

# Net-Generation Attributes and Seductive Properties of the Internet as Predictors of Online Activities and Internet Addiction

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## ABSTRACT

Born between 1977 and 1997, Net-generation is the first generation to grow up surrounded by home computers, video games, and the Internet. As children of the Baby Boomers, the Internet is the medium of choice for the Net-geners. Based on the assumption that Net-generation has unique characteristics, this study examined (1) how Net-geners addicted to the Internet differ from the non-addicted and (2) how these attributes, together with the seductive properties of the Internet, are related to Internet addiction. Data were gathered from a probability sample of 699 Net-geners between the ages of 16 and 24. Results show that Net-geners addicted to the Internet tend to be young female students. Being emotionally open on the Net and a heavy user of ICQ were most influential in predicting Net-geners' problematic use of the Internet. Addicted Net-geners are also strongly linked to the pleasure of being able to control the simulated world in online games. The finding reinforces previous research that "dependents" of the Internet spend most of their time in the synchronous communication environment engaging in interactive online games, chat rooms, and ICQ for pleasure-seeking or escape, while "non-dependents" use information-gathering functions available on the Internet. Furthermore, Internet addicts tend to watch television significantly less, indicating a displacement effect on traditional media use for the Net-generation.

## INTRODUCTION

THE TERM "Internet addiction" has been used to describe problematic, excessive, or mal-adaptive use of the Internet.<sup>1-3</sup> Some people become addicted to online games, some to chatting and forming relationships, and some to online gambling, pornography or cybersex. Others live their lives through the keyboard and monitor—shopping, accessing information, maintaining relation-

ships, and finding support when those relationships end. Young defined Internet addiction as staying online for pleasure averaging 38 h or more per week, largely in chat rooms, and concluded that Internet addiction can shatter families, relationships, and careers.<sup>4</sup> She believes that Internet abuse can be as damaging as drug or alcohol abuse and addiction typically strikes new users of personal computers and often housebound women with a median age of 43. Internet addicts can be

people who are depressed, lonely, afraid to go out, and in high family conflicts. They can be men, women, or children. Anecdotal evidence suggests that the Internet "addict" is a predominantly young teenager, usually male, with little or no social life, and little or no self-confidence.<sup>5</sup> In a survey examining Internet addiction among 387 university students, Scherer found that addicted students log on at least once a week, 13% met the criteria for addiction, including tolerance (i.e., requiring longer periods of time to achieve satisfaction) and withdrawal (e.g., depression, moodiness, or irritability when offline).<sup>6</sup> For many people, the Internet is an escape from reality in order to ease the pressures of everyday life. Most addicts do not understand the power of it, the seductiveness of it. The seductive online relationship can be potent and so real.

This research is motivated by the public anxieties on the nature and the impact of Internet addiction generated recently. However, the body of empirical work reviewed is still small. Although important questions of academic and policy significance are already addressed regarding the consequences or danger of problematic use of the Internet for students and the Internet public at large,<sup>2,3,6-9</sup> Internet addiction specifically on a group of users is still overlooked. This study will focus on examining the status and impact if compulsive Internet use is a problem for a new generation born between 1977 and 1997—the Net-generation—and how characteristics of this group are linked to Internet addiction.

Net-generation is a new generation not defined by demographics alone, but rather by a combination of their demographic cohort, values, and life experiences. Preceded by Generation-X, the Net-generation is the first generation to grow up surrounded by home computers, video games, and the Internet. As children of the Baby Boomers, the Internet is the medium of choice for the Net-geners. Net-geners are more numerous, more affluent, better educated, and more ethnically diverse than any generation.<sup>10</sup> Previous research has estimated this group represents 30% of the population in the United States,<sup>11</sup> making it a consumer group potentially larger than the baby boomers. Yet, we have very little understanding of how characteristics of the Net-geners are related to addictive Internet behavior.

Not everyone is willing to add the Internet to the list of addictions. Many argued that the term should be confined to substances that are known to create physical dependence. How can the Internet be addicting, especially since it is not a chemical substance like alcohol or drugs? While the interest is not a physical addiction, it is a mental one; some

psychologists believe spending too much time online can lead to a clinically diagnosable disorder called Internet Addiction. The question of whether habit-forming behaviors are addictions as defined by psychologists and psychiatrists is debatable. Nevertheless, taking into consideration that Internet addiction may be creating alarming consequences, this study will fill an important void in our evolving understanding of how this medium is affecting the Net-geners and who would be most vulnerable to being addicted.

#### *Theoretical frameworks*

*Internet addiction.* A review of the psychology and counseling literature reveals two basic definitions for Internet related disorders. Derived from substance-dependence criteria of the *Diagnostic and Statistical Manual—Fourth Edition (DSM-IV)*,<sup>12</sup> the first definition for Internet related disorder, *Internet Addiction Disorder (IAD)*, is a behavioral addiction, which consists of six core components: salience, mood modification, tolerance, withdrawal symptoms, conflict, and relapse.<sup>13</sup> He proposed that the source of this addiction could originate from one or more aspects of Internet use including the process of typing, the medium of communication, the lack of face-to-face contact, Internet content (e.g., pornography), or online social activities (e.g., chat rooms, multi-user domains, bulletin boards, and online games). Young presented a second definition for Internet related disorders, called *Problematic Internet Use (PIU)*, also adapted from DSM-IV but from criteria associated with pathological gambling.<sup>3</sup> This definition requires that individuals meet five of eight criteria for Internet addiction to qualify as an addict. These include (1) preoccupation with Internet, (2) need for longer amount of time on line, (3) repeated attempts to reduce Internet use, (4) withdrawal when reducing Internet use, (5) time management issues, (6) environmental distress (family, school, work, friends), (7) deception around time spent online, and (8) mood modification through Internet use.<sup>2,3</sup> In adopting criteria symptoms similar to that of pathological gambling,<sup>14</sup> Young argues that PIU assumes more similarity to an impulse control disorder than to substance dependency.

