted from Young's Internet Addiction Test (IAT) (Young, 1998b); eight questions were adapted from Venkatesh et al.'s Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003); and the remaining questions were used to capture the respondents' demographic information. A copy of the survey questionnaire was presented in Appendix A.

3.2.1. Internet Addiction Test (IAT)

For the first 20 questions, Young's Internet Addiction Test (IAT) (Young, 1998b) was adopted to evaluate the respondents' level of Internet addiction. The IAT has 20 items associated with Internet use, including psychological dependence, compulsive use, and withdrawal, as well as related problems of school, sleep, family, and time management. For each item, a graded response can be selected (1 = "not at all" to 5 = "always"). The minimum score is 20 while the maximum is 100; the higher the score, the greater the level of Internet addiction. As suggested by Young, cut-off scores for the IAT were used to classify Internet users based on the severity of their addictive behavior (Young, 1998b). In current study, the same cut-off scores were used:

- Minimal users (scores 20 to 39) – average online users who have complete control over their Internet usage;
- Moderate users (scores 40 to 69) – those experiencing occasional or frequent problems due to Internet usage
- Excessive users (scores 70 to 100) – those having significant problems caused by Internet usage.

IAT was selected among the many assessment tools because the 20 items in IAT are comprehensive covering the common diagnostic criteria of Internet addiction and, at the same time, narrow enough to eliminate any overlapping / unnecessary diagnostic items found in other instruments. Also, IAT is the most famous measurement in the Internet addiction field and has been used by many researchers (Egger & Rauterberg, 1996; Johansson & Götestam, 2004; Widyanto & McMurran, 2004; Yang, Choe, Baity, Lee, & Cho, 2005). This instrument has exhibited good psychometric properties in previous researches. For example, in Yang et al.'s study, they found that the internal consistency (Cronbach's alpha) of IAT was 0.92, and its test-retest reliability was satisfactory (Yang et al., 2005). Besides, Widyanto and McMurran said that "the IAT has high face validity" (Widyanto & McMurran, 2004).

3.2.2. Perceived Behavioral Control (PBC)

Perceived behavioral control is a construct found in the Theory of Planned Behavior (TPB) and is defined as people's perceptions of their ability to perform a given behavior (Ajzen, 1991). Questions 21-24 were used to measure this variable and the measurement scale was based on Venkatesh et al.'s UTAUT (Venkatesh et al., 2003) and adapted to the use of the Internet. Four statements like "I have control over using the Internet", "I have the resources necessary to use the Internet" etc were used. The items were rated on a five-point scale ranging from strongly disagree (1) to strongly agree (5).

3.2.3. Attitude Toward Using the Internet (ATUI)

Attitude toward using the Internet is the same as the construct – attitude toward behavior – found in TPB. It is the degree to which performance of the behavior is positively or negatively valued (Ajzen, 1991). To simplify its definition in current study, attitude toward using the Internet is defined as an individual's overall affective reaction to using the Internet and questions 25-28 were used to measure this variable. In this measurement scale, three items were adapted from a construct in Venkatesh et al.'s UTAUT (Venkatesh et al., 2003). Besides, one item asking about respondents' pleasantness of using the Internet was added. This four-item scale was also rated on a five-point scale ranging from strongly disagree (1) to strongly agree (5).

3.2.4. General Information

Questions 29-35 asked about the respondent's gender, age, education background, academic

performance, weekly Internet usage, Internet experience, and the type of Internet activity he/she frequently spends most time on.

3.3. Procedure

During 6 February, 2006 to 18 March, 2006, a total of 480 questionnaires were evenly distributed to the eight universities. In each university, undergraduates were randomly recruited in the campus (libraries, canteens, computer labs etc.) to fill in the 35-item questionnaire.

3.4. Hypothesis Testing

This research aimed at finding out "How the level of Internet addiction varies among different groups of undergraduates". The dependent variable was level of Internet addiction while the chosen independent variables were gender, major of study, types of Internet activity engaged, academic performance, Internet usage, internet experience, perceived behavioral control, and attitude toward using the Internet. Table 6 summarizes the seven hypotheses tested in the study.

Hypothesis 1: Internet Addiction and Gender

To test whether the level of Internet addiction differs between males and females.

Hypothesis 2: Internet Addiction and Major of Study

To test whether the level of Internet addiction differs between those majoring in computer related subjects (Computer Science, Information Systems Management etc.) and those not majoring in computer subjects (Chinese, History, Chemistry etc.).

Hypothesis 3: Internet Addiction and Internet Activity Engaged

To test whether the level of Internet addiction is related to the types of Internet activity one engages.

Hypothesis 4: Internet Addiction and Academic Performance

To test whether the level of Internet addiction is related to a one's academic performance.

Hypothesis 5: Internet Addiction and Internet Usage

To test whether the level of Internet addiction is related to average number of hour spent on the Internet per week.

Hypothesis 6: Internet Addiction and Internet Experience

To test whether the level of Internet addiction is related to one's Internet experience (years of online experience).

Hypothesis 7: Internet Addiction and Perceived Behavioral Control

To test whether one's perceived behavioral control is related to his/her level of Internet addiction.

Hypothesis 8: Internet Addiction and Attitude Toward Using the Internet

To test whether one's attitude is related his/her level of Internet addiction.

Table 5: List of Research Hypotheses

No.	Hypotheses
H1	H_0: Internet addiction is independent of Gender
	H_a: Internet addiction is dependent on Gender
H2	H_0: Internet addiction is independent of Major of Study
	H_a: Internet addiction is dependent on Major of Study
H3	H_0: Internet addiction is independent of Internet Activity Engaged
	H_a: Internet addiction is dependent on Internet Activity Engaged
H4	H_0: Internet addiction is independent of Academic Performance
	H_a: Internet addiction is dependent on Academic Performance
H5	H_0: Internet addiction is independent of Internet Usage
	H_a: Internet addiction is dependent on Internet Usage
H6	H_0: Internet addiction is independent of Internet Experience
	H_a: Internet addiction is dependent on Internet Experience
H7	H_0: Internet addiction is independent of Perceived Behavioral Control
	H_a: Internet addiction is dependent on Perceived Behavioral Control
H8	H_0: Internet addiction is independent of Attitude Toward Using the Internet
	H_a: Internet addiction is dependent on Attitude Toward Using the Internet

3.5. Data Analysis

The internal consistency and reliability of the three multi-item scales (IAT, PBC, and ATUI) were assessed using the Cronbach alpha. Statistical analysis were performed with level of Internet addiction as the dependent variable and the following predictor variables: gender, major of study, academic performance, Internet usage, Internet experience, Internet activity engaged, perceived behavioral control, and attitude toward using the Internet.

Data were analyzed from two aspects:

1   Test of independence: To find out whether the level of Internet addiction is independent of each predictor variable. (Tested by Chi square and correlation)

2   Test of predictive power: To find out whether the predictor variables could explain the level of Internet addiction. (Tested by regression)

4.   Results

4.1.   Participants

Over the 6-week dada collection period, 413 questionnaires were collected while three of them were incomplete. Thus, they were discarded from further analysis. This yielded a total of 410 usable questionnaires (a net response rate of 85%). The sample was made up of 187 (45.6%) males and 223 (54.4%) females (Figure 1). Of the 410 responses, 408 (99.5%) filled in their major of study. Among them, there were 271 (66.4%) majoring in non-computer subjects (e.g. Chinese, Fine Art, Geography etc.) and 137 (33.6%) majoring in computer-related subjects (e.g. Information System, Computer Science, Computer Engineering etc.). According to the IAT cut-off score, 102 students (24.9%) were minimal users, 234 students (57.1%) were moderate users, and 74 students (18.0%) were excessive users (Figure 2).

