



# Predictors of the initiation and persistence of Internet addiction among adolescents in Taiwan



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## HIGHLIGHTS

- Online activities predicted the initiation of Internet addiction.
- Lower school bonding predicted the initiation of Internet addiction.
- Depression and smoking predicted the initiation of Internet addiction.
- Depression and alcohol use predicted the persistence of Internet addiction.

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## ABSTRACT

**Purpose:** The present study examined the psychosocial factors associated with the initiation and persistence of Internet addiction among adolescents in Taiwan.

**Methods:** A total of 2315 students from 26 high schools were assessed in the 10th grade, with follow-up performed in the 11th grade, in Taipei, Taiwan. Self-administered questionnaires were collected in each year to assess the pattern of changes in Internet addiction and psychosocial factors.

**Results:** Of the 1602 students without an Internet addiction in the 10th grade, 253 (15.8%) had initiated Internet addiction by grade 11. Multivariate analysis results indicated that greater engagement in online activities (i.e., social network website use, online gaming), depression, and lower school bonding in grade 10 coupled with an increase in online activities, depression, and smoking from grades 10 to 11 predicted the initiation of Internet addiction. Of the 605 students with Internet addiction in the 10th grade, the addiction had persisted for 383 students (63.3%) in grade 11. An increase in the existence of depression and alcohol use from grades 10 to 11 predicted the persistence of Internet addiction.

**Conclusions:** Online activities, depression, and substance use were important predictors of youth initiation and of the persistence of Internet addiction.

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## 1. Introduction

With the exponential growth of information technology during the past decade, young people now spend more time in the cyber world. In Taiwan, adolescents spend 44 h per week on media, and the Internet is the leading medium that adolescents use (Wu, 2009). The percentage of households with Internet access increased from 54% in 2003 to 81% in 2012 in Taiwan (Taiwan Network Information center, 2012). The cyber world offers information and social networking opportunities, and also cyber risks such as cyberbullying, sexual solicitation, and Internet

addiction. Adolescents with Internet addiction are more likely to have various co-morbid psychiatric disorders (i.e., depression, anxiety, attention-deficit hyperactivity disorder, hostility, and social anxiety disorder) (Ko, Yen, Chen, Yeh, & Yen, 2009), interpersonal problems (Kuss, Griffiths, Karila, & Billieux, 2013; Seo, Kang, & Yom, 2009), aggressive behaviors (Ko, Yen, Liu, Huang, & Yen, 2009), self-injury (Lam, Peng, Mai, & Jing, 2009a), suicide ideation (Kim et al., 2006), insomnia (Cheung & Wong, 2011), inappropriate dietary behavior (Tsai et al., 2009), and substance use (Yen, Yen, Chen, Chen, & Ko, 2007).

Internet addiction is an emerging public health problem. The prevalence of youth Internet addiction varies widely across countries, with the prevalence in Asia placed at between 8% and 26% (Ko, Yen, Yen, Lin, & Yang, 2007; Shek & Yu, 2012) and the prevalence in Europe and the United States at between 2% and 8% (Weinstein & Lejoyeux, 2010).

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Despite wide variations in the instrument that is used for the diagnosis of Internet addiction, it is characterized by preoccupation, uncontrolled impulse, use that is more than intended, tolerance, withdrawal, impairment of control, devotion of excessive time and effort, and impaired decision-making (Karim & Chaudhri, 2012; Shaw & Black, 2008). However, there is consensus neither on a standardized definition nor on the diagnostic criteria for Internet addiction. Internet addiction disorder has not been recognized as a separate disorder by the American Psychiatric Association, while Internet gaming disorder has been included in Section III of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) to urge further investigation. Researchers have used differing terms to describe Internet addiction problems such as problematic Internet use, pathological Internet use, or compulsive Internet use.

Kuss and Griffiths reviewed 68 studies and found that Internet addiction was associated with sociodemographic factors, Internet use, psychosocial factors, and comorbid symptoms and disorders (Kuss et al., 2013). Studies have indicated that the risk factors that are associated with Internet addiction include the following: being male (Jang, Hwang, & Choi, 2008; Tsai et al., 2009), poor academic performance (Tsitsika et al., 2011), watching online pornography, online gambling (Siomos et al., 2012), online gaming (Ko et al., 2007; Seo et al., 2009), online chatting (Jang et al., 2008), smoking (Lee, Han, Kim, & Renshaw, 2013), alcohol use (J.Y. Yen, Ko, Yen, Chen, & Chen, 2009; Lam, Peng, Mai, & Jing, 2009b), hostility (Ko, Yen, Chen et al., 2009), poor social skills (Ghassemzadeh, Shahraray, & Moradi, 2008), loneliness (Bozoglan, Demirer, & Sahin, 2013), low self-esteem (Ghassemzadeh et al., 2008; Ko et al., 2007), depression (Jang et al., 2008; Ko, Yen, Chen et al., 2009), low parental monitoring (C.F. Yen, Ko, Yen, Chang, & Cheng, 2009; Lin, Lin, & Wu, 2009), low school bonding (C.F. Yen et al., 2009), deficient social support (Tsai et al., 2009), experience of stressful events (Lam et al., 2009b), and living in rural areas (C.F. Yen et al., 2009).