Past research has investigated, using self-selected online samples, the criteria for compulsive Internet use. It was found that dependents of the Internet use the Internet to escape from negative feelings. The vast majority admitted to feelings of time distortion, accelerated intimacy, and feeling uninhibited when online.<sup>3</sup> Scherer and Bost sur-

veyed 531 students about their Internet use using a checklist of ten clinical symptoms to parallel the symptoms of substance abuse and dependency.<sup>9</sup> Results indicated that 13% of the sample reported Internet use had interfered with their academic work, professional performance, or their social lives. Others described not sleeping, ignoring family responsibilities, and show up late for work to fulfill their desire to visit chat rooms and surf the Web. The evidence points to a psychological disorder, so researchers probed further and found that the participants' habits met the criteria for impulse control disorder, a mental illness characterized by an uncontrollable desire to perform a behavior. The consequences could be severe, resulting in those who suffered from marital problems, failed in school or lost a job, and accumulated debt.<sup>15-18</sup> Drawing on the insights from the definitions and previous research, this study examines how this compulsive Internet behavior is related to characteristics of the Net-generation.

*The Net-generation.* Tapscott describes the Net-generation as accepting of diversity, curious, assertive, and self-reliant. In addition, he identifies that the Net-geners are distinctively different from the boomers and the busters that media practitioners and educators should consider, as Net-geners are targeted as a new generation of consumers.<sup>11</sup> Furthermore, Tapscott also portrays the Net-generation as having the following characteristics:

- *Global orientation and emotionally uninhibited:* Technology, especially the Internet, facilitates the ability of the Net-generation to talk with others around the world. Net-geners find it easier to expose their inner thoughts online and the anonymity of the Internet allows them to reveal their feelings as much as they like. E-mail and chat rooms provide opportunities for this generation to exchange ideas with others without regard to ethnic or geographical boundaries. Netters have grown up understanding the need for interconnectivity to the worldwide community. And they have been connected globally via the Internet.
- *Right to information and learning:* With strong belief in equal opportunity, Netters are strong advocates of lifelong learning. They believe that access to information and the expression of opinions are fundamental rights. They understand that they need to update and maintain their training at cutting edge to ensure their employability. More than previous generations, they accept and recognize that they will go through

numerous job changes and perhaps five to eight different careers in their lifetimes—aided by distance learning. This generation desires a good education. The right to privacy and the right to speak out are equally important.

- *Technology savvy:* Net-geners possess a keen sense of being innovative and investigative. They have a passionate interest in how technology works. Net-geners want options. Accustomed to years of TV channel surfing and Internet surfing, they expect a world of almost limitless choices. They value independence and are intellectually open to new ideas through access to the Internet. They are incredibly innovative about their use of the Net, and love its immediacy. To them, prime time is anytime. They control their “programming” agenda. The emphasis is no longer on the delivery of information and entertainment, but on the search—which they control.
- *Preoccupied with maturity and adulthood:* The Net-generation is a generation deeply preoccupied with maturity. This preoccupation is rooted in a desire to be treated like an adult by adults and judged based on what you can contribute rather than how old you are. This generation also resents that their ideas and activities are often suspect because they are young and inexperienced.

In light of this conceptualization, this study seeks an in-depth understanding of the psycho-graphic profile rather than the demographic characteristics of the Net-geners.<sup>1,20</sup> Past research have used value systems and lifestyle concepts as predictors of mass media habits.<sup>21-25</sup> Being a popular medium for the Net-generation, it is important for this exploratory study to examine the psychology of the Net-generation, particularly their attributes, their values, and media habits in predicting their problematic use of the Internet.<sup>26</sup>

*Seductive properties of the internet.* In addition to Net-generation attributes, another aspect receiving attention in this study in predicting Internet addiction among the Net-geners is the seductive properties of the Internet experienced by this cohort. Turkle suggested two dimensions worthy of consideration that may captivate the Net-Generation: (1) the pleasure of control (i.e., the pleasure of being able to control the simulated world inside the computer, such as in video games or online games) and (2) the perceived fluidity of identity in online life (i.e., the anonymous nature of chat rooms and ICQ, which allows participants to disguise their true identity in their interaction).<sup>27,28</sup> Past research has

demonstrated that there are indeed some very compelling psychological spaces on the Internet beyond the two most common activities people pursue—e-mail exchanges and web surfing that occupy much of the online time. These activities are not generally the ones that grab the Net-geners like the way the seductive interactive games and ICQ on the Internet. For Net-geners whose real lives are troubled by low self-esteem, boredom, lack of social support, or unsatisfactory personal relations, they may find excitement, intimacy, friendship, and respect in the synchronous communication environment such as online games, chat rooms, and MUDs.

Turkle explained why game players have a hypnotic fascination with video games.<sup>26</sup> She pointed out that “television is something you watch, but video games are something you do, something you do with your head, a world that you enter, and, to a certain extent, they are something you ‘become’.” The object of video game designers has been to search for ways to capture the attention and the imagination of the players. The major appeal of interactive games is that players are being able to extend their mind and to control the artificial world inside the computer. This pleasure of control is the holding power that draws out behavior that in extreme cases looks like an addiction. This holding power provokes repeat behavior that is rewarded. This fundamental psychological process may help explain why synchronous Internet environment can be so seductive. The reward that attracts so many Net-geners to online games, in a social setting, is because of “the recognition and attention from the unknown and potentially idealized others, all in the context of faceless and anonymous interaction in which your persona is under your control.”<sup>29</sup>

MUDs, a text-based virtual reality game on the Internet, use screen graphics or icons to communicate with each other directly in real time by typing messages that other players can see. In MUDs, players immerse themselves in a world of words, without using sophisticated hardware, in which each player makes scenes and drama advance and becomes the author of the story. You can be whoever you want to be. You can completely redefine yourself, can be the opposite sex and talkative. MUDs are interactive, the explicit task is to construct a viable mask or persona that can be as close to your real self as you choose. According to Turkle, the “self” represented in MUD is decentralized, ongoing, anonymous, invisible, and multiplied.<sup>30</sup> As a result, unparalleled opportunity to play with one’s

identity and to “try out” new ones is possible. In fact, MUDs make possible the construction of an identity that is so “fluid” and “multiple” that we can live through the electronic self-representations with unlimited identities.<sup>29</sup> Similar to MUDs, a more novel and compelling discourse on ICQ also possess these special properties of fluid identity, allowing anonymous persona, being invisible, multiple, and sometimes ongoing for the Net-generation. These qualities are at the root of the holding power of fluid identity and evocative potential of MUDs or ICQ.