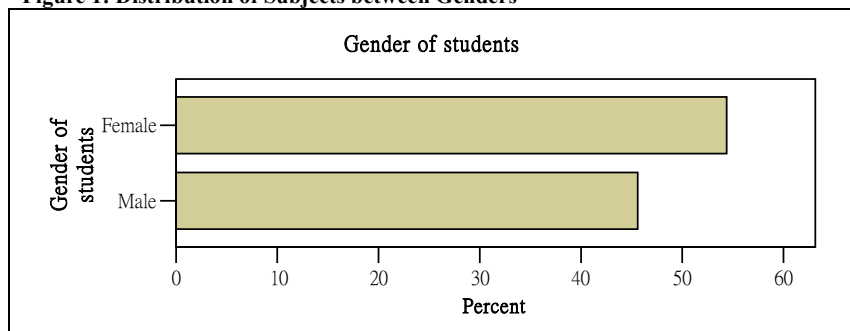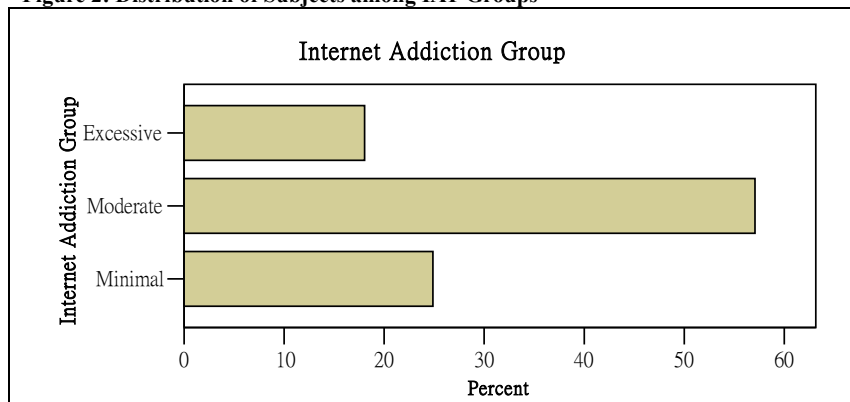**Figure 1: Distribution of Subjects between Genders**

Figure 2: Distribution of Subjects among IAT Groups

4.2. Distribution of IAT Groups in Eight Universities

The number of participants was rather evenly distributed among the eight local universities, with proportions of participant from each university ranged from 11.5% to 15.1%. Of the 308 moderate and excessive users, 16.6% and 15.3% came from HKBU and CUHK respectively. One hundred and fifty-three (49.7%) from the moderate and excessive groups were nearly equal-distributed among HKU, HKIED, LU, and UST. Of the 74 excessive users, 81.1% of them were nearly equal-occupied by HKBU, CUHK, HKU, HKIED, and UST (Figure 3).

Figure 3: Distribution of Subjects among IAT Groups and Universities
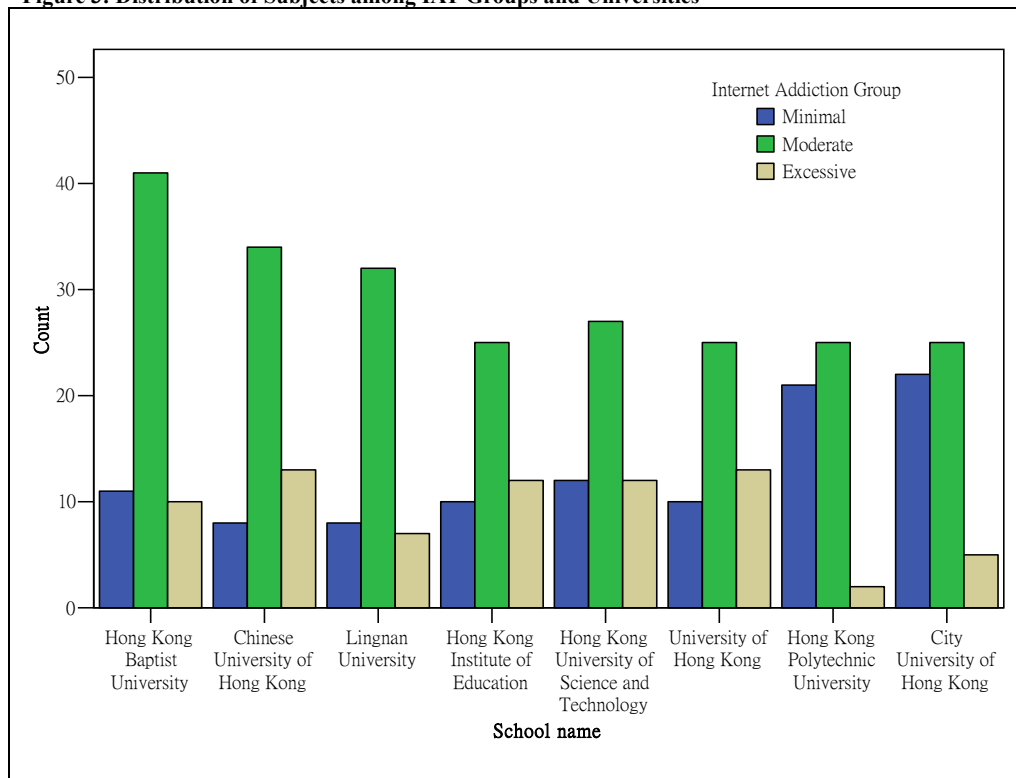
4.3. Reliability of the Instrument

Cronbach's alphas were used to assess the internal consistency of the IAT, PBC and ATUI scales. As shown in table 6, the reliability coefficients ranged from 0.818 to 0.899. According to Nunnally and Bernstein (1994), reliability coefficients of 0.70 or higher are considered adequate. Therefore, the instrument used in the study indicates a high internal consistency or reliability.

Table 6: Reliability Test for IAT, PBC, and ATUI

Measurement Scale	No. of Items	Cronbach's alphas
Internet Addiction Test (IAT)	20	0.899
Perceived Behavioral Control (PBC)	4	0.818
Attitude Toward Using the Internet (ATUI)	4	0.822

4.4. Test of Independence

To see whether the level of Internet addiction is independent of the variables gender, major of study, and types of Internet activity engaged, cross-tabulations and Chi-square tests were carried out to find if statistical differences exist among the three IAT groups: minimal, moderate, and excessive (Table 7). Also, Pearson correlations between the total IAT scores and the variables (academic performance, Internet usage, Internet experience, perceived behavioral control, and attitude toward using the Internet) were calculated to check if there are any relationships between the level of Internet addiction and these variables (Table 8).

