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Problematic Internet use, well-being, self-esteem and self-control: Data from a high-school survey in China

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Abstract

Given the prevalence of Internet use among youth, there is concern that a subset of Internet-using youth may exhibit problematic or addictive patterns of Internet use. The present study examines the association between problematic Internet use (PIU), demographic variables, and health-related measures among Chinese adolescents. Survey data from 1552 adolescents (male = 653, mean age = 15.43 years) from Jilin Province, China, were collected. According to the Young Diagnostic Questionnaire for Internet Addiction (YDQ), 77.8% ($n=1,207$), 16.8% ($n=260$), and 5.5% ($n=85$) showed adaptive, maladaptive, and problematic Internet use, respectively. Multinomial logistic regression analysis revealed that gender and family income per month differed between youth showing problematic and adaptive patterns of Internet use. Well-being, self-esteem, and self-control were related to severity of problematic Internet use, with greater severity typically associated with poorer measures in each domain. The findings that severity of problematic Internet use is associated with specific socio-demographic features and temperamental and well-being measures suggest that specific groups of youth may be particularly vulnerable to developing

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problematic Internet use. Early prevention/intervention programs targeting at-risk groups may help improve public health.

Keywords

Problematic Internet use; well-being; self-esteem; self-control

Introduction

The use of the Internet has increased dramatically over the past decade, and the Internet has become an important academic, business and recreational tool. Data from the China Internet Network Information Center suggest that China ended 2014 with a total Internet population of 632 million people, of which 24% were adolescents below 19 years of age (CNNIC, 2014). With the growing number of Internet users, there is concern that a subset of individuals may exhibit addictive patterns of engagement. While moderate Internet use may enhance one's quality of life such as by widening social circles (Wellman and Haythornthwaite, 2001; Willoughby, 2008), diminished control over Internet use may be problematic and impact negatively on daily function, health and well-being (Ko, Yen, et al., 2012; Yau, Potenza, et al., 2012) particularly as behaviors may become habitual and compulsive over time (Brewer and Potenza, 2008; Leeman and Potenza, 2013).

Problematic Internet Use (PIU) or "Internet addiction disorder" was proposed for inclusion in the recently released DSM-5; however, it was concluded that there is currently insufficient evidence to warrant its inclusion in the main section of the text (Petry, 2013; Potenza, 2014). Although there remains no consensus as to what constitutes PIU, most definitions contend that PIU is characterized by excessive or poorly controlled urges and a maladaptive obsession with the Internet (Aboujaoude, Koran et al., 2006; Yau, Crowley, et al., 2012). Noticeably, PIU is a problem that has been observed in different cultures. Globally, it is estimated that 4–12% (Yau, Crowley, et al., 2012) of adolescents may demonstrate PIU, although estimates have varied widely depending on definitions used (Petry, 2013). Prevalence estimates have typically been highest in the Far East with studies reporting rates such as 17.9% among Taiwanese university freshmen (Tsai, Cheng, et al., 2009) and 20.3% among Korean adolescents (Ha, Kim, et al., 2007). Among Chinese adolescent populations, rates have ranged from between 2.4%–5.5% in Hunan Province to 6.4% in Shanxi Province (Cao, Su, et al., 2007; Deng, Hu, et al., 2007).

Multiple demographic features may be associated with or contribute to PIU. For example, males are roughly five times more likely to report PIU (Cao and Su, 2007; Tsai, Cheng, et al., 2009). Family structure, such as having siblings (Low, Shortt, et al., 2012; McCutcheon, Scherrer, et al., 2012), and family socioeconomic status may also contribute to adolescent problem behaviors (e.g. substance use and problem gambling) (Tozzi, Akre, et al., 2013); however, few studies have examined these factors in the context of PIU severity.

Internet addiction has been associated with poor mental health in 74,980 Korean middle- and high school students (Yoo, Cho, et al., 2013). Affective temperament profiles and emotional are more frequent in Turkish adolescents who have problematic Internet use