Wallace suggested that some psychological spaces of the Internet might be so attractive, so absorbing, that they may lead people into very heavy use, even compulsive overuse.<sup>28</sup> Scholars began to accept the notion that certain features of the Internet activities can cause behavioral patterns to flourish. Young found that addictive Internet use shared characteristics with pathological gambling.<sup>4</sup> But what is it about the Internet that draws out behavior that in extreme cases looks like an addiction? This study examines two specific seductive properties of the Internet, namely the pleasure of control and the sensation in the fluidity of identity, and their relationships to Internet addiction among the Net-geners.

Grounded in these conceptual frameworks, this exploratory study seeks to expand previous research by addressing the following research questions:

- RQ<sub>1</sub>: In what way do Net-geners addicted to the Internet differ from the non-addicted in terms of demographics and Internet usage pattern?
- RQ<sub>2</sub>: How can Internet addiction, Net-generation attributes, seductive properties of the Internet, and demographics predict online activities among the Net-geners?
- RQ<sub>3</sub>: What are the relative influences of Net-generation attributes, seductive properties of the Internet, online activities, Internet usage pattern, mass media use, and demographics on Net-geners’ Internet addiction?

## MATERIALS AND METHODS

### *Sample and procedures*

Data for this study were collected from a telephone survey with a probability sample of 976 Net-geners in Hong Kong. Telephone numbers were

drawn from the most recent edition of the territory telephone directory by first selecting randomly a page, then selecting randomly a column within the page, and finally selecting randomly a name with a phone number in the column. All of the calls were made from a central location during the evening hours with close supervision by trained advanced undergraduates at the Survey Research Laboratory using its Computer-Assisted Telephone Interviewing (CATI) system. Non-eligible respondents (i.e., younger than 16 and older than 24), nonworking numbers, and numbers that were not answered after five attempts were excluded. In addition, eligible respondents were all PC users and have access to the Internet at home. The survey instrument was pilot tested before actual fieldwork, which ran between June 11 and 22, 2001. The response rate was 71.6% with a total of 699 complete interviews. The sample consisted of 50.5% male, averaged 19.8 years in age ( $SD = 2.75$ ). Over half of all respondents (51.2%) had median annual household income of less than \$46,154. About 6% did not complete high school, 41.5% were high school graduates, 30.4% were university graduates, and less than 1% with a postgraduate degree.

#### *Questionnaire and measurement scales*

The questionnaire comprised of questions concerning seven aspects of the Net-generation and Internet use. They were: (1) Internet addiction, (2) Net-generation attributes, (3) perceived seductive properties of the Internet, (4) online activities, (5) Internet usage pattern, (6) mass media use, and (7) demographics of respondents.

*Internet addiction.* Internet addiction was measured using Young's<sup>17</sup> screening instrument for addictive Internet use. Respondents were considered "addicted" when answering "yes" to five (or more) of the eight "yes" or "no" questions. Questions included the following: (1) Do you experience a tolerance in that you have a need for increased amounts of Internet use to achieve the desired effect? (2) Do you find there is a diminished effect with continued use of the same time spent on the Internet? (3) Do you spend longer periods of time on the Internet than you intended? (4) Do you spend a great deal of time in activities to stay online longer? (5) Have you given up any social, occupational, or recreational activities because of the Internet? (6) Have you continued to use the Internet despite knowledge of having a persistent or recurrent problem that is likely to have been caused or exac-

erbated by the Internet (e.g., work-related problems, academic problems, financial problems, or family problems)? (7) Have you made unsuccessful attempts to cut down how much time you spend online? and (8) Do you have a lack of desire to cut down on the amount of time you spend online? Responses were coded 1 meaning "yes" to the question and 0 meaning "no." A composite Internet addiction index was constructed with data ranging from 0 to 8. Young stated that the cut off score of "five" was consistent with the number of criteria used for pathological gambling and was seen as an adequate number of criteria to differentiate normal from pathological addictive Internet use.<sup>2,3</sup>

*Net-generation attributes.* To assess Net-generation attributes, respondents were asked to rank their agreement with a series of 26 statements reflecting the characteristics of the Net-generation adopted from the literature.<sup>11,39,40</sup> At the start, 43 statements were gathered reflecting Net-generation as being fierce, independent, self-reliant and assertive, uninhibited emotionally, intellectually open, inclusive, having belief in free expression and their right to information, technology savvy, preoccupied with maturity and adulthood, immediate, and globally oriented. The pre-test eliminated 17 items. A five-point Likert scale was used in rating 26 attribute items, namely "1" means "strongly disagree" and "5" "strongly agree" with statements characterizing the traits of the Net-generation. A principal components factor analysis with varimax rotation yielded four factors with eigenvalue greater than 1.0, explaining 42% of the variance (Table 1).

The first factor was "right to information," which consisted of six items reflecting how Net-geners believe in equal opportunities, responsibility to educate themselves, fundamental rights to information access, expression of opinions, and in privacy. This factor had an eigenvalue of 5.74 and explained 22.06% of the total variance. The reliability of these six items as indicated by Cronbach's alpha was high at 0.80. "Uninhibited on the Net" was the second factor (eigenvalue = 2.49, 9.56% of variance,  $\alpha = 0.70$ ). It included seven items characterizing that Net-geners find the Internet a comfortable place to reveal their feelings, to meet new people, and to sample different cultures. Net-geners find it safe and easy to expose their inner thoughts and express their views freely on the Net. "Technology savvy" was the third factor (eigenvalue = 1.35, 5.19% of variance,  $\alpha = 0.71$ ). It consisted of six items illustrating how Net-geners consider themselves modern,

TABLE 1. FACTOR ANALYSIS FOR NET-GENERATION ATTRIBUTE ITEMS (N = 699)