Table 7: Tests Conducted with Chi-Square

No.	Hypotheses	n =	χ^2
H1	H_0: Internet addiction is independent of Gender	410	7.004*
	H_a: Internet addiction is dependent on Gender		
H2	H_0: Internet addiction is independent of Major of Study	408	1.961
	H_a: Internet addiction is dependent on Major of Study		
H3	H_0: Internet addiction is independent of Internet Activity Engaged	409	35.238**
	H_a: Internet addiction is dependent on Internet Activity Engaged		

*$\rho < 0.05$; **$\rho < 0.01$

Table 8: Tests Conducted with Pearson Correlation

No.	Hypotheses	n =	Correlation
H4	H_0: Internet addiction is independent of Academic Performance	410	-0.237**
	H_a: Internet addiction is dependent on Academic Performance		
H5	H_0: Internet addiction is independent of Internet Usage	410	0.045
	H_a: Internet addiction is dependent on Internet Usage		
H6	H_0: Internet addiction is independent of Internet Experience	369	0.013
	H_a: Internet addiction is dependent on Internet Experience		
H7	H_0: Internet addiction is independent of Perceived Behavioral Control	407	-0.140**
	H_a: Internet addiction is dependent on Perceived Behavioral Control		
H8	H_0: Internet addiction is independent of Attitude Toward Using the Internet	406	0.048
	H_a: Internet addiction is dependent on Attitude Toward Using the Internet		

**$\rho < 0.01$

4.4.1. Internet Addiction Level and Gender

Chi-square was used to test whether the level of Internet addiction is independent of gender (H1). As shown in table 7, chi-square is significant at the 0.05 level. Thus, the null hypothesis is rejected, meaning that the level of Internet addiction is significantly different between males and females. Table 9 shows the combination of males and females in each IAT group. A comparison of gender representation shows that female students significantly outnumbered male students in both the moderate and excessive user groups.

Table 9: Gender and IAT Group Crosstabulation

| Count | | Internet Addiction Group | | | |
		Minimal	Moderate	Excessive	Total
Gender of students	Male	58	97	32	187
	Female	44	137	42	223
Total		102	234	74	410

4.4.2. Internet Addiction Level and Major of Study

Chi-square was used to test whether the level of Internet addiction is independent of major of study (H2). Refer to table 7, the chi-square is not significant at the 0.05 level and the null hypothesis cannot be rejected. This means there are no differences in level of Internet addiction among those majoring in computer-related subjects and those majoring in non-computer subjects.

4.4.3. Internet Addiction Level and Internet Activity Engaged

Chi-square was used to test whether the level of Internet addiction is independent of the types Internet activity engaged (H3). Since the chi-square is significant at the 0.01 level, the null hypothesis is rejected. This means the level of Internet addiction is significantly different among those engage in different Internet activities. According to Table 10, the Internet is mainly used for interactive communication such as Chat room, E-mail, instant messaging, news group etc., information searching, simply Web surfing, and gaming. The preference on two of the major activities, gaming/interactive gaming and simply Web surfing, is different among the three IAT groups. For gaming/interactive gaming, it comprises 13.6% minimal users, 56.8% moderate users, and 29.5% excessive users; the activity "simply Web surfing" comprises 8.3% minimal users, 68.3% moderate users and 23.3% excessive users. It is obvious that the moderate and excessive user groups significantly outnumber the minimal user group in the activities "gaming/interactive gaming" and

"simply Web surfing", implying that the moderate and excessive users spend more time and engage more frequently in these two activities than the minimal users do.

Table 10: Internet Activity Engaged and IAT Group Crosstabulation

Count

| | | Internet Addiction Group | | | |
		Minimal	Moderate	Excessive	Total
Internet Activity Engaged	Chat room, E-mail, instan messaging, newsgroup et	50	102	24	176
	Cyberrelationship	1	5	5	11
	Cybersex	0	1	1	2
	Gaming, interactive gami	6	25	13	44
	Online gambling	2	4	3	9
	Online shopping, auction	4	9	1	14
	Information searching	33	45	13	91
	Simply Web surfing	5	41	14	60
	Others	0	2	0	2
Total		101	234	74	409

4.4.4. Internet Addiction Level and Academic Performance

Pearson correlation was used to test whether there is any relationship between a person's level of Internet addiction and his/her academic performance (H4). As shown in table 8, the correlation is significant at the 0.01 level and the null hypothesis is rejected. The negative correlations found between academic performance and total IAT score indicate that those who are more addicted to the Internet have a relatively poor academic performance. Table 11 shows the mean values of students' academic performance for the three IAT groups. The comparison of means indicates that the academic performance of the excessive group is slightly worse than that of the moderate and minimal users.

Table 11: Comparison of Academic Performance among Three IAT Groups

		N	Mean
Academic Performance	Minimal	90	.7257
	Moderate	212	.7282
	Excessive	67	.6738
	Total	369	.7177

4.4.5. Internet Addiction Level and Internet Usage

Pearson correlation was used to test whether there is any relationship between a person's level of Internet addiction and his/her Internet usage, which is measured by total number of hours spent on the Internet per week (H5). Refer to table 8, since the correlation for H5 is not significant at the 0.05

level, the null hypothesis can not be rejected. This means there is no systematic association between a person's level of Internet addiction and the number of hours he/she spends on the Internet per week.

4.4.6.   Internet Addiction Level and Internet Experience

Pearson correlation was used to test whether there is any relationship between a person's level of Internet addiction and his/her Internet experience, which is measured by the number of years one has been using the Internet (H6). As reflected by table 8, the correlation for H6 is not significant at the 0.05 level. Therefore, the null hypothesis can not be rejected. This means there is no systematic association between a person's level of Internet addiction and his/her Internet experience.

4.4.7.   Internet Addiction Level and Perceived Behavioral Control

Pearson correlation was used to test whether there is any relationship between a person's level of Internet addiction and his/her perceived behavioral control (H7). As shown in table 8, the correlation for H7 is significant at the 0.01 level and the null hypothesis is rejected. The negative correlation found between perceived behavioral control and total IAT score shows that those who perceive themselves as having less control in using the Internet are more Internet-addicted. Besides, refer to table 12, the comparison of PBC mean shows that the mean values for both the moderate and excessive groups are slightly lower than that of the minimal group, implying that higher level of Internet addiction is associated with lower level of perceived behavioral control

Table 12: Comparison of PBC among Three IAT Groups

		N	Mean
Perceived Behavioral Control	Minimal	102	4.1691
	Moderate	234	3.9359
	Excessive	74	3.8930
	Total	410	3.9862

4.4.8.   Internet Addiction Level and Attitude Toward Using the Internet

Pearson correlation was used to test whether there is any relationship between a person's level of Internet addiction and his/her attitude toward using the Internet (H8). According to table 8, the correlation for H8 is not significant at the 0.05 level. So, the null hypothesis cannot be rejected, meaning that there is no systematic association between a person's level of Internet addiction and

his/her attitude toward using the Internet.

4.5.   Test of Predictive Power

To find out whether the independent variables can explain the level of Internet addiction, simultaneous multiple regression was performed using the total IAT score as the independent variable and the following predictor variables: gender, major of study, academic performance, Internet usage, Internet experience, perceived behavioral control, attitude towards using the Internet, and types Internet activity engaged. Besides taking all respondents into account, for a more specific investigation, multiple regression for the excessive IAT group was also carried out using the same dependent and independent variables. However, as the objective of current is to identify the predictors of Internet addiction in general, emphasis is still put on the regression analysis which focuses on the three IAT groups.

4.5.1.   Regression Analysis for the Three IAT Groups

As shown in table 13, the regression equation is significant at the 0.01 level and the independent variables can explain 18.1% of the variance of total IAT score.

