The presence of heavy Internet using peers is protective of the risk of problematic Internet use (PIU) in adolescents when the amount of use increases

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ABSTRACT

Problematic Internet use (PIU) in adolescents has been widely conceptualized as heavy Internet use that interferes with life. Although heavy use typically indicates severe PIU, their relationship is not one-to-one. Without interferences to life, mere heavy use does not constitute PIU. Accordingly, the association between them depends on how much disturbance to life is caused. While this might systematically differ by environmental factors, especially peer influences, no previous study was conducted to investigate such interaction. Hence, this study aims to test for the variation in this association in the presence of heavy Internet using peers. A cross-sectional self-administered survey on Internet use pattern was conducted with 723 Hong Kong secondary school students. Class average was used to measure peer normative use. A linear mixed model was constructed to test for interaction between the individual amount of Internet use and class normative use in relation to PIU. Significantly weaker association between a heavy amount of Internet use and PIU was identified with increased peer normative use ($\beta = -0.24$, $p < 0.01$). Log-likelihood ratio test also confirmed improved goodness-of-fit with the inclusion of the interaction ($\chi^2 = 6.67$, $df = 1$, $p = 0.010$). Findings of this study essentially imply that the presence of heavy Internet using peers might act as a protective factor of PIU for individuals with an increased amount of Internet use. It was speculated that the weaker association is due to reduced psychological problems brought by peer norm conformity. Resources to tackle PIU should, therefore, be focused on other aspects of PIU such as time management issues.

1. Introduction

Problematic Internet use (PIU) in adolescents is commonly conceptualized as 'heavy use of the Internet that interferes with life' (Byun et al., 2009). According to previous studies, identified aspects of PIU include 'withdrawal & social problems', 'time management & performance', 'reality substitution', 'mood modification', 'psychological conflicts', etc. (Byun et al., 2009; Lai et al., 2013; Widyanto & McMurran, 2004; Widyanto et al., 2011). Also, it was consistently found associated with various psychiatric co-morbidities, such as anxiety disorder and depression (Ho et al., 2014; Kuss, Griffiths, Karila, & Billieux, 2014; Lam, Peng, Mai, & Jing, 2009; Lam & Peng, 2010).

Estimated prevalence rate of PIU ranged widely from 0.8–26.7% across populations, partly due to the absence of an official set of diagnostic criteria (Kuss et al., 2014; Spada, 2014).

1.1. Association between amount of Internet use and PIU

Other addictive behaviors alike, a heavy amount of Internet use is often indicative of PIU (Borland, Yong, O'Connor, Hyland, & Thompson, 2010; Swendsen et al., 2012). As summarized in a systematic review by Kuss et al. (2014), time spent online, a common proxy measure of Internet use, was consistently identified as positively associated with PIU. In addition, the amount of specific uses such as online-gaming and social-networking were also found associated (Baer, Saran, & Green, 2012; Mueller et al., 2016). These implied that heavy amount of Internet use represented an essential component in the shaping of PIU, and in many cases indicated the severity of the condition (Baer et al., 2012;

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Kuss et al., 2014; Mueller et al., 2016). This also largely resembles other addictive behaviors such as alcohol use and nicotine dependence, in the sense that the severity of these behaviors has been found highly correlated with consumption patterns (Borland et al., 2010; Greenfield et al., 2014). Such a correlation facilitates better clinical judgement in the screening of potential addicts.

1.2. Peer influence on the association

Nevertheless, it should be noted that by definition, a heavy amount of Internet use without interference with life does not sufficiently constitute PIU (Byun et al., 2009; Spada, 2014). The association between the amount of Internet use and PIU therefore essentially depends on how much disturbance to life is caused by Internet use in adolescents. Accordingly, even given the same increase in the individual amount of use, the magnitude of extra interference to life might differ systematically by various environmental and personal factors. In other words, there are potential moderators to the association between the amount of use and the extent of PIU.

In particular, the effects from peers on this association are of great research interest, as peers have been identified as highly influential on adolescents' mental health and development, and were thus often recommended as the medium for behavioral interventions (Bakker, Ormel, Verhulst, & Oldehinkel, 2010; Dishion & Tipsord, 2011; Salvy, de la Haye, Bowker, & Hermans, 2012). By revealing peer effects on the extent to which increased individual amount of Internet use implies additional interferences to life, clinical and educational resources could be better directed to adolescent groups in need for assistance in different aspects.