(Canan, 2013). Cao et al reported that PIU was associated with more happiness but poorer life satisfaction among Chinese students (Cao, Sun, et al., 2011; Canan, 2013; Yoo, Cho, et al., 2013). A study of college freshmen assessed self-reported levels of depression, loneliness and self-esteem and grouped respondents into four latent classes: good psychological well-being, normative, minor-disadvantageous and severe-disadvantageous. Greater PIU severity increased the likelihood of disadvantageous psychological well-being and decreased the probability of good psychological well-being (Chen, 2012). Adolescence represents a developmental stage that may be more prone to both developing PIU and exhibiting poorer self-control (Yau, Crowley, et al., 2012). Increased self-control has been associated with decreased PIU severity and may serve to moderate social relationships with parents and peers (Li et al., 2013; Park et al., 2014). Some data indicate that preferences for online social interactions influence the relationship between self-esteem and adolescent PIU (Fioravanti, Dèttore, et al., 2012), and poorer self-esteem may predict Internet-related problems (Armstrong, Phillips, et al., 2000); however, other data do not find significant relationships between self-esteem and PIU (Caplan, 2006; Fioravanti, Dèttore, et al., 2012; Koronczai, Kökönyi, et al., 2013).

In the current study, we surveyed over 1,500 junior- and senior-high-school students on Internet-use behaviors and other measures including well-being, self-esteem and self-control. Given prior data linking adolescent PIU with poor mental health (Caplan, 2006; Fioravanti, Dèttore, et al., 2012; Liu, et al., 2011; Dèttore et al., 2012; Koronczai, Kökönyi, et al., 2013), we hypothesized that low self-esteem, poorer well-being and diminished self-control would be related to PIU in the sample.

2 Method

2.1 Participants

The present study obtained data between October 2009 and October 2010 from 5 junior-high schools (mean age=13.62 years, SD=1.16) and 5 senior-high schools (mean age=16.81 years, SD=1.02) in Jilin Province located in the northeast of China. Participating high schools were from different districts of the province and five junior-high schools and five senior-high schools were randomly selected. Two classes were then randomly selected from grade 7 to 9 or grade 10 to 12. In each school, we invited all students in the six classes participate in the survey. After gaining approval from school principals, students using the Internet in the past six months were invited to participate and complete a series of self-report questionnaires in class. A member of the research team described the survey and answered any questions prior to implementation. Students were reminded that their participation was voluntary and anonymous. Individuals who did not wish to participate were instructed to sit quietly and complete other work. This procedure received approval from the Jilin University Public Health School's Institutional Review Board and the Jilin Province Bureau of education. Students who refused participation and/or students with incomplete questionnaires were excluded. The response rate was 77.6%, and the final analytic sample included 1,552 adolescents.

2.2 Socio-demographics

Socio-demographic variables assessed in the present analysis include gender, grade (junior-high school, including grades 7–9, senior-high school, including grades 10–12), only child, single parent, living expense per month, father's education level, mother's education level, and family income per month.

2.3 Young's diagnostic questionnaire for Internet addiction (YDQ)

The YDQ (Young 1998) was adapted from the DSM-IV diagnostic criteria for pathological gambling and was modified to the distinctive features of PIU; it is the most commonly used questionnaire to assess PIU and has demonstrated reliability and validity (Su and Lin, 2014). Consisting of eight “yes” or “no” questions, the YDQ diagnosis is based on patterns of Internet use over the past 6 months. In preference to a dichotomous classification, previous studies using the YDQ have identified three subcategories of PIU severity; this approach is widely used and may allow for greater statistical power (Bakken, Wenzel, et al., 2009; Durkee et al., 2012; Greenfield, 1999; Johansson and Götestam, 2004). Respondents who answered yes to 5 of the criteria were categorized as “problematic users,” and those answering yes to 3–4 criteria were categorized as “maladaptive users”. A previous review of the Chinese YDQ indicated that 341 of 713 studies use the YDQ as a measure to assess Internet addiction in China during 2009–2012 (Su and Lin, 2014). The internal consistency of the YDQ in the present study was acceptable with Cronbach's $\alpha = 0.72$.