	Mean	SD	Factors			
			1	2	3	4
<i>Right to Information</i>						
1. I believe in equal opportunity for everyone, no matter what race or gender they are	4.13	0.99	0.74			
2. I have the freedom and responsibility to educate myself	3.91	0.92	0.71			
3. Access to information and the expression of opinion are fundamental rights	3.94	0.94	0.71			
4. I am willing to learn new ideas	3.78	0.93	0.64			
5. No one has the right to hide information from me or invade my privacy	3.91	1.03	0.64			
6. I believe that I am open to other culture	3.74	0.93	0.62			
<i>Uninhibited on the Net</i>						
7. I find it easier to expose my inner thoughts online	3.12	1.11		0.66		
8. The anonymity of the Internet allows me to reveal my feelings as much as I like	3.34	1.16		0.58		
9. I like chat rooms because comments can be immediately posted for everyone to see	3.02	1.07		0.57		
10. I find the Internet a more comfortable place for me to freely express my view	3.45	1.01		0.55		
11. The Internet will be a boring place if no one revealed any of their personality, or their life	3.15	1.16		0.52		
12. I often talk about myself on the Internet	2.75	1.08		0.47		
13. Internet provides a wonderful opportunity to meet new people and sample different culture	3.76	1.02	0.41	0.46		
<i>Technology Savvy</i>						
14. I am interested in how mechanical things, such as engines, work	3.06	1.14			0.67	
15. I am willing to explore new technologies	3.58	0.97			0.63	
16. I like to create my own web-age	3.18	1.21			0.56	
17. I consider myself a modern person who is usually up-to-date on new technologies	3.47	0.94			0.54	
18. I like to keep up with new technologies	3.70	0.97	0.46		0.52	
19. The Internet allows me to see a much greater range of ideas, opinions, and arguments	3.35	0.96	0.36		0.40	
<i>Adulthood and Confidence</i>						
20. I like to be treated as adults by adults	3.19	1.00				0.54
21. I have more ability than most people	3.09	0.88				0.52
22. I started using the Net and learning about computers, and everyone thinks I'm smart now	2.92	0.99				0.51
23. My generation can change the world and make a big impact	3.38	1.01				0.47
24. Immediate gratification is what my generation expects	3.39	0.95				0.45
25. Whenever I call adults, they do not take me seriously	2.67	1.05		0.35		0.42
26. I resent that my ideas and activities are often suspect because I am young and inexperienced	3.45	1.11	0.33			0.40
Eigenvalue			5.74	2.49	1.35	1.23
Variance explained (%)			22.06	9.56	5.19	4.74
Cronbach's alpha			0.80	0.70	0.71	0.55

Response categories: 1 = strongly disagree; 2 = disagree; 3 = neutral or undecided, 4 = agree; 5 = strongly agree.

up-to-date, and like to keep up with new ideas and opinions. The fourth factor, "adulthood and confidence" (eigenvalue = 1.23, 4.74% variance,  $\alpha = 0.55$ ), contained seven items indicating that Net-geners are confident in their ability, want to be treated as adults by adults, and resent their ideas and activities being questioned because of their age and inexperience.

As a whole, these four factors were conceptually consistent with the theoretical expectations described by Tapscott.<sup>11</sup> In sum, Net-Geners believe that through the availability of choice, they have the opportunity and fundamental rights to information access. Net-geners thrive on their immediate access to the world, and it is indicative of their culture's tolerance and reluctance to reject anything outright. They are also an emotionally uninhibited and innovative generation, with much confidence, and preoccupied with maturity and adulthood.

*Perceived seductive properties of the Internet.* Respondents were further asked to rank their agreement with a series of eight perceived characteristics describing the seductive properties of the Internet (Table 2). Exploratory factor analysis yielded the following two factors: "pleasure of control" and "fluidity of identity in online life." These two factors were

conceptually consistent with the theoretical expectations discussed in the literature review. The Cronbach's Alpha was 0.71 and 0.67, respectively.

*Online activities.* Online activities were measured by asking how often they use a wide-range of popular Internet activities among the Net-generation, namely e-mailing, chatting on ICQ, surfing the World Wide Web, playing online games, participating in online forum and bulletin board, reading online news, online magazine, online newspaper, lifestyle information, and using the Internet to do home banking/investing, paying bills or taxes, and making purchases on books and tickets. A five-point scale was used where 1 = "never," 2 = "once every few weeks," 3 = "1-2 days per week," 4 = "3-5 days per week," and 5 = "every day." A factor analysis of these Internet activities yielded the following clusters of Internet services: marketing-oriented services ( $\alpha = 0.74$ ), information-oriented services ( $\alpha = 0.73$ ), social interaction-oriented services ( $\alpha = 0.71$ ), communication-oriented services ( $\alpha = 0.49$ ), and utilities-oriented services ( $\alpha = 0.57$ ). Items, factor loadings, means, and standard deviation are listed for each Internet activity in Table 3. Because of the low reliability obtained for both communication-oriented and utilities-oriented ser-

TABLE 2. FACTOR ANALYSIS FOR PERCEIVED SEDUCTIVE PROPERTIES OF THE INTERNET ( $N = 699$ )

	Mean	SD	Factors	
			1	2
<i>Pleasure of Control</i>				
1. Playing interactive games is stimulating	2.94	1.22	0.74	
2. The computer provokes self-reflection, extends my mind into the artificial world	3.18	1.12	0.72	
3. I am drawn by the appeal of being able to control the world inside the computer	2.96	1.19	0.69	
4. The interactive quality of the computer makes it seem as though the computer responds to my every move	3.12	1.01	0.66	
<i>Fluidity of Identity in Online Life</i>				
5. The computer offers an illusion of companionship without the demand of friendship	2.58	1.12		0.72
6. The ability to allow me to present a different persona when chatting on ICQ fascinates me	2.47	1.18		0.72
7. The use of the Internet allows me to be taken seriously and listened to	2.44	1.02		0.68
8. It gives people feelings of status and modernity, which may bolster self-esteem	2.56	1.10		0.61
Eigenvalue			3.17	1.02
Variance explained (%)			39.65	12.73
Cronbach's alpha			0.71	0.67

Scale used: 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree.