1.3. Presence of heavy Internet using peers

In previous relevant studies, peer social norm, among other peer-related variables, was most frequently adopted as predictor of the behaviors under investigation and has been shown as consistently associated across types of behaviors, including PIU (Baumgartner, Valkenburg, & Peter, 2011; Litt & Stock, 2011; Simons-Morton & Farhat, 2010; Zhou & Fang, 2015). In addition, studies showed that adolescents tended to conform to the peer social norm to gain peer acceptance (Teunissen et al., 2012), which was identified as beneficial to psychological well-being (Newman, Lohman, & Newman, 2007; Sentse, Lindenberg, Omvlee, Ormel, & Veenstra, 2010). These previous findings suggest that peer social norm might play a more complex role in the shaping of PIU than a mere predictor. On one hand, a peer norm of heavy Internet use might increase the amount of individual use and cause interferences to life, i.e. PIU; on the other hand, social norm conformity might partially offset the interferences caused by increased use, potentially through reduced 'social problems', 'psychological conflicts' or 'mood modification', etc. due to peer acceptance. (Lai et al., 2013; Sentse et al., 2010). To the best of our knowledge, nevertheless, no study has been conducted to investigate this interesting interplay between individual use, peer normative use, and PIU.

Hence, this study aims at testing whether the association between a heavy amount of Internet use and the extent of PIU was different in adolescents with heavy Internet using peers. In essence, this answers whether, in the presence of heavy Internet using peers, increased individual Internet use implies even more additional interference to life.

2. Materials and methods

2.1. Participants and procedures

Students from two Hong Kong secondary schools were invited to participate in early 2015. Out of 805 students (27 classes) invited, 723 returned the self-administered questionnaire during their reading class under informed consent. The response rate was therefore 89.8%.

This study was approved by the research ethics committee of the authors' home institution (Ref. no: 2014–2015-0058).

2.2. Independent variables

A single question: 'what is the average number of hours you spent online per day in the past week?' was used to proxy the amount of Internet use as an individual-level variable, while class normative use, computed by taking arithmetic mean within the same class, was adopted to measure peer normative use as a class-level variable.

2.3. Multivariate adjustments

Socio-demographic variables were also included for proper multivariate adjustment. First, besides age, sex and year of study (i.e. school grade), parental educational attainment was obtained. Options were 'tertiary or above', 'secondary', 'primary or below' and 'unknown'. Second, participants were asked to rate family income as 'high', 'relatively high', 'average', 'relatively low' and 'low'. Third, housing types were categorized as 'public', 'subsidized', 'private' or 'others'. Fourth, self-evaluation of academic competence was included with 'very good', 'good', 'average', 'bad' and 'very bad' as options. Fifth, the extent to which participants were engaged in school activities was obtained. Options were 'plentiful', 'many', 'average', 'few', and 'very few'.

2.4. Outcome variable

PIU was measured with a revised Chinese version of the Internet Addiction Test with 20 items and a 6-point Likert scale ranging from 0 = 'Never/N.A.' to 5 = 'Always' (Young, 1998). Specifically, independent forward and backward translation was conducted, with items 2, 3, and 8 rephrased to enhance specificity to adolescents based on feedbacks from a qualitative pilot study with students from the same target population (see Table 1). A simple summative score was taken as the measure of PIU in the participants. Cronbach's alpha of the scale was computed as 0.92 in the sample.

2.5. Statistical analysis

A two-level (classes and students) linear mixed model (or hierarchical/multilevel linear model) was constructed with restricted maximum likelihood estimation. The model intercept was specified as random across classes while other parameters were specified as fixed. An interaction term between class normative and individual use was included. Log-likelihood ratio test was conducted to determine whether specifying the interaction improved model fit. All statistical analyses were conducted using R statistical environment (R Core Team, 2014).

Table 1
Rephrased items of Internet Addiction Test.

Item no.	Original phrasing	Revised phrasing[a]
2	How often do you neglect household chores to spend more time online?	How often do you neglect school work to spend time online?
3	How often do you prefer the excitement of the Internet to intimacy with your partner?	How often do you prefer the excitement of the Internet to having fun with friends?
8	How often does your job performance or productivity suffer because of the Internet?	How often does your school performance or study efficiency suffer because of the Internet?

Note:
[a] Rephrased then translated into Chinese with independent forward and backward translation procedures.