2.4 Self-esteem, well-being and self-control variables

The Rosenberg self-esteem scale (RSES) (Rosenberg, 1989), a ten-item questionnaire with a four-point Likert-type scale, provides evaluation of one's state self-esteem by asking respondents to reflect on their current feelings. The RSES, including the Chinese version, is considered a reliable and valid quantitative tool for self-esteem assessment (Moksnes and Espnes, 2013; Wang, Jiang, et al., 1999). The Chinese RSES fit better ($\chi^2/df = 3.72$, CFI= 1.00, TLI = 0.99, RMSEA = 0.07) (Yang and Wang, 2007). The internal consistency of the RSES in this study was good with the Cronbach's $\alpha = 0.87$. The well-being scale (WBS), based on work by Campbell (1976), consists of eight items that measure subjective well-being on a seven-point Likert scale (ranging from delighted to terrible). The validity and reliability study in China was performed by Wang et al. (Wang, Jiang, et al., 1999). A meta-analysis of the Chinese well-being scale (WBS) indicated that more than 86 studies use the WBS to assess subjective well-being. (Song and Fan, 2013). The internal consistency of the WBS in this study was good with the Cronbach's $\alpha = 0.84$. The self-control scale (SCS) (Grasmick et al., 1993) is a 23-item measure of self-control and includes three subscales (Impulsivity, Simple Tasks, Self-Centeredness). Impulsivity assesses tendencies to respond to tangible stimuli in the immediate environment, to have a concrete “here-and-now” orientation (e.g., “I often act on the spur of the moment without stopping to think.”); Simple Tasks assesses lack of diligence, tenacity, or persistence in the course of action (e.g., “I dislike really hard tasks that stretch my abilities to the limit.”); and Self-Centeredness assesses people with low self-control who tend to be self-centered, indifferent, or insensitive to the suffering and needs of others (e.g., “I try to look out for myself first, even if it means making things difficult for other people.”). Each item is scored on a four-point Likert with 1

representing ‘‘strongly disagree’’ and 4 representing ‘‘strongly agree’’. Total scores and each dimension’s score were calculated with higher scores representing lower self-control. Although it has been argued that there is no optimal measure of self-control (Benda, 2005), the SCS has been shown to be a valid and reliable measure of self-control (Longshore et al., 1998). Consistent with a previous study conducted among Turkish adolescents (Ozdemir et al., 2014), the internal consistency of the SCS in this study was good with the Cronbach’s $\alpha = 0.89$. Adoption of the SCS to Chinese was conducted and the SCS in Chinese fit better ($\chi^2/df = 3.96$, $GFI = 0.94$, $TLI = 0.81$, $RMSEA = 0.06$) (Qu, and Zou. 2009).

2.5 Data analysis

Statistical analyses were conducted using SPSS 19.0 (IBM Corp., NY). Chi-square tests were utilized to evaluate the socio-demographic variables and Kruskal-Wallis H-test were used to test for group differences on health-related variables (i.e., well-being, self-esteem, self-control). To examine the unique effects of PIU severity, multinomial logistic regression analyses were performed to examine maladaptive vs. adaptive use, and problematic vs. adaptive use. We present the odds ratio (ORs) and corresponding 95% confidence intervals (CIs). CIs that do not include 1.0 indicate statistical significant at $p < .05$. An alpha level of .05 was adopted for all statistical analyses.

3. Results

3.1. Prevalence estimates and socio-demographics

The analytic sample was comprised of 899 girls and 652 boys with an average age of 15.43 years ($SD = 1.89$, $range = 11-20$). Of all Internet users, the percentage of adolescents classified as adaptive, maladaptive, and problematic Internet users were 77.8% ($n = 1,207$), 16.8% ($n = 260$), and 5.5% ($n = 85$), respectively.

The relationships between PIU and socio-demographic variables are provided in Table 1. Chi-square analyses revealed that severity of PIU was significantly associated with gender ($X^2 = 7.13$, $p < .05$), grade ($X^2 = 6.60$, $p < .05$), having a single parent ($X^2 = 7.11$, $p < .05$), monthly living expenses ($X^2 = 15.12$, $p < .05$), and monthly family income ($X^2 = 45.98$, $p < .05$). No significant relationship was observed between PIU severity and father’s or mother’s education levels and whether the subject was an only child (all $p > .05$).

3.2 Associations between PIU severity and well-being, self-esteem and self-control

Table 2 shows mean scores of well-being and individual-difference variables among adolescents with adaptive, maladaptive, and problematic Internet users. Significant between-group differences were observed for well-being ($X^2(2) = 80.39$, $p < .001$) and self-esteem ($X^2(2) = 40.33$, $p < .001$), with the highest and lowest mean scores for both variables observed in the adaptive and problematic use groups, respectively. Significant differences were observed between PIU severity and measures of self-control, Impulsivity ($X^2(2) = 52.98$, $p < .001$), Self-Centeredness ($X^2(2) = 73.46$, $p < .001$), and Simple Tasks ($X^2(2) = 37.76$, $p < .001$). The higher scores represent lower self-control. The highest mean scores observed among the problematic use group, which means that problematic Internet users have lower self-control than the other groups (Table 2).