Table 13: Prediction of Internet Addiction for the Three IAT Groups

Predictor Variables	Internet Addiction
Perceived behavioral control	-0.197**
Attitude toward using the Internet	0.121*
Gender	0.120*
Major of study	-0.078
Academic performance	-0.251**
Internet usage	0.014
Internet experience	-0.053
Chat room, E-mail, instant messaging, newsgroup or discussion	-0.014
Cyberrelationship	0.172
Cybersex	0.008
Gaming, interactive gaming	0.136
Online gambling	0.099
Online shopping, auction	-0.023
Information searching	-0.046
Simply Web surfing	0.107
R^2	0.181**

  *   Regression coefficient is significant at the 0.05 level

  **   Regression coefficient is significant at the 0.01 level

Of the independent variables, perceived behavioral control, attitude toward using the Internet, gender, and academic performance are significant. Thus, they make a significant addition to the

prediction of the level of Internet addiction over and above the contribution of all other variables (major of study, Internet usage, Internet experience, and types of Internet activity engaged). Besides, since the absolute value of standardized regression coefficient (β = -0.251) for academic performance is the highest among the other significant independent variables, it is the most important predictor for a person's level of Internet addiction.

4.5.2. Regression Analysis for the Excessive Group

According to table 14, the regression equation is significant at the 0.01 level and the independent variables account for 41.8% of the variance of total IAT score. At the 0.05 significance level, perceived behavioral control, Internet usage, and Internet experience are all positively related to the total IAT score; gender (with male coded as "0", female coded as "1") has negative relationship with the total IAT score, while the remaining variables are not significant.

Table 14: Prediction of Internet Addiction for the Excessive Groups

Predictor Variables	Internet Addiction
Perceived behavioral control	0.276*
Attitude toward using the Internet	0.140
Gender	-0.308*
Major of study	-0.129
Academic performance	0.017
Internet usage	0.312*
Internet experience	0.282*
Cyberrelationship	0.237
Gaming, interactive gaming	-0.145
Online gambling	0.154
Online shopping, auction	-0.087
Information searching	-0.174
Simply Web surfing	-0.132
R^2	0.418**

   *   Regression coefficient is significant at the 0.05 level

   **   Regression coefficient is significant at the 0.01 level

4.5.3. Comparison of the Two Regression Models

Results obtained from the first regression analysis support the previously reported independence tests (Chi-square and Pearson correlations) that gender, academic performance, and perceived behavioral control are the significant predictors for a person's level of Internet addiction. When looking at the second regression model, it is found that its results further support the previous tests that gender and perceived behavioral control are significant in predicting Internet addiction.

However, contrast to the independence tests and the first regression model, the second regression analysis (focus on the excessive users) has discovered a positive relationship between perceived behavioral control and total IAT score and males have higher total IAT score than females do.

Comparing the results of the two regression models, some differences are discovered. Firstly, the variables attitude toward using the Internet and academic performance are significant in the first regression model while they are not in the second model. Secondly, in the second regression analysis, two variables (weekly Internet usage, Internet experience) which are not significant in the first model are found significantly contributing to the prediction of total IAT scores. Thirdly, in the first regression analysis (based on the three IAT groups), the most important predictor is academic performance, followed by perceived behavioral control, attitude toward using the Internet, and gender. Yet, in the second analysis (focus on excessive users), the variable having the highest predictive power becomes weekly Internet usage, followed by gender, Internet experience, and perceived behavioral control.

It is obvious that within the excessive user group, gender becomes a more important predictor while perceived behavioral control becomes a less important one in predicting a person's IAT score. In short, the above comparisons showed that the excessive users were homogeneous in a way that their total IAT scores were affected by a very different combination of factors.

5. Discussions

This study primarily focused on exploring the problem of Internet addiction among undergrads in Hong Kong and finding out any predictors of Internet addiction.

In current study, academic performance is found to have a significant negative relationship with Internet addiction, consistent with Young's study (Young, 1998b). Being a student, one can hardly live without exams, assignments, group projects, various extracurricular activities etc. Whether a student can have good academic achievement greatly depends on the student's health, his/her time management for every schoolwork, as well as how hard he/she works. There are some researches showing that the Internet can distract students from their study (Barber, 1997; Brady, 1996; Young, 1998b). In Young's study, she discovered 58% of students suffered from poor study habits, poor grades, or failed school

due to excessive Internet use (Young, 1998b). Besides, a survey investigating the potential impact of student Internet use found that many students failed school due to extensive patterns of late night Web surfing (Brady, 1996). All these previous studies support current findings that academic performance is the most important predictor of Internet addiction.

Perceived behavioral control, which reflects people's perceptions of their ability to perform a given behavior (Ajzen, 1991), is found to be the second most important predictor having a significant negative relationship with total IAT score. This means those who think they have sufficient resources, knowledge and control over their use of the Internet are associated with lower level of Internet addiction. Interestingly, people like conquering something not easily achievable – the more one is refrained from using the Internet, the more he/she thinks about the excitements experienced from using it, resulting in an uncontrollable desire and preoccupation with the Internet. From psychological views, various arousal or stress (e.g. being restricted to certain kinds of Internet activities by parents or lacking of competency to master the Internet) may lead to some associations between internal states such as stimulation, hope, desire, surprise. As a result, the users become psychologically dependent on the experiences and feelings derived from using the Internet. (Griffiths, 1997; Koerner, 1999; Young, 1996, 1998b, 1999).

Following the significance of perceived behavioral control, attitude toward using the Internet (defined as an individual's overall affective reaction to using the Internet) is found to be positively related to the IAT score. Previous researches show that most Internet addicts like the idea of using the Internet and feel happy when using it. For example, some researchers discovered that Internet addicts enjoy the ability given by the Internet to let them remain anonymous (Beard, 2001; Corell, 1995; Griffiths, 1997; Young, 1997, 1998b, c) while some found that most Internet addicts felt pleasant and safe to express opinions on the Internet (Harmon, 1998; King, 1996; Suler, 2004; Young, 1997, 1998b, c). This supports current findings that those with positive attitude toward using the Internet are associated with higher level of Internet addiction.

Males and females differ in many perspectives such as cognitive style, perception, attitude, communication style, emotional control etc (Busch, 1995; Tear, 1995). According to Young, gender influences the types of applications and underlying reasons for Internet addiction (Young, 1998c). Thus, in current study, it is not surprised to find that gender is also a significant predictor (with its relative

importance staying close to that of attitude toward using the Internet) for Internet addiction. This result is consistent with previous researches (Egger, 1996; Yang et al., 2005; Chen, Chen & Paul, 2001) except the findings of which gender is prone to higher level of Internet addiction. Previous researches indicated that males are more likely to be addicted to the Internet but current study found that females have a higher IAT score than males do.

6.   Limitations and Further Research

The overall results of this study show that the problem of Internet addiction is prevalent among Hong Kong undergrads and those with certain characteristics are more likely to have a higher level of Internet addiction. While conclusions should be reserved until future research can produce similar results, the inclusion of perceived behavioral control and attitude toward using the Internet in current study provides an alternative way to explain the addictive behavior of Internet users. However, there are some limitations which should be considered in future studies.

