



Is Internet addiction transitory or persistent? Incidence and prospective predictors of remission of Internet addiction among Chinese secondary school students



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ABSTRACT

Background: Internet addiction (IA) is prevalent among adolescents but it is potentially revertible. Only three Taiwan adolescent studies reported IA remission and a few related factors. We investigated incidence and predictors of remission among Hong Kong Chinese secondary school students with a 12-month longitudinal study.

Methods: IA was defined as Chen Internet Addiction Scale (CIAS) score > 63 . Validated measures were used to assess students' psychosocial wellbeing at baseline and follow-up.

Results: Of 1545 students with IA at baseline, 1296 (83.9%) provided matched baseline/12-month follow-up data; their data were analyzed. Incidence of remission (CIAS ≤ 63 at follow-up) was 59.29/100 person-years. Significant predictors included: 1) baseline CIAS score (ORa = .95), 2) baseline health belief model (HBM) constructs [perception of having severe IA (ORa = .34), perceived susceptibility to IA (ORa = 0.82), perceived barrier (ORa = 0.95), cue to action from parents (ORa = 0.82), and self-efficacy for reducing Internet use (ORa = 1.13)], and 3) baseline psychosocial health measures [self-esteem (ORa = 1.03), severe depression (ORa = 0.72) and social anxiety (ORa = 0.96)] and their changes over time [depression (ORa = .95), anxiety (ORa = .94), loneliness (ORa = .93), self-esteem (ORa = 1.07), positive affect (ORa = 1.10) and family support (ORa = 1.03)]. Two-thirds (64.3%) of the remission group presented reduced CIAS score > 1.5 SD, and recorded larger improvements in psychosocial status over time than the non-remission group.

Conclusion: Without noticeable interventions, incidence of remission was high and related to improvements in psychosocial health. Most of the HBM constructs, and baseline/changes in psychosocial measures predicted remission. Interventions to increase remission should modify these factors.

1. Introduction

Internet addiction (IA) is defined as excessive Internet use, which is associated with preoccupation of Internet use, tolerance development, and withdrawal symptoms. (Young, 2004) It interferes with daily life including ones' mental state, emotional state, academic/work performance, and social interactions (Byun et al., 2009). The global prevalence of IA was 6.0% (aged 12–41 years) (Cheng & Li, 2014). A recent systematic review, reported that prevalence of adolescent IA ranged from 5.0–15.2% in some European countries (e.g. Greece, Turkey, and Italy) and 2.5–23.4% in some Asian countries (e.g. South Korea, Taiwan, and mainland China) (Kuss, Griffiths, Karila, & Billieux,

2014). Prevalence among Hong Kong adolescents ranged from 16.0–26.8% (Shek & Yu, 2016; Wang, Wu, & Lau, 2016). In these previous studies, different tools were used to define IA. In the literature, IA is commonly defined by using validated questionnaires and respective cut-off points. The Chen Internet Addiction Scale (CIAS) is one of the most common tools for such classification (cut-off point of 63/64). IA as defined, was shown to predict harms in longitudinal studies (e.g. (Chang, Chiu, Lee, Chen, & Miao, 2014; Chen & Gau, 2016). The developer also reported accuracy of 87.6%, using psychiatrists' diagnostic interview results as the gold standard (Ko et al., 2005).

We understand little about reversibility of IA in the absence of interventions and factors predicting such changes. Only three long-

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itudinal Taiwan studies reported proportions of remission from IA to non-IA in 36.7–51.4% of their subsample ($n = 83, 138, \text{ and } 605$) among junior high and high school students. Significant predictors of remission from IA reported by these studies included interpersonal sensitivity and hostility, and decreases in depression, hostility and alcohol use (Chang et al., 2014; Ko, Yen, Yen, Lin, & Yang, 2007; Ko et al., 2014).

It is warranted to identify modifiable factors that can prospectively predict remission from IA. Psychological problems (e.g., depression, social phobia, loneliness and low self-esteem) were associated with IA in cross-sectional studies and predictive of IA in longitudinal studies (Chang et al., 2014; Fu, Chan, Wong, & Yip, 2010; Ghassemzadeh, Shahraray, & Moradi, 2008; Kim, LaRose, & Peng, 2009; Ko, Yen, Chen, Yeh, & Yen, 2009; Tang et al., 2014). These factors may be predictive of remission from IA. No study has investigated the relationship between positive psychology (e.g. positive affect) and remission from IA, although such factors predicted recovery from other forms of addiction (Krentzman, 2013). Inter-personal factors should be taken into account. Family dynamics (e.g., support and conflict) have shown mixed findings on its relationship with IA (Ko et al., 2015; Park, Kim, & Cho, 2008; Yu & Shek, 2013), and may potentially predict remission from IA. Furthermore, perceptions related to Internet use, such as those related to the Health Belief Model (HBM), are also potential predictors of remission from IA. According to the HBM (Rosenstock, 1974; Rosenstock, Strecher, & Becker, 1988), which has been applied to research on smoking and drinking (Mantler, 2013; Von Ah, Ebert, Ngamvitroj, Park, & Kang, 2004), cognitions including perceived susceptibility, perceived severity, perceived benefit, perceived barrier, cue to action and self-efficacy are determinants of health-related behaviors.