3.3 Multivariate analysis

Multinomial logistic regression analyses indicated a lower odds of being female in association with problematic versus adaptive use (OR = 0.59, 95%CI: 0.35–0.97). Income-related differences were also noted between groups, with lower odds of higher income associated with maladaptive and problematic patterns of use (Table 3).

Maladaptive and problematic users as compared with adaptive users were also generally less likely to report better subjective well-being and higher self-esteem and more likely to report greater Impulsivity, Self-Centeredness and Simple Task scores, with maladaptive and problematic users not showing significant differences in these domains (Table 3).

Discussion

The present study investigated prevalence estimates of PIU among youth Internet users in Jilin province, China. Additionally, associations between PIU, demographic variables, and tendencies relating to self-control were examined.

Prevalence estimates of PIU appear to vary with respect to different target groups and measures used to assess PIU. The present study suggests that 5.5% of students demonstrated PIU, and 22.2% demonstrated maladaptive use. This finding closely resembles prevalence estimates reported in previous studies that have used the YDQ among adolescent populations, which have ranged between 1.45%–4.02% for pathological use, and 13.5%–38.0% for maladaptive use (Durkee et al., 2012; Johansson and Götestam, 2004; Kim et al., 2006). Moreover, this finding appears largely consistent with studies that used different measures to assess PIU, including a 3% prevalence estimate for PIU among Korean middle-school students (Yoo, Cho, et al., 2013), 17.6% of Qatar adolescents (Bener and Bhugra, 2013), and 17.9% of Taiwanese university freshmen (Tsai, Cheng., et al., 2009). Further studies and standardized diagnostic criteria are needed before direct comparison between studies can be made. Nevertheless, the high prevalence estimates suggest that PIU may be a serious concern with a significant public health impact.

Consistent with previous studies (Tsai, Cheng, et al., 2009; Xiu, Hui, et al., 2010), PIU severity is related to socio-demographic variables. Males may be at higher risk for PIU as compared to females. The exact reasons for observed gender-related differences in PIU-related behaviors are not well understood, and there have been differing results in the literature (Yau, Crowley, et al., 2012; Chiu, Hong, et al., 2013). Differences in preferred online activities may contribute to the findings. For example, males are more likely to view cyber porn (Cooper, Delmonico, et al., 2000) and engage in online gaming (Hellström, Nilsson, et al., 2012; Wang, Ho, Chan, and Tse, 2015). The extent to which there are gender-related differences in patterns and types of online activities warrants further examination. Some differences are observed with family income per month, suggesting that high-income may serve as a protective factor with respect to PIU. This finding is consistent with a prior report (Yoo, Cho, et al., 2013; Mason, Mennis, et al., 2014) stating that adolescents with PIU are more likely to have low familial socioeconomic status.

Though other socio-demographic variables were significantly different when examining across all three PIU groups using Chi-square tests, further analysis using logistic regression to investigate the unique effects of PIU severity found only family income per month to be significant. Interestingly, pathological users were less likely than adaptive users and maladaptive users to have a family income per month higher than our lowest income group (<1,000RMB per month). This result appears to differ from previous findings in adults that suggest Internet use is associated with higher social status (determined by income and education) (Beutel et al., 2011). According to the results of regression analysis, we found that group differences between self-reported well-being, self-esteem, and measures of self-control were observed in the present study. Individuals with PIU or maladaptive use, as compared to those with adaptive use, were less likely to report high subjective well-being. Subjective well-being reflects an important component of an individual's soundness of mind and body (Pressman, Cohen 2005). Consistent with other surveys, subjective well-being was negatively correlated with PIU (Spada, Langston, et al., 2008; Meerkerk, van den Eijnden, et al., 2010; Akin, 2012), with reductions in positive emotions and life satisfaction also associated with PIU (Wan and Chiou, 2006; Cao, Sun, et al., 2011).

Individuals reporting higher self-esteem were less likely to be maladaptive users, and the association with PIU trended in the same direction, although it was not statistically significant at $P < 0.05$. Previous research has posited self-esteem as measure of psychological well-being (Meerkerk, van den Eijnden et al. 2010), and low self-esteem may represent a risk factor for PIU (Douglas, Mills et al. 2008; Yang, Tung 2007; Kim, Davis 2009). It is possible that individuals with low self-esteem may have difficulty controlling PIU behavior, facing differences between realities and ideals, and understanding the potential negative consequences of PIU. Low self-esteem may lead individuals to seek temporary relief through mind-altering activities (Greenberg, Lewis, et al., 1999). However, there have been some seemingly conflicting results in the literature, with a report of a positive relationship between self-esteem and PIU among adolescents. Thus, further research is warranted to determine the specific relationships between self-esteem and PIU.