Youth and young people are more prone to use Internet excessively to garner social support from friends. A study found that youths being oriented toward having more online friends and preferring online communication were related to an increased risk of Internet addiction (Smahel, Brown, & Blinka, 2012). Other studies have found significant links between low levels of school connectedness (C.F. Yen et al., 2009) and academic performance decrement to Internet addiction by youth (Stavropoulos, Alexandraki, & Motti-Stefanidi, 2013; Tsitsika et al., 2011). In addition, studies have found that low family function (Ko et al., 2007; Tsitsika et al., 2011) and family dissatisfaction (Lam et al., 2009b) also were associated with Internet addiction among adolescents.

Despite studies that have documented the psychosocial factors associated with Internet addiction, there has been very little longitudinal research examining the risk factors of the initiation and persistence of youth Internet addiction. Taiwan residents tend to adopt information technology very quickly, which is common in Asian societies, particularly among the youth and young adults. The purpose of the present study was to assess the longitudinal predictors of the initiation and persistence of Internet addiction among senior high school students in Taiwan.

## 2. Methods

### 2.1. Participants

In 2010, a total of 72,327 high school students were enrolled in the 10th grade of 122 high schools (including vocational high schools) in Taipei City and New Taipei City, Taiwan. Based on the sampling frame, which was a list of schools and their 10th grade student enrollments, a probability-proportionate-to-size sampling method was used to systematically draw a random sample of schools. Three to four classes were randomly selected from each sample school. Approval was obtained from the Institutional Review Board (IRB) at Taipei Medical University.

Following class selection, consent forms were taken home by students to give to parents requesting their consent to allow the children to participate in the survey. After the parental consent forms were collected, researchers visited the schools to conduct the self-administered survey and address students' questions about it. Students were assured the information would remain confidential. In 2010, a total of 2992 students enrolled in the 10th grade from 102 classes in 26 sample schools completed the questionnaire. One-fifth of parents and students declined to participate in this study. The response rate was 80%.

In 2011, when the students were in the 11th grade, participating students were re-contacted to complete the same questionnaire. However, at the time of the follow-up surveys some students had dropped out of school, some had transferred to other schools, and some refused to participate or were absent on that day. Thus, a total of 2315 students completed the questionnaire in both the 2010 and 2011 surveys. The response rate for the follow-up survey was 77%. The 2315 students who completed both surveys were used to establish a pattern of change for Internet addiction and risk factors. Of all participating schools, 54% were public schools, and 88% were located in urban areas. In the 2010 survey, student ages ranged from 15 to 17 years ( $M = 15.5$ ,  $SD = 0.6$ ). Forty-eight percent of the participating students were female, while 52% were male.

### 2.2. Instruments

A self-administered questionnaire was developed based on previous studies. A group of 10 experts were invited to assess the content validity of the questionnaire. Experts reviewed the draft questionnaire and gave comments and suggestions for improvements. In addition, the piloting survey was conducted at two schools to examine the students' responses to the survey and to evaluate the reliability of the data yielded by the questionnaire. The piloting survey found that the data were reliable.

The dependent variable in this study was the change pattern of Internet addiction from grades 10 to 11.

#### 2.2.1. Internet addiction

Internet addiction was assessed using the Chen Internet Addiction Scale (Chen, Weng, & Su, 2003). The Chen Internet Addiction Scale contains 26 items to assess core symptoms of Internet addiction and related problems of Internet addiction. For example, participants were asked whether they agreed or disagreed with a statement such as: "I find that I stay online longer than I intended," "I neglect family interaction to spend more time online," and, "I feel that life would be boring without the Internet." Each item was evaluated on a 4-point Likert-type scale from "strongly agree" (scoring 4) to "strongly disagree" (scoring 1). The total score of the scale ranged from 26 to 104. Cronbach's  $\alpha$  of the Chen Internet Addiction Scale for the sample was 0.94. A threshold score of 63/64 was suggested to provide good diagnostic accuracy with respect to Internet addiction among adolescents (Ko et al., 2005). Students with a score of 64 or higher were classified as having an Internet addiction. Using students' self-reported Internet addiction in the 10th and 11th grades, respondents were categorized into four groups: (a) no Internet addiction: the student had no Internet addiction in either of the two surveys in the 10th and 11th grades; (b) initiation of Internet addiction: the student had no Internet addiction in the 10th grade survey but had developed an Internet addiction in the 11th grade survey; (c) cessation of Internet addiction: the student had an Internet addiction in the 10th grade survey but had no Internet addiction in the 11th grade survey; (d) persistence of Internet addiction: the student had an Internet addiction in both the 10th and 11th grade surveys.

The independent variables in this study included weekly social network website use days, weekly online game use days, weekly pornography website use days, self-esteem, depression, smoking, alcohol use, school bonding, and parental attachment.

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