TABLE 3. FACTOR ANALYSIS FOR ONLINE ACTIVITIES (N = 699)

	Mean	SD	Factors				
			1	2	3	4	5
<i>Marketing-oriented services</i>							
1. Home banking & investing	1.42	0.94	0.79				
2. Auto-pay of utility bills or taxes	1.40	0.90	0.71				
3. Entertainment ticket booking and sales	1.40	0.86	0.59				
4. Financial news	1.67	1.21	0.57	0.41			
<i>Information-oriented services</i>							
5. Online newspaper	2.36	1.50		0.66			
6. Sports news	2.61	1.33		0.65			
7. Online magazine	3.23	1.52		0.64			
8. Lifestyle information	3.05	1.35		0.58			
<i>Social interaction oriented services</i>							
9. Online forum	2.26	1.53			0.69		
10. Online games	2.35	1.44			0.66		
11. Online bulletin board	2.14	1.30			0.66		
12. Software exchange	2.81	1.32			0.43		
<i>Communication-oriented services</i>							
13. General web surfing	4.16	1.06				0.69	
14. E-mail	3.95	1.22				0.64	
15. ICQ chat	3.72	1.50			0.42	0.59	
<i>Utilities-oriented services</i>							
16. Library search	2.11	1.24					0.79
17. Educational resources	2.46	1.26					0.74
Eigenvalue			3.55	1.86	1.49	1.11	1.04
Variance explained (%)			20.86	10.92	8.76	6.53	6.12
Cronbach's alpha			0.74	0.73	0.71	0.49	0.57

Scale used: 1 = never; 2 = once every few weeks; 3 = 1–2 days per week; 4 = 3–5 days per week; 5 = everyday.

vices clusters, they were omitted for further analysis. However, as e-mailing, web surfing, and ICQ were three of the most popular Internet services for the Net-geners, they were used as individual online activities (i.e., a single item dependent variable).

*Internet usage pattern.* Internet usage pattern was measured by asking respondents (1) the number of months they have been using the Internet; (2) average number of hours they use the Internet on a typical day; (3) how often they use the Net to do e-mail, surf the WWW, read online news, play online games, and chat on ICQ on a typical day using 1 = "less than 15 min," 2 = "15–30 min," 3 = "31–59 min," 4 = "1–2 h," 5 = "3–4 h," 6 = "5–6 h," 7 = "more than 6 h;" (4) whether they subscribed to broadband service (yes = 1); and (5) the amount they spend each month using online services.

*Mass media use.* Four mass media variables were included in the analyses: use of newspaper, magazines, TV viewing, and radio listening. Newspaper and magazine reading were measured in days per week while TV and radio exposure were measured in minutes per day.

*Demographics.* Social demographic variables were included in the present study as control variables: gender (male = 1), age, education (highest level of formal schooling), and household income.

## RESULTS

### *Profiles of the Internet-addicted Net-geners*

According to Young's definition of Internet addiction,<sup>17</sup> which requires respondents to answer five (or more) of the eight "yes" or "no" questions

for addictive Internet use, data showed that only 37.9% of the 699 Net-geners in our sample can be classified as Internet addicts ( $M = 4.01$ ,  $SD = 1.87$ ).

To examine how the Internet addicted differed from the non-addicted, a canonical discriminant analysis was run. Variables in the equation included demographics and Internet usage pattern. The goal was to test the discriminating effects of these predictors and to seek a multidimensional profile of the Internet addicts. The overall analysis was significant ( $p < 0.001$ ; Wilk's lambda = 0.94). More than 62% of the cases were correctly classified. Structure coefficients for the Internet addicted are shown in Table 4. Results suggest that Net-geners addicted to the Internet were distinguished by a younger age, being a student, and spent much more time on the Internet daily than the non-addicted. More specifically, the Internet addicted are

about 0.8 year younger ( $t = 3.64$ ,  $p < 0.001$ ) and spend about 1.1 hours a day more on the Internet ( $t = -4.39$ ,  $p < 0.001$ ) than the non-addicted. On average, addicted Net-geners spend 34.8 h a week on the Internet while the non-addicted spend 27.1 h. The 34.8 h per week is in line with Young's finding with a striking average of 38.5 h per week spent online for the dependents.<sup>2,3</sup> However, the 27.1 h for the non-addicted Net-geners found in this study may seem high, as compared to 4.9 h for the non-dependent general Internet users reported by Young. Nevertheless, unlike any other, Internet is the medium of choice for the Net-generation. This new generation is at the heart of a new youth culture treating the Internet as a companion, where in profound and fundamental ways, they learn, work, play, communicate, shop, and create communities very differently than their parents.<sup>11,31</sup> In addition, the majority of the addicted were students (69%) as compared to the non-addicted.

TABLE 4. DISCRIMINANT ANALYSIS OF THE INTERNET ADDICTED WITH DEMOGRAPHICS AND INTERNET USAGE PATTERN PREDICTORS<sup>a</sup> ( $N = 699$ )

Predictors	Structure coefficients
<i>Demographics</i>	
Gender (male = 1)	-0.29
Age	-0.56***
Education	-0.15
Household monthly income	0.22
Student (yes = 1)	0.55***
<i>Internet usage pattern</i>	
Web experience (in years)	-0.20
Hours spent on web per day (excluding work) <sup>b</sup>	0.72***
Broadband (yes = 1)	-0.06
Internet access charge <sup>c</sup>	-0.12
Eigenvalue	0.06
Canonical correlation	0.24
Degree of freedom	10.00
Wilks' Lambda	0.94
Significance	$p < 0.001$
<i>Group centroids</i>	
Addicted Net-geners	-0.20
Non-addicted Net-geners	0.31
Cases correctly classified	62.40%

<sup>a</sup>Internet addicted was dummy coded 1; else = 0.

<sup>b</sup>Hours spend on the Web a day (excluding work) was coded with 1 = less than 15 min; 2 = 15–30 min; 3 = 31–59 min; 4 = 1–2 h; 5 = 3–4 h; 6 = 5–6 h; 7 = more than 6 h.

<sup>c</sup>Internet access charge was coded 1 = free; 2 = less than \$100 a month; 3 = \$100–\$150; 4 = \$151–\$200; and 5 = \$201 or above.

#### *Predicting online activities*

To assess how Internet addiction, Net-generation attributes, seductive properties of the Internet, Internet usage pattern, mass media use, and demographics can predict online activities, six simple regression analyses were conducted. Results in Table 5 show that market-oriented activities were significantly predicted by age ( $\beta = 0.16$ ,  $p < 0.05$ ), education ( $\beta = 0.16$ ,  $p < 0.01$ ), being technology savvy ( $\beta = 0.15$ ,  $p < 0.001$ ), not being a student ( $\beta = -0.15$ ,  $p < 0.01$ ), fluidity of identity ( $\beta = 0.10$ ,  $p < 0.05$ ), adulthood and confidence ( $\beta = 0.09$ ,  $p < 0.05$ ), and right to information ( $\beta = -0.07$ ,  $p < 0.05$ ). No significant relationships were found between Internet addiction and the use of marketing-oriented services. This result indicates that heavy users of marketing oriented services online, such as home banking, paying bills and purchasing tickets online, are those who are innovative, educated, older Net-geners preoccupied with maturity and usually not a student. Also, these heavy users are attracted very much by the ability of the Internet to allow different persona, but do not believe in the right to information. These seven significant predictors explained 20% of the variance.