Self-control has been proposed to be a key factor relating to the pathophysiology and treatment of PIU (Dong and Potenza, 2014). The measure of self-control used in the present study assesses multiple domains- Impulsivity, Self-Centeredness, and Simple Task- that may be correlated with PIU. Consistent with previous studies (Li, Li, et al., 2013), individuals with higher self-control are less likely to experience PIU. Self-control has also been previously found to correlate negatively with online gaming problems (Kim, Namkoong, et al., 2008). These results suggest that low self-control may increase the tendency to escape from daily activities (Ozdemir et al., 2014). The above suggest that countermeasures may address these PIU by focusing on the need for better self-control, perhaps involving better time management or emotional regulation (Hormes, Kearns, & Timko, 2014).

There are strengths and limitations in the current study. While associations were observed between PIU and poorer well-being, self-esteem, and self-control, the cross-sectional nature of the study does not permit insight into temporal relationships. Future longitudinal data will be important to understand what factors may increase the risk for development of PIU. The present study also did not differentiate between different types of Internet use (e.g., online

gaming, social networking, academics). Internet use is a heterogeneous construct and the contexts may relate differently to various health-related measures and socio-demographic variables. Furthermore, the measures are all self-reported and thus are limited by individuals' abilities and willingnesses to recall and report information accurately. Additionally, the number of individuals who were not included in the survey due to not using the computer in the last 6 months is not known.

Conclusion

This study provides an initial investigation of the psychological variables relating to PIU among adolescents in Jilin province in China. Psychological characteristics relating to subjective well-being, self-esteem, and self-control are related to PIU. Although more research should be performed to corroborate and extend the findings, the results have the potential to inform policy and prevention efforts to limit the impact of PIU among adolescents and into adulthood.

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References

- Aboujaoude E, Koran LM, Gamel N, Large MD, Serpe RT. Potential markers for problematic internet use: a telephone survey of 2,513 adults. *CNS spectrums*. 2006; 11(10):750–755. [PubMed: 17008818]
- Akin A. The relationships between Internet addiction, subjective vitality, and subjective happiness. *Cyberpsychology, Behavior, and Social Networking*. 2012; 15(8):404–410.
- Armstrong L, Phillips JG, Saling LL. Potential determinants of heavier Internet usage. *International Journal of Human-Computer Studies*. 2000; 53(4):537–550.
- Bakken IJ, Wenzel HG, Göttestam KG, Johansson A, Oren A. Internet addiction among Norwegian adults: a stratified probability sample study. *Scandinavian journal of psychology*. 2009; 50(2):121–127. [PubMed: 18826420]
- Benda BB. The robustness of self-control in relation to form of delinquency. *Youth & Society*. 2005; 36(4):418–444.
- Bener A, Bhugra D. Lifestyle and Depressive Risk Factors Associated With Problematic Internet Use in Adolescents in an Arabian Gulf Culture. *Journal of addiction medicine*. 2013; 7(4):236–242. [PubMed: 23666321]
- Beutel ME, Brähler E, Glaesmer H, Kuss DJ, Wölfling K, Müller KW. Regular and problematic leisure-time Internet use in the community: results from a German population-based survey. *Cyberpsychology, Behavior, and Social Networking*. 2011; 14(5):291–296.
- Brewer JA, Potenza MN. The neurobiology and genetics of impulse control disorders: relationships to drug addictions. *Biochemical pharmacology*. 2008; 75(1):63–75. [PubMed: 17719013]
- Cao F, Su L. Internet addiction among Chinese adolescents: prevalence and psychological features. *Child: care, health and development*. 2007; 33(3):275–281.