Firstly, as mentioned before, level of Internet addiction for the excessive IAT group is predicted by a combination of variables different from that of the three IAT groups as a whole. The variance in predictor combination implies that there may be some behavioral differences that discriminate the excessive users from the others. However, sticking to the objective of current research – to find out the predictors of Internet addiction in general, emphasis is being put on the discussion of first regression analysis (for the three IAT groups) that no further investigation on the excessive group is performed. Comparing the results of current study (18% being identified as excessive users) with that obtained by Breakthrough (14.7% being identified as Internet addicted) in 2002 (Breakthrough Youth Research Archives, 2003), it is noticeable that the problem of Internet addiction is expanding. Thus, more focus should be put on exploring the behavioral differences of the excessive group so that solutions can be found to help those excessive Internet users.

Secondly, although the two variables: perceived behavioral control and attitude toward using the Internet are found to be significant predictors of Internet addiction, only brief explanations have been drawn for the relationship between Internet addiction and these two predictors. According to the theory of planned behavior (Ajzen, 1991), perceived behavioral control and attitude toward behavior

contribute to the formation of behavioral intention and consequently lead to actual behavior. Therefore, the study of behavioral intention in future research can help understand the formation of addictive behavior.

7. Conclusions

With the advancement of information technology, people can enjoy lots of conveniences brought by the Internet. Despite the numerous advantages of using the Internet, there are some derived problems worth paying attention. In psychological field, the concept "Internet addiction" has been used to explain uncontrollable and damaging use of the Internet. While there are some studies exploring the problem of Internet addiction in Hong Kong, they are too brief without investigating the predictors of Internet addiction.

In this research, emphases were put on studying the problem of Internet addiction among undergraduates in Hong Kong and identifying any predictors of Internet addiction. Questionnaires were distributed to eight local universities and 410 usable responses were collected. Using Young's (1998b) Internet Addiction Test (IAT), 18% of the respondents were identified as excessive Internet users, showing the prevalence of Internet addiction among undergraduates in Hong Kong.

Results of statistical analyses show that academic performance is the most important variable significantly contributing to the prediction of Internet addiction, followed by perceived behavioral control, gender, and attitude toward using the Internet. This result is consistent with previous studies that academic performance and gender are significant predictors of Internet addiction. Apart from this, the study of predictors for the excessive IAT group has been performed and the result shows that the level of Internet addiction for the excessive users is predicted by a different combination of variables, implying there may be some behavioral differences that discriminates the excessive users from the others. The findings here provide explanations on some addictive behavior of the Internet users and open up new paths for further research.

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Appendix A

9. Appendix A – Questionnaire

This is a survey about Internet addiction among undergraduates in Hong Kong. Please take a few minutes to fill in this questionnaire. The information you provide will be kept confidential and only be used for research purpose.

A. In this section, please answer questions 1 to 20 according to the following scale and circle the point which is most characteristic of your Internet using habit:
在這環節，請根據以下尺度來回答第１至２０條問題，並圈出最適切形容你互聯網使用習慣之分數：

```
1 = Not at all        完全沒有
2 = Rarely            很少
3 = Occasionally      偶爾
4 = Often             經常
5 = Always            總是
```

1.	How often do you find that you stay on-line longer than you intended? 你有多少次發現你在網上逗留的時間比你原來打算的時間要長？	1	2	3	4	5
2.	How often do you neglect household chores to spend more time on-line? 你有多少次忽視了你的家庭事務而把更多時間花在網上？	1	2	3	4	5
3.	How often do you prefer the excitement of the Internet to intimacy/relationships with your partner/friends? 你有多少次喜歡網路上帶給你的刺激多於喜歡你和你伴侶/朋友間的關係？	1	2	3	4	5
4.	How often do you form new relationships with fellow on-line users? 你有多少次與你的網友形成新的朋友關係？	1	2	3	4	5
5.	How often do others in your life complain to you about the amount of time you spend on-line? 在你生活中，別人有多少次向你抱怨你在網上所花的時間太長？	1	2	3	4	5
6.	How often do your grades or school works suffer because of the amount of time you spend on-line? 你的學術成績和功課有多少次因爲你在網上多花了時間而受到損害？	1	2	3	4	5
7.	How often do you check your e-mail before something else that you need to do? 在需要做其他事前，你有多少次去檢查你的電子郵件？	1	2	3	4	5
8.	How often does your job performance or productivity suffer because of the Internet? 由於互聯網的存在，你的工作表現或效率有多少次遭受影響？	1	2	3	4	5
9.	How often do you become defensive or secretive when anyone asks you what you do on-line? 當有人問你在網上幹甚麼時，你有多少次變得好爲自己辯護或變得遮遮掩掩？	1	2	3	4	5

10.	How often do you block out disturbing thoughts about your life with soothing thoughts of the Internet? 你有多少次以互聯網帶給你的安慰來排遣有關你生活的煩惱？	1	2	3	4	5
11.	How often do you find yourself anticipating when you will go on-line again? 你有多少次發現自己期待著再一次上網的時刻？	1	2	3	4	5
12.	How often do you fear that life without the Internet would be boring, empty, and joyless? 你有多少次擔心：若失去了互聯網，生活將會變得煩悶、空虛和無趣？	1	2	3	4	5
13.	How often do you snap, yell, or act annoyed if someone bothers you while you are on-line? 若有人在你上網時打擾你，你有多少次厲聲說話、叫喊或表示憤怒？	1	2	3	4	5
14.	How often do you lose sleep due to late-night log-ins? 你有多少次因為深夜上網而睡眠不足？	1	2	3	4	5
15.	How often do you feel preoccupied with the Internet when off-line, or fantasize about being on-line? 沒有上網的時候，你有多少次為互聯網而出神，或幻想自己在網上？	1	2	3	4	5
16.	How often do you find yourself saying "just a few more minutes" when on-line? 當你上網時，你有多少次發現自己在說/想著「只是多玩幾分鐘而已」？	1	2	3	4	5
17.	How often do you try to cut down the amount of time you spend on-line and fail? 你有多少次試圖減少自己花在互聯網上的時間但卻失敗了？	1	2	3	4	5
18.	How often do you try to hide how long you've been on-line? 你有多少次試圖隱瞞自己在網上所花的時間？	1	2	3	4	5
19.	How often do you choose to spend more time on-line oven going out with others? 你有多少次選擇把更多的時間花在網上而不是和其他人一起外出？	1	2	3	4	5
20.	How often do you feel depressed, moody or nervous when you are off-line, which goes away once you are back on-line? 沒有上網的時候，你有多少次感到沮喪、喜怒無常、或緊張，而當你一旦回到網上時，這些情緒就會消失？	1	2	3	4	5

B. **In this section, please answer questions 21 to 28 using the agree-disagree scale and circle the point which is most characteristic of your situation:**
在這環節，請根據以下同意/不同意尺度來回答第２１至２８條問題，並圈出最適切形容你處境之分數：

Strongly Disagree 非常不同意	1	2	3	4	5	Strongly Agree 非常同意

21.	I have control over using the Internet. 我掌握到控制到如何使用互聯網·	1	2	3	4	5
22.	I have the resources necessary to use the Internet. 我擁有所需的資源來讓我使用互聯網·	1	2	3	4	5
23.	I have the knowledge necessary to use the Internet. 我擁有所需的知識來讓我使用互聯網·	1	2	3	4	5
24.	Given the resources, opportunities and knowledge it takes to use the Internet, it would be easy for me to use the Internet. 如果擁有所需的資源、機會和知識，使用互聯網將會是一件容易的事·	1	2	3	4	5
25.	Using the Internet is a good idea. 使用互聯網是一個好主意·	1	2	3	4	5
26.	The actual process of using the Internet is pleasant. 實際上，使用互聯網的過程是愉快的·	1	2	3	4	5
27.	Working with the Internet is fun. 與互聯網一起工作是一種樂趣·	1	2	3	4	5
28.	Overall, I like using the Internet. 整體而言，我喜歡使用互聯網	1	2	3	4	5

C. In this section, please fill in the following table. For questions with choices offered, please choose the suitable answer and put a   in the □ provided.