Results also show that female ( $\beta = -0.22$ ,  $p < 0.001$ ), older ( $\beta = 0.13$ ,  $p < 0.05$ ), and highly educated Net-geners ( $\beta = 0.12$ ,  $p < 0.05$ ) are those who seek information regularly on the Internet through reading online newspaper, magazine, sports, and lifestyle information. However, these Net-geners are usually not Internet addicts and their information seeking behavior is not affected by the proper-

TABLE 5. REGRESSION TESTING INTERNET ADDICTION, NET-GENERATION ATTRIBUTES, SEDUCTIVE PROPERTIES OF THE INTERNET, AND DEMOGRAPHICS AS PREDICTORS OF ONLINE ACTIVITIES

Predictor variables	Marketing-activities		Information activities		Social-interaction oriented activities		Communication-oriented activities		ICQ $\beta$
	$\beta$		$\beta$		$\beta$		$\beta$		
<i>Internet addiction</i>	<i>n.s.</i>		<i>n.s.</i>		<i>n.s.</i>		<i>n.s.</i>		0.13**
<i>Net-generation attributes</i>									
Right to information	-0.07*		<i>n.s.</i>		-0.09*		0.17***		<i>n.s.</i>
Uninhibited on the Net	<i>n.s.</i>		<i>n.s.</i>		0.12**		<i>n.s.</i>		0.15**
Technology savvy	0.15**		<i>n.s.</i>		0.10*		0.08#		<i>n.s.</i>
Adulthood and confidence	0.09*		<i>n.s.</i>		<i>n.s.</i>		<i>n.s.</i>		<i>n.s.</i>
<i>Seductive properties of the Internet</i>									
Pleasure of control	<i>n.s.</i>		<i>n.s.</i>		0.27***		<i>n.s.</i>		0.08#
Fluidity of identity in online life	0.10*		<i>n.s.</i>		0.22***		<i>n.s.</i>		0.11*
<i>Demographics</i>									
Gender (male = 1)	<i>n.s.</i>		-0.22***		-0.08*		-0.11**		<i>n.s.</i>
Age	0.16*		0.13*		-0.18**		<i>n.s.</i>		-0.21**
Education	0.16**		0.12*		<i>n.s.</i>		0.14**		0.10*
Household income	<i>n.s.</i>		<i>n.s.</i>		<i>n.s.</i>		<i>n.s.</i>		<i>n.s.</i>
Student (yes=1)	-0.15**		<i>n.s.</i>		<i>n.s.</i>		0.11*		<i>n.s.</i>
$R^2$	0.20		0.10		0.30		0.08		0.14
Final adjusted $R^2$	0.19		0.08		0.28		0.06		0.12

Figures are standardized beta coefficients.

# $p \leq 0.1$ ; \* $p \leq 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p \leq 0.001$ ;  $n = 699$ .

ties of the Internet. Also, as information seeking is the most widely adopted activity on the Internet, no specific Net-generation cohort was found to be associated with information-oriented services. The information-oriented services regression equation explained 10% of the variance.

Social interaction oriented services were predicted by pleasure of control ( $\beta = 0.27, p < 0.001$ ), fluidity of identity ( $\beta = 0.22, p < 0.001$ ), age ( $\beta = -0.18, p < 0.01$ ), uninhibited on the Net ( $\beta = 0.12, p < 0.01$ ), technology savvy ( $\beta = 0.10, p < 0.05$ ), right to information ( $\beta = -0.09, p < 0.01$ ), and gender ( $\beta = -0.08, p < 0.05$ ). This result suggests that Net-geners, who spend much time on the Internet interacting with others through online games, online forums, or bulletin boards, are largely seduced by the unyielding sensation of being able to control the computer in games and the fluid nature of the Internet to allow different personas online. Those who interact heavily on the Net are usually young, emotionally open, technology savvy, demands less of their right to information, and generally female. However, contrary to our expectation, heavy users of social interaction-oriented services do not exhibit addictive symptoms on the Net. A total of 30% of the variance were accounted for in this equation.

Regression results further show that intense or serious web surfers are usually highly educated female students ( $\beta = 0.14, p < 0.01$ ;  $\beta = -0.11, p < 0.01$ ; and  $\beta = 0.11, p < 0.05$ , respectively) who believe firmly on the right to information ( $\beta = 0.17, p < 0.001$ ). Similarly, heavy e-mail users are also highly educated ( $\beta = 0.24, p < 0.001$ ) and older Net-geners ( $\beta = 0.16, p < 0.05$ ), who are technology savvy ( $\beta = 0.10, p < 0.05$ ). Finally, as expected, heavy ICQ users are usually young Net-geners ( $\beta = -0.21, p < 0.01$ ), highly educated ( $\beta = 0.22, p < 0.001$ ), uninhibited emotionally on the Net ( $\beta = 0.15, p < 0.01$ ), and attracted fiercely by the fluid nature of the Internet to be in other persona ( $\beta = 0.08, p < 0.05$ ). Most important, heavy users of ICQ usually exhibit Internet addiction symptoms, but not for general web-surfing nor e-mail activities. The regression equations explained 8%, 14%, and 14%, respectively, for the three popular communication-oriented services.

In sum, Net-Generation attributes and perceived seductive properties of the Internet were two important concepts contributed significantly in explaining why Net-geners were active in online activities.