1.1. Objectives

We investigated incidence and prospective predictors of remission from IA among Chinese secondary students with IA (i.e., having CIAS > 63). Besides socio-demographic factors, three blocks of potential predictors were considered: 1) pattern of Internet use at baseline (CIAS score and amount of time), 2) constructs of the HBM assessed at baseline, and 3) psychosocial health status assessed at baseline (including depression, social anxiety, self-esteem, loneliness, positive affect, and family support) and changes in such measures from baseline to follow-up.

We hypothesized that lower baseline CIAS score, less time spent on Internet, perceived HBM constructs supportive of remission from IA (i.e., lower levels of perceived benefits of Internet use and perceived barriers for reducing Internet use, and higher levels of perceived susceptibility to IA, perceived severity of IA, self-efficacy for reducing Internet use, and cue to action for reducing IA), and better psychosocial health status at baseline and/or improvements over time would be predictive of remission from IA during the follow-up period.

To understand whether observed remissions were caused by random fluctuations around the cut-off point, we also calculated the mean change in CIAS scores over time within the remission group. We expected a sizeable reduction. To assess whether remission brought about improvements in wellbeing, we compared differences in the psychosocial measures assessed at baseline, follow-up, and changes from baseline to follow-up between the remission and the non-remission groups. We hypothesized that the remission group would show better psychosocial health status at follow-up and larger improvements from baseline to follow-up than the non-remission group.

2. Materials and methods

2.1. Study design

The baseline survey was conducted from September 2012 through January 2013 and the follow-up survey was conducted 12 months later

in 19 schools, using the same procedures. One school from each of the 19 districts in Hong Kong was selected by convenience sampling. All Chinese secondary 1–4 students of the selected schools were invited to participate in this study. Parents of these students were asked to return a form if they objected to their child's participation in this study, yielding a refusal rate of 1.6%. Participants completed an anonymous questionnaire in classrooms in the absence of any teacher and were guaranteed that the data would only be accessed by the researchers. They were briefed that participation was voluntary and return of the completed questionnaire implied informed consent. No incentive was given to the participants. The last five digits of participants' Hong Kong identity card, date of birth, and the last four digits of their mobile/home phone number (if any) were recorded for matching purposes. Ethics approval was granted from the institute of the corresponding author.

2.2. Measures

2.2.1. Variables related to IA and Internet use assessed at baseline and follow-up

The 26-item CIAS (Chen, Weng, Su, Wu, & Yang, 2003) assessed IA symptoms (4-point Likert-type scale from 1 = *definitely disagree* to 4 = *definitely agree*). Higher scores indicated more severe IA (score range = 26–104). It has been commonly used in studies targeting Chinese adolescents (Ko et al., 2009; Ko et al., 2014; Ko et al., 2015; Mak et al., 2014) using 63/64 as the cut-off point to define IA (Ko et al., 2005).

Amount of time spent (hours) on the Internet for entertainment and communication was assessed by two items (Responses: *not at all*, 1–10 h, 11–20 h, 21–35 h, 36–50 h, 51–70 h, 71–100 h, and ≥ 101 h per week). We recoded responses ≥ 21 h into one category.

2.2.2. HBM variables assessed at baseline

Perceived susceptibility was assessed by *self-perceived IA status* at baseline (responses were recoded as *definitely no IA*, *quite/very mild*, *neutral*, *quite/very severe*, and *unsure*). Another single item assessed *perceived susceptibility* to have IA in the next year. A single item assessed *perceived severity* of consequences of IA. A 5-item scale on *perceived benefit* of Internet use (Cronbach's $\alpha = 0.80$) and a 4-item scale on *perceived barrier* for reducing Internet use (Cronbach's $\alpha = 0.83$) were used. *Cue to action* for reducing Internet use from parents and teachers/social workers was assessed separately by two items instead of forming a scale, as Cronbach's α for such was low (0.58). *Self-efficacy for reducing Internet use* was measured by a 2-item scale (Cronbach's $\alpha = 0.63$). A panel consisting of psychologists, public health researchers, and epidemiologists was formed to construct the items of these scales. Unless specified otherwise, they were rated on 5-point Likert scales from 1 = *strongly disagree* to 5 = *strongly agree*.

2.2.3. Variables on psychosocial health status assessed at baseline and follow-up surveys

Depression was assessed by the validated Chinese version of 20-item Center for Epidemiological Studies Depression Scale (CESD; 4-point scales: 0 = *never* to 3 = *often*) (Radloff, 1977; Zhang et al., 2011). CESD scores between 16 and 20, 21–24, and ≥ 25 implied probable mild, moderate and severe depression (Song et al., 2008).

Social anxiety was measured by the validated Chinese version of the 6-item Social Anxiety Subscale of the Self-Consciousness Scale (5-point Likert scale: 1 = *does not apply to me at all* to 5 = *applies to me very much*) (Scheier & Carver, 1985; Daniel TL Shek, 1994).

Loneliness was assessed by the 8-item short form UCLA Loneliness Scale (Russell, Peplau, & Cutrona, 1980) with a 4-point Likert scale: 1 = *I never feel this way* to 4 = *I often feel this way*. It has been widely used in the Chinese population (Wu & Yao, 2008).

Self-esteem was measured by the validated 10-item Rosenberg Self-esteem Scale (RSE) (Rosenberg, 1965; Schmitt & Allik, 2005); with 4-point Likert scales from 1 = *strongly agree* to 4 = *strongly disagree*.

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