Gender:	Male □ Female □
Age:	_____ years old
Education background:	My major of study is: _____
Academic performance:	Cumulative GPA / Other Scale _____ out of _____ scale
Average amount of time spent on Internet per week:	_____ hour(s) per week
Internet experience:	_____ year(s) and _____ month(s)

What type of Internet activity do you most frequently engage and <u>spend most time on</u> when you get access to the Internet? (Please choose one type only)

□	Chat room, E-mail, instant messaging, newsgroup or discussion group, online diaries
□	Cyberrelationship, e.g. online dating
□	Cybersex
□	Gaming, interactive gaming
□	Online gambling
□	Online shopping, auction
□	Information searching
□	Simply Web surfing
Others:	Please specify: _____

Thank you for taking time to fill in the questionnaire

Appendix B

10. Appendix B – Descriptive Statistics (Frequencies)

Statistics

		Internet Addiction Group	Gender of students	Major of study	Internet Activity Engaged	School name
N	Valid	410	410	408	409	410
	Missing	0	0	2	1	0

Internet Addiction Group

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Minimal	102	24.9	24.9	24.9
	Moderate	234	57.1	57.1	82.0
	Excessive	74	18.0	18.0	100.0
	Total	410	100.0	100.0	

Gender of students

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	187	45.6	45.6	45.6
	Female	223	54.4	54.4	100.0
	Total	410	100.0	100.0	

Major of study

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Non computer majo	271	66.1	66.4	66.4
	Computer major	137	33.4	33.6	100.0
	Total	408	99.5	100.0	
Missing	System	2	.5		
Total		410	100.0		

Internet Activity Engaged

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Chat room, E-mail, instar messaging, newsgroup et	176	42.9	43.0	43.0
	Cyberrelationship	11	2.7	2.7	45.7
	Cybersex	2	.5	.5	46.2
	Gaming, interactive gamir	44	10.7	10.8	57.0
	Online gambling	9	2.2	2.2	59.2
	Online shopping, auction	14	3.4	3.4	62.6
	Information searching	91	22.2	22.2	84.8
	Simply Web surfing	60	14.6	14.7	99.5
	Others	2	.5	.5	100.0
	Total	409	99.8	100.0	
Missing	System	1	.2		
Total		410	100.0		

School name

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Hong Kong Baptist University	62	15.1	15.1	15.1
	City University of Hong Kong	52	12.7	12.7	27.8
	Chinese University of Hong Kong	55	13.4	13.4	41.2
	University of Hong Kong	48	11.7	11.7	52.9
	Hong Kong Institute of Education	47	11.5	11.5	64.4
	Lingnan University	47	11.5	11.5	75.9
	Hong Kong Polytechnic University	48	11.7	11.7	87.6
	Hong Kong University of Science and Technology	51	12.4	12.4	100.0
	Total	410	100.0	100.0	

Appendix C

11. Appendix C – Descriptive Statistics (Crosstabs)

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Gender of students * Internet Addiction Group	410	100.0%	0	.0%	410	100.0%
Major of study * Internet Addiction Group	408	99.5%	2	.5%	410	100.0%
Internet Activity Engaged * Internet Addiction Grou	409	99.8%	1	.2%	410	100.0%
School name * Internet Addiction Group	410	100.0%	0	.0%	410	100.0%

Gender of students * Internet Addiction Group Crosstabulation

			Internet Addiction Group			Total
			Minimal	Moderate	Excessive	
Gender of students	Male	Count	58	97	32	187
		% within Gender of studen	31.0%	51.9%	17.1%	100.0%
		% within Internet Addictio Group	56.9%	41.5%	43.2%	45.6%
	Female	Count	44	137	42	223
		% within Gender of studen	19.7%	61.4%	18.8%	100.0%
		% within Internet Addictio Group	43.1%	58.5%	56.8%	54.4%
Total		Count	102	234	74	410
		% within Gender of studen	24.9%	57.1%	18.0%	100.0%
		% within Internet Addictio Group	100.0%	100.0%	100.0%	100.0%

Major of study * Internet Addiction Group Crosstabulation

			Internet Addiction Group			Total
			Minimal	Moderate	Excessive	
Major of study	Non computer majo	Count	62	159	50	271
		% within Major of stud	22.9%	58.7%	18.5%	100.0%
		% within Internet Addiction Group	60.8%	68.5%	67.6%	66.4%
	Computer major	Count	40	73	24	137
		% within Major of stud	29.2%	53.3%	17.5%	100.0%
		% within Internet Addiction Group	39.2%	31.5%	32.4%	33.6%
Total		Count	102	232	74	408
		% within Major of stud	25.0%	56.9%	18.1%	100.0%
		% within Internet Addiction Group	100.0%	100.0%	100.0%	100.0%

Internet Activity Engaged * Internet Addiction Group Crosstabulation

			Internet Addiction Group			Total
			Minimal	Moderate	Excessive	
Internet Activity Engaged	Chat room, E-mail, instan messaging, newsgroup et	Count	50	102	24	176
		% within Interne Activity Engaged	28.4%	58.0%	13.6%	100.0%
		% within Interne Addiction Group	49.5%	43.6%	32.4%	43.0%
	Cyberrelationship	Count	1	5	5	11
		% within Interne Activity Engaged	9.1%	45.5%	45.5%	100.0%
		% within Interne Addiction Group	1.0%	2.1%	6.8%	2.7%
	Cybersex	Count	0	1	1	2
		% within Interne Activity Engaged	.0%	50.0%	50.0%	100.0%
		% within Interne Addiction Group	.0%	.4%	1.4%	.5%
	Gaming, interactive gamir	Count	6	25	13	44
		% within Interne Activity Engaged	13.6%	56.8%	29.5%	100.0%
		% within Interne Addiction Group	5.9%	10.7%	17.6%	10.8%
	Online gambling	Count	2	4	3	9
		% within Interne Activity Engaged	22.2%	44.4%	33.3%	100.0%
		% within Interne Addiction Group	2.0%	1.7%	4.1%	2.2%
	Online shopping, auction	Count	4	9	1	14
		% within Interne Activity Engaged	28.6%	64.3%	7.1%	100.0%
		% within Interne Addiction Group	4.0%	3.8%	1.4%	3.4%
	Information searching	Count	33	45	13	91
		% within Interne Activity Engaged	36.3%	49.5%	14.3%	100.0%
		% within Interne Addiction Group	32.7%	19.2%	17.6%	22.2%
	Simply Web surfing	Count	5	41	14	60
		% within Interne Activity Engaged	8.3%	68.3%	23.3%	100.0%
		% within Interne Addiction Group	5.0%	17.5%	18.9%	14.7%
	Others	Count	0	2	0	2
		% within Interne Activity Engaged	.0%	100.0%	.0%	100.0%
		% within Interne Addiction Group	.0%	.9%	.0%	.5%
Total		Count	101	234	74	409
		% within Interne Activity Engaged	24.7%	57.2%	18.1%	100.0%
		% within Interne Addiction Group	100.0%	100.0%	100.0%	100.0%