#### *Predicting Internet addiction*

Finally, to compare the relative influence of Net-generation attributes, seductive properties of the

Internet, online activities, Internet usage pattern, mass media use, and demographics on Internet addiction, a hierarchical regression analysis was run. Result in Table 6 show that uninhibited on the Net was the only significant predictor ( $\beta = 0.18, p < 0.001$ ) under the Net-generation attributes block. This indicates that Net-geners addicted to the Internet are generally emotionally open and find the Internet a place easier for them to express their inner thoughts. This block alone explained 7% of the variance. When seductive properties of the Internet were entered into the equation next, pleasure of control, as expected, turned out to be a strong predictor ( $\beta = 0.16, p < 0.01$ ), demonstrating that addicted Net-geners found interactive online games stimulating as they could extend their mind into the artificial world. This block contributed an additional 2% in explaining the variance of Internet addiction. In the next step, the five online activities measuring the effects of different Internet services were entered. Use of ICQ was the only significant predictor with a moderate size beta ( $\beta = 0.16, p < 0.001$ ). This third block accounted for an additional 3% of variance, indicating the important influence of the addictive nature of online chat such as ICQ on Internet addiction. The next block of variables entered were Internet usage pattern. However, no significant predictor was found indicating that Internet addicts may not be long time users, frequent users, broadband users, or spending a lot on connect time. Use of mass media was entered next into the fifth block. Only TV viewing was found a negative but significant predictor ( $\beta = -0.12, p < 0.01$ ), illustrating a possible displacement effect of the Internet on TV watching. This block accounted for an additional 1% of the variance. Finally, demographic variables were entered last into the equation. Gender ( $\beta = -0.14, p < 0.01$ ) and student ( $\beta = 0.12, p < 0.05$ ) were both significant. This shows that Net-geners addicted to the Internet are most likely female students. The equation explained 16 percent of the variance in total.

Based on the changes in *R* squares shown in Table 6, the results concerning the relative influences on Internet addiction can be summarized as follows: Net-generation attributes, especially uninhibited on the Net, were the most influential; while the influence of online activities, particularly the use of ICQ, was of secondary importance. These two blocks accounted for almost two-thirds of the variance (10%). Demographics were the third block as influential predictors, followed by seductive properties of the Internet. These two blocks accounted for approximately one-third of the remaining variance (5%). Thus, a hierarchy of relative

TABLE 6. HIERARCHICAL REGRESSION TESTING NET-GENERATION ATTRIBUTES, SEDUCTIVE PROPERTIES OF THE INTERNET, ONLINE ACTIVITIES, INTERNET USAGE PATTERN, MEDIA USE, AND DEMOGRAPHICS AS PREDICTORS OF INTERNET ADDICTION

Predictor variables	Internet addiction		
	Simple <i>r</i>	$\beta$	
<i>Attributes of Net-generation</i>			
Right to information	<i>n.s.</i>	<i>n.s.</i>	
Uninhibited on the Net	0.22***	0.17***	
Technology savvy	<i>n.s.</i>	<i>n.s.</i>	
Adulthood and confidence	0.09*	<i>n.s.</i>	
$\Delta R^2$			0.07
<i>Seductive properties of the Internet</i>			
Pleasure of control	0.20***	0.12*	
Fluidity of identity in online life	0.09*	<i>n.s.</i>	
$\Delta R^2$			0.02
<i>Online activities</i>			
Marketing oriented services	<i>n.s.</i>	<i>n.s.</i>	
Information oriented services	<i>n.s.</i>	<i>n.s.</i>	
Social interaction oriented services	0.16***	<i>n.s.</i>	
Web surfing	<i>n.s.</i>	<i>n.s.</i>	
e-mail	<i>n.s.</i>	<i>n.s.</i>	
ICQ	0.12**	0.16***	
$\Delta R^2$			0.03
<i>Internet usage pattern</i>			
Web experience (in years)	-0.02	<i>n.s.</i>	
Hours on Web per day	0.18***	0.11*	
Broadband (yes = 1)	<i>n.s.</i>	<i>n.s.</i>	
Internet access charge	<i>n.s.</i>	<i>n.s.</i>	
$\Delta R^2$			0.00
<i>Media Use</i>			
Newspaper reading	<i>n.s.</i>	<i>n.s.</i>	
Magazine reading	<i>n.s.</i>	<i>n.s.</i>	
TV viewing	<i>n.s.</i>	-0.13**	
Radio listening	<i>n.s.</i>	<i>n.s.</i>	
$\Delta R^2$			0.01
<i>Demographics</i>			
Gender (male = 1)	-0.08*	-0.14**	
Age	-0.11**	<i>n.s.</i>	
Education	<i>n.s.</i>	<i>n.s.</i>	
Household income	<i>n.s.</i>	<i>n.s.</i>	
Student (yes = 1)	0.14***	0.10*	
$\Delta R^2$			0.03
$R^2$			0.16
Total adjusted $R^2$			0.15

Figures are standardized beta coefficients from final regression equation with all blocks of variables included for the entire sample. # $p \leq 0.1$ ; \* $p \leq 0.05$ ; \*\* $p \leq 0.01$ ; \*\*\* $p \leq 0.001$ ;  $n = 699$ .

influences surfaces. The influences from the characteristics of the Net-generation, (i.e., being emotionally open) and the attraction of a mediated communication channel called ICQ, allowing Net-geners to express freely on the Internet, far outweigh that of the demographics and properties of the technology on Internet addiction.

## DISCUSSION

Based on the empirical findings, this study has reached several conclusions. First, consistent with past research on Internet addiction,<sup>6,27,32</sup> discriminant function confirms that demographic characteristics are useful predictors in differentiating Internet addicts and non-addicts. Addicted Net-geners tend to be young female students. In the past, research have profiled the Internet addicted individual as a predominantly young, introverted, computer-oriented,<sup>6</sup> and a socially unskilled male teenager who has little or no social life and/or self-confidence.<sup>27</sup> Students are considered high-risk for problematic use of the Internet because of ready access and flexible time schedule.<sup>30</sup> However, the lack of significance in other demographic variables to differentiate the addicts and non-addicts seems to support Young's claim that problematic Internet use could occur in any social, educational, or economic group.<sup>2</sup> In fact, the insignificant differences in education and socio-economics among excessive Internet users in this study may be due to increasing ease-of-use for computer technologies and decreasing costs for computers and Internet services.<sup>33</sup> As Internet technologies become more and more accessible and diverse, any unique demographic characteristics of Internet behavioral disorder are likely to disappear. Thus, this finding supports the need for formulation of problem deterrence policies to prevent excessive non-productive use of the Internet for all students.