School name * Internet Addiction Group Crosstabulation

| | | | Internet Addiction Group | | | Total |
			Minimal	Moderate	Excessive	
School name	Hong Kong Baptist University	Count	11	41	10	62
		% within School nam	17.7%	66.1%	16.1%	100.0%
		% within Internet Addiction Group	10.8%	17.5%	13.5%	15.1%
	City University of Hong Kong	Count	22	25	5	52
		% within School nam	42.3%	48.1%	9.6%	100.0%
		% within Internet Addiction Group	21.6%	10.7%	6.8%	12.7%
	Chinese University of Hong Kong	Count	8	34	13	55
		% within School nam	14.5%	61.8%	23.6%	100.0%
		% within Internet Addiction Group	7.8%	14.5%	17.6%	13.4%
	University of Hong Kong	Count	10	25	13	48
		% within School nam	20.8%	52.1%	27.1%	100.0%
		% within Internet Addiction Group	9.8%	10.7%	17.6%	11.7%
	Hong Kong Institute of Education	Count	10	25	12	47
		% within School nam	21.3%	53.2%	25.5%	100.0%
		% within Internet Addiction Group	9.8%	10.7%	16.2%	11.5%
	Lingnan University	Count	8	32	7	47
		% within School nam	17.0%	68.1%	14.9%	100.0%
		% within Internet Addiction Group	7.8%	13.7%	9.5%	11.5%
	Hong Kong Polytechnic University	Count	21	25	2	48
		% within School nam	43.8%	52.1%	4.2%	100.0%
		% within Internet Addiction Group	20.6%	10.7%	2.7%	11.7%
	Hong Kong University of Science and Technology	Count	12	27	12	51
		% within School nam	23.5%	52.9%	23.5%	100.0%
		% within Internet Addiction Group	11.8%	11.5%	16.2%	12.4%
Total		Count	102	234	74	410
		% within School nam	24.9%	57.1%	18.0%	100.0%
		% within Internet Addiction Group	100.0%	100.0%	100.0%	100.0%

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Appendix D

12. Appendix D – Reliability Analysis

12.1. Internet Addiction Test (IAT)

Warnings

The space saver method is used. That is, the covariance matrix is not calculated or us analysis.

Case Processing Summary

		N	%
Cases	Valid	404	98.5
	Excluded	6	1.5
	Total	410	100.0

a. Listwise deletion based on all variables in the proced

Reliability Statistics

Cronbach's Alpha	N of Items
.899	20

12.2. Perceived Behavioral Control (PBC)

Warnings

The space saver method is used. That is, the covariance matrix is not calculated or us analysis.

Case Processing Summary

		N	%
Cases	Valid	407	99.3
	Excluded	3	.7
	Total	410	100.0

a. Listwise deletion based on all variables in the proced

Reliability Statistics

Cronbach's Alpha	N of Items
.818	4

12.3. Attitude Toward Using the Internet (ATUI)

Warnings

The space saver method is used. That is, the covariance matrix is not calculated or use analysis.

Case Processing Summary

		N	%
Cases	Valid	409	99.8
	Excluded	1	.2
	Total	410	100.0

a. Listwise deletion based on all variables in the proced

Reliability Statistics

Cronbach's Alpha	N of Items
.822	4

Appendix E

13. Appendix E – Chi-square Test

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Gender of students * Internet Addiction Group	410	100.0%	0	.0%	410	100.0%
Major of study * Internet Addiction Group	408	99.5%	2	.5%	410	100.0%
Internet Activity Engaged * Internet Addiction Grou	409	99.8%	1	.2%	410	100.0%

13.1. Chi Square Test for H1: Gender and Internet Addiction Group

Crosstab

			Internet Addiction Group			Total
			Minimal	Moderate	Excessive	
Gender of students	Male	Count	58	97	32	187
		% within Gender of studer	31.0%	51.9%	17.1%	100.0%
	Female	Count	44	137	42	223
		% within Gender of studer	19.7%	61.4%	18.8%	100.0%
Total		Count	102	234	74	410
		% within Gender of studer	24.9%	57.1%	18.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.004[a]	2	.030
Likelihood Ratio	6.989	2	.030
Linear-by-Linear Association	4.043	1	.044
N of Valid Cases	410		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 33.75.

13.2. Chi Square Test for H2: Major of Study and Internet Addiction Group

Crosstab

			Internet Addiction Group			
			Minimal	Moderate	Excessive	Total
Major of study	Non computer majo	Count	62	159	50	271
		% within Major of stud	22.9%	58.7%	18.5%	100.0%
	Computer major	Count	40	73	24	137
		% within Major of stud	29.2%	53.3%	17.5%	100.0%
Total		Count	102	232	74	408
		% within Major of stud	25.0%	56.9%	18.1%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.961[a]	2	.375
Likelihood Ratio	1.931	2	.381
Linear-by-Linear Association	1.119	1	.290
N of Valid Cases	408		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 24.85.

13.3. Chi Square Test for H3: Internet Activity and Internet Addiction Group

Crosstab

			Internet Addiction Group			
			Minimal	Moderate	Excessive	Total
Internet Activity Engaged	Chat room, E-mail, instan messaging, newsgroup et	Count	50	102	24	176
		% within Interne Activity Engaged	28.4%	58.0%	13.6%	100.0%
	Cyberrelationship	Count	1	5	5	11
		% within Interne Activity Engaged	9.1%	45.5%	45.5%	100.0%
	Cybersex	Count	0	1	1	2
		% within Interne Activity Engaged	.0%	50.0%	50.0%	100.0%
	Gaming, interactive gamir	Count	6	25	13	44
		% within Interne Activity Engaged	13.6%	56.8%	29.5%	100.0%
	Online gambling	Count	2	4	3	9
		% within Interne Activity Engaged	22.2%	44.4%	33.3%	100.0%
	Online shopping, auction	Count	4	9	1	14
		% within Interne Activity Engaged	28.6%	64.3%	7.1%	100.0%
	Information searching	Count	33	45	13	91
		% within Interne Activity Engaged	36.3%	49.5%	14.3%	100.0%
	Simply Web surfing	Count	5	41	14	60
		% within Interne Activity Engaged	8.3%	68.3%	23.3%	100.0%
	Others	Count	0	2	0	2
		% within Interne Activity Engaged	.0%	100.0%	.0%	100.0%
Total		Count	101	234	74	409
		% within Interne Activity Engaged	24.7%	57.2%	18.1%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	35.238[a]	16	.004
Likelihood Ratio	36.805	16	.002
Linear-by-Linear Association	1.098	1	.295
N of Valid Cases	409		

a. 12 cells (44.4%) have expected count less than 5. The minimu expected count is .36.

Appendix F

14. Appendix F – Correlation Test

Descriptive Statistics

	Mean	Std. Deviation	N
Level of Internet Addiction	52.26	15.941	410
Perceived Behavioral Contro	3.9862	.66138	410
Attitude Toward Using the Internet	3.8809	.64194	410
Academic Performance	.7177	.10025	369
Average amount of time spent on Internet per week	23.3587	19.75466	407
Internet experience	7.3713	1.95787	406

Correlations

		Level of Internet Addiction	Perceived Behavioral Control	Attitude Toward Using the Internet	Academic Performance	Average amount of time spent on Internet per week	Internet experience
Level of Internet Addiction	Pearson Correlation	1	-.140**	.048	-.237**	.045	.013
	Sig. (2-tailed)	.	.004	.329	.000	.366	.801
	N	410	410	410	369	407	406
Perceived Behavioral Contro	Pearson Correlation	-.140**	1	.463**	-.085	.112*	.089
	Sig. (2-tailed)	.004	.	.000	.101	.024	.073
	N	410	410	410	369	407	406
Attitude Toward Using the Internet	Pearson Correlation	.048	.463**	1	-.101	.236**	.072
	Sig. (2-tailed)	.329	.000	.	.053	.000	.145
	N	410	410	410	369	407	406
Academic Performance	Pearson Correlation	-.237**	-.085	-.101	1	-.108*	-.165**
	Sig. (2-tailed)	.000	.101	.053	.	.038	.002
	N	369	369	369	369	369	368
Average amount of time spent on Internet per week	Pearson Correlation	.045	.112*	.236**	-.108*	1	.111*
	Sig. (2-tailed)	.366	.024	.000	.038	.	.025
	N	407	407	407	369	407	405
Internet experience	Pearson Correlation	.013	.089	.072	-.165**	.111*	1
	Sig. (2-tailed)	.801	.073	.145	.002	.025	.
	N	406	406	406	368	405	406

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Appendix G

15. Appendix G – Regression Analyses

15.1. Regression Analyses (Three IAT Groups)

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	Simply Web surfing, Average amount of time spent on Internet per week, Cybersex, Online shopping, auction, Gender of students, Online gambling, Cyberrelationship, Internet experience, Perceived Behavioral Control, Gaming, interactive gaming, Academic Performance, Major of study, Information searching, Attitude Toward Using the Internet, Chat room, E-mail, instant messaging, newsgroup discussion	.	Enter

a. All requested variables entered.

b. Dependent Variable: Level of Internet Addiction

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.425[a]	.181	.146	14.828

a. Predictors: (Constant), Simply Web surfing, Average amount of time spent on Internet per week, Cybersex, Online shopping, auction, Gender of students, Online gambling, Cyberrelationship, Internet experience, Perceived Behavioral Control, Gaming, interactive gaming, Academic Performance, Major of study, Information searching, Attitude Toward Using the Internet, Chat room, E-mail, instant messaging, newsgroup or discussion

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17001.356	15	1133.424	5.155	.000[a]
	Residual	77170.339	351	219.859		
	Total	94171.695	366			

a. Predictors: (Constant), Simply Web surfing, Average amount of time spent on Internet week, Cybersex, Online shopping, auction, Gender of students, Online gambling, Cyberrelationship, Internet experience, Perceived Behavioral Control, Gaming, interact gaming, Academic Performance, Major of study, Information searching, Attitude Towa the Internet, Chat room, E-mail, instant messaging, newsgroup or discussion

b. Dependent Variable: Level of Internet Addiction

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Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	89.389	13.992		6.389	.000
	Perceived Behavioral Control	-4.798	1.348	-.197	-3.560	.000
	Attitude Toward Using the Internet	2.981	1.388	.121	2.147	.032
	Gender of students	3.849	1.648	.120	2.335	.020
	Major of study	-2.625	1.781	-.078	-1.474	.141
	Academic Performance	-40.338	8.542	-.251	-4.722	.000
	Average amount of time spent on Internet per week	.011	.042	.014	.270	.788
	Internet experience	-.442	.415	-.053	-1.064	.288
	Chat room, E-mail, instant messaging, newsgroup or discussion	-.438	10.586	-.014	-.041	.967
	Cyberrelationship	17.779	11.649	.172	1.526	.128
	Cybersex	2.346	18.267	.008	.128	.898
	Gaming, interactive gaming	6.991	10.783	.136	.648	.517
	Online gambling	10.821	11.769	.099	.919	.358
	Online shopping, auction	-2.121	11.442	-.023	-.185	.853
	Information searching	-1.800	10.644	-.046	-.169	.866
	Simply Web surfing	4.920	10.712	.107	.459	.646

a. Dependent Variable: Level of Internet Addiction

15.2. Regression Analyses (Excessive Group)

Warnings

For models with dependent variable Level of Internet Addiction, the following variables constants or have missing correlations: Cybersex. They will be deleted from the analys

Variables Entered/Removed [b,c]

Model	Variables Entered	Variables Removed	Method
1	Simply Web surfing, Major of study, Attitude Toward U the Internet, Online shopping, auction, Online gamblin Cyberrelationship, Perceived Behavioral Control, Intern experience, Gaming, interactive gaming, Gender of stu Information searching, Average amount of time spent Internet per week, Academic Performance	.	Enter

a. Tolerance = .000 limits reached.

b. Dependent Variable: Level of Internet Addiction

c. Models are based only on cases for which Internet Addiction Group = Excessive

Model Summary

Model	R Internet Addiction Group = Excessive (Selected)	R Square	Adjusted R Square	Std. Error of the Estimate
1	.647[a]	.418	.276	6.819

a. Predictors: (Constant), Simply Web surfing, Major of stud Attitude Toward Using the Internet, Online shopping, auc Online gambling, Cyberrelationship, Perceived Behavioral Control, Internet experience, Gaming, interactive gaming, Gender of students, Information searching, Average amou time spent on Internet per week, Academic Performance

ANOVA [b,c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1772.351	13	136.335	2.932	.003[a]
	Residual	2464.514	53	46.500		
	Total	4236.866	66			

a. Predictors: (Constant), Simply Web surfing, Major of study, Attitude Toward Using the Internet, Online shopping, auction, Online gambling, Cyberrelationship, Perceived Beh Control, Internet experience, Gaming, interactive gaming, Gender of students, Informa searching, Average amount of time spent on Internet per week, Academic Performanc

b. Dependent Variable: Level of Internet Addiction

c. Selecting only cases for which Internet Addiction Group = Excessive

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	47.072	11.368		4.141	.000
	Perceived Behavioral Control	3.406	1.429	.276	2.384	.021
	Attitude Toward Using the Internet	1.749	1.448	.140	1.208	.232
	Gender of students	-4.913	2.108	-.308	-2.331	.024
	Major of study	-2.187	2.007	-.129	-1.089	.281
	Academic Performance	1.182	9.887	.017	.120	.905
	Average amount of time spent on Internet per week	.192	.081	.312	2.370	.021
	Internet experience	1.276	.518	.282	2.462	.017
	Cyberrelationship	7.185	3.595	.237	1.998	.051
	Gaming, interactive gaming	-3.004	2.542	-.145	-1.182	.242
	Online gambling	5.938	4.487	.154	1.323	.191
	Online shopping, auction	-5.712	7.323	-.087	-.780	.439
	Information searching	-3.726	2.670	-.174	-1.396	.169
	Simply Web surfing	-2.729	2.734	-.132	-.998	.323

a. Dependent Variable: Level of Internet Addiction

b. Selecting only cases for which Internet Addiction Group = Excessive

Excluded Variables[b]

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics
						Tolerance
1	Chat room, E-mail, instant messaging, newsgroup or discussion	.[a]	.	.	.	.000

a. Predictors in the Model: (Constant), Simply Web surfing, Major of study, Attitude Toward the Internet, Online shopping, auction, Online gambling, Cyberrelationship, Perceived B Control, Internet experience, Gaming, interactive gaming, Gender of students, Informat searching, Average amount of time spent on Internet per week, Academic Performance

b. Dependent Variable: Level of Internet Addiction