Second, as expected in Internet usage pattern, this study finds that Internet addicts are usually heavy users of the Internet regardless how long they have been a user. However, this finding is inconsistent with Young's claim that new users are more vulnerable to pathological Internet use as she reported a total of 83% of the participants who had been classified as addicted to the Internet had been online for less than 1 year.<sup>4</sup> Specifically, Net-geners addicted to the Internet in this study were not those who are new online. In fact, no significant difference in Net experience was found between the addicted Net-geners, who averaged 2.64 years online

experience, and the non-addicted at 2.75 years. Moreover, although previous studies reported that weekly Internet use increased in direct proportion to access and to high-speed capacity,<sup>34,35</sup> the use of broadband and the amount spend on Internet access per month did not appear to have a significant impact on addiction despite the decreasing cost of the Internet services in recent years.

Third, with the exception of ICQ use, Internet addiction was not a significant predictor for online activities while Net-generation attributes were. In particular, Net-geners reported more use of marketing and social-interaction oriented activities and e-mailing when they are innovative or technological savvy individuals. Similarly, when Net-geners do not have a strong belief in the right to information, they tend to be active in marketing and social interaction functions such as online banking, bill-paying, online forum, and bulletin boards. However, when they are strong believers in the right to information, they tend to surf the Web regularly to gratify their information needs. These findings reinforce Net-geners' profound attitude in fundamental right to free flow of information and expression of opinions regardless of race, gender, and culture. As expected, Net-geners, who carried out a lot of marketing-oriented services such as home banking, bills paying, tickets purchasing and booking, are pre-occupied with adulthood and maturity. Furthermore, emotionally open Net-geners find the Internet a comfortable place to express their feelings online such as using ICQ, online forums, or online games. As such, these revealing findings support that Net-geners are up-to-date with technology and fashion, like to be treated as adults by adults, uninhibited on the Net, and are strongly principled individuals in the right to information access, who engage themselves differently in various online activities. As a whole, being "technology savvy" and having strong principles in "information right" are more potent factors in predicting online activities for the Net generation than others like "uninhibited on the Net" and pre-occupation with "adulthood" and being "confident." Nevertheless, it is also worthy to note that Internet addicts are usually attracted by two-way communication or social interaction activities such as ICQ.

Fourth, in addition to the impact of Net-generation attributes on online activities and the effect of Internet addiction on ICQ use, this study also supported the notion that the seductive power of the Internet is predictive of Internet use especially for social-interaction and communication activities, particularly ICQ. Results specifically showed that

Net-geners who use online forum, online games, online bulletin boards and ICQ heavily are those who are seduced by the pleasure of being able to control the simulated environment and the ability to make endless changes to their persona in the Internet. Rewards received, resulting from the recognition and attention from the potentially idealized others, may make the interactive gaming, debates, exchanges, even more compelling.<sup>28,36</sup> This indicates that the pleasure of being able to control in games and the enjoyment of in the exploration and the expression of multiple and fragmented identities in the process of recreating and obscuring some aspects of their true self on the Net, particularly in ICQ, are the primary driving forces in seducing the Net-generation.

Fifth, being emotionally opened on the Net and a heavy user of ICQ were most influential in predicting Net-geners' problematic use of the Internet. These two highly interrelated predictors explained two-thirds of the variance indicating that Internet addicted Net-geners, who obtained much affection and social bonding gratifications from ICQ use, are outgoing individuals and emotionally uninhibited on the Net. They find it easier, timely, comfortable, and even entertaining to care for others and to reveal their feelings freely online. Furthermore, results also show that the addicted Net-geners are also seduced by the pleasure of being able to control the simulated world in online games. The finding reinforces previous research that "dependents" of the Internet spend most of their time in the synchronous communication environment engaging in interactive online games, chat rooms, MUDS, and ICQ for pleasure-seeking or escape,<sup>37</sup> while nondependents use information-gathering functions available on the Internet, such as information protocols and the WWW.<sup>2</sup> For Net-geners whose lives are troubled by low self-esteem and lack of social support, once they developed the winning strategies and getting stronger at the games, the ultimate addictive power of the Internet will be when they are praised by other chatters and gamers with admiration and respect.

Finally, it is also interesting to note that Internet addicts tend to watch television significantly less. This seems to support the notion that Internet activities, particularly ICQ and interactive games, are having a displacement effect on traditional media use for the Net-generation. Furthermore, unlike previous research that Internet addicts are likely to be young male, it is important to point out that female students could be most vulnerable or equally at risk as they are easier to open themselves to oth-

ers in revealing their feelings and emotions on the Net. However, it is important to note that addictive use of the Internet for these purposes was associated with declines in participants' communication with family members in the household, declines in the size of their social circle, and increases in their depression and loneliness.<sup>38</sup> Furthermore, Internet has an addictive potential with harmful consequences that could silently run rampant in our schools, our universities, our offices, our libraries, and our homes.<sup>4</sup> Nevertheless, problematic use of the Internet or Internet addiction are not problems that can be solved by technology or policies alone. These are the new societal challenges that must be addressed through education. Only when parents and teachers recognize Internet addiction as a true disorder and offer ways to combat it can schools and parents start regaining the benefits certain applications of the Internet have unwittingly taken away.

Several limitations should be considered in this study: First, although using the eight clinical symptoms to assess Internet addiction seems parallel to the symptoms of substance abuse and dependency, it is a crude measure. Refinement is certainly needed. Second, accurate assessment of actual Internet use is difficult to determine because of underreporting of hours spent on the Internet, either because of denial or because of losing track of time while using.<sup>25</sup> A more accurate diary keeping method may be an alternative for future research. Third, the data were gathered from a random sample of youngsters in Hong Kong. Applications or generalization of the results from this study to other population may not be justified. Fourth, despite 26 Net-generation attributes items seem applicable in this study, the failure to include 17 other items from a list of 43 gathered in the literature may be explained by social and cultural differences between Hong Kong and the West.<sup>11,39,40</sup> Future research should consider attribute items developed locally to reflect the characteristics of the Net-generation for the native culture or a focused cross-cultural study on comparing differences in the distinct characteristics of the Net-generation between cultures. Fifth, the emerged attributes may not be unique for the Net-generation and non-Net-generation could also possess these attributes. Future studies should explore the similarities and differences in the applications of these attributes between the Net-Generation and other generations such as Generation-X, baby busters, and baby boomers. Lastly, identifying Net-generation attribute clusters using exploratory factor analysis is admittedly a weakness. Future re-

search should undergo more rigorous testing, such as using confirmatory factor analysis, with alternative solutions and interpretations to make predictions or to test the presence of a hypothesized structure in a different population.

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