- Cao F, Su L, Liu T, Gao X. The relationship between impulsivity and Internet addiction in a sample of Chinese adolescents. *European Psychiatry*. 2007; 22(7):466–471. [PubMed: 17765486]
- Cao H, Sun Y, Wan Y, Hao J, Tao F. Problematic Internet use in Chinese adolescents and its relation to psychosomatic symptoms and life satisfaction. *BMC public health*. 2011; 11(1):802. [PubMed: 21995654]
- Caplan SE. Relations among loneliness, social anxiety, and problematic Internet use. *CyberPsychology & Behavior*. 2006; 10(2):234–242. [PubMed: 17474841]
- Chen SK. Internet use and psychological well-being among college students: A latent profile approach. *Computers in Human Behavior*. 2012; 28(6):2219–2226.
- Chiu SI, Hong FY, Chiu SL. An Analysis on the Correlation and Gender Difference between College Students Internet Addiction and Mobile Phone Addiction in Taiwan. *ISRN Addiction*. 2013
- CNNIC. The 2013 statistics report the development of China Internet network. Beijing: China Internet Network Information Center (CNNIC); 2014. (in Chinese) Available from URL: http://www.cnnic.net.cn/hlwfzyj/hlwxzbg/hlwtjbg/201403/t20140305_20146240.htm
- Cooper A, Delmonico DL, Burg R. Cybersex users, abusers, and compulsives: New findings and implications. *Sexual Addiction & Compulsivity: The Journal of Treatment and Prevention*. 2000; 7(1):5–29.
- Deng YX, Hu M, Hu GQ, Wang LS, Sun ZQ. An investigation on the prevalence of internet addiction disorder in middle school students of Hunan province. *Zhonghua Liu Xing Bing Xue Za Zhi*. 2007; 28(5):445–448. [PubMed: 17877171]
- Douglas AC, Mills JE, Niang M, Stepchenkova S, Byun S, Ruffini C, et al. Internet addiction: Meta-synthesis of qualitative research for the decade 1996–2006. *Computers in Human Behavior*. 2008; 24(6):3027–3044.
- Dong G, Potenza MN. A cognitive-behavioral model of internet gaming disorder: theoretical underpinnings and clinical implications. *Journal of Psychiatric Research*. 2014; 58(8):7–11. [PubMed: 25062755]
- Durkee T, Kaess M, Carli V, Parzer P, Wasserman C, Floderus B, ... Brunner R. Prevalence of pathological internet use among adolescents in Europe: demographic and social factors. *Addiction*. 2012; 107(12):2210–2222. [PubMed: 22621402]
- Fioravanti G, Dèttore D, Casale S. Adolescent Internet Addiction: Testing the association between self-esteem, the perception of internet attributes, and preference for online social interactions. *Cyberpsychology, Behavior, and Social Networking*. 2012; 15(6):318–323.
- Grasmick HG. Testing the core empirical implications of Gottfredson and Hirschi's general theory of crime. *The journal of research in crime and delinquency*. 1993; 30(1):5–29.
- Greenberg JL, Lewis SE, Dodd DK. Overlapping addictions and self-esteem among college men and women. *Addictive behaviors*. 1999; 24(4):565–571. [PubMed: 10466852]
- Greenfield DN. Psychological characteristics of compulsive internet use: A preliminary analysis. *Cyberpsychology and Behavior*. 1999; 2(5):403–412. [PubMed: 19178212]
- Ha JH, Kim SY, Bae SC, Bae S, Kim H, Sim M, et al. Depression and Internet addiction in adolescents. *Psychopathology*. 2007; 40(6):424–430. [PubMed: 17709972]
- Hellström KW, Leppert J, Åslund C. Influences of motives to play and time spent gaming on the negative consequences of adolescent online computer gaming. *Computers in human behavior*. 2012; 28(4):1379–1387.
- Hormes JM, Kearns B, Timko CA. Craving facebook? behavioral addiction to online social networking and its association with emotion regulation deficits. *Addiction*. 2014; 109(12):2079–2088. [PubMed: 25170590]
- Johansson A, Götestam KG. Internet addiction: characteristics of a questionnaire and prevalence in Norwegian youth (12–18 years). *Scandinavian journal of psychology*. 2004; 45(3):223–229. [PubMed: 15182240]
- Karbach J, Gottschling J, Spengler M, Hegewald K, Spinath FM. Parental involvement and general cognitive ability as predictors of domain-specific academic achievement in early adolescence. *Learning & Instruction*. 2013; 23(4):43–51.

- Kim EJ, Namkoong K, Ku T, Kim SJ. The relationship between online game addiction and aggression, self-control and narcissistic personality traits. *European Psychiatry*. 2008; 23(3):212–218. [PubMed: 18166402]
- Kim HK, Davis KE. Toward a comprehensive theory of problematic Internet use: Evaluating the role of self-esteem, anxiety, flow, and the self-rated importance of Internet activities. *Computers in Human Behavior*. 2009; 25(2):490–500.
- Kim K, Ryu E, Chon MY, Yeun EJ, Choi SY, Seo JS, Nam BW. Internet addiction in Korean adolescents and its relation to depression and suicidal ideation: a questionnaire survey. *International journal of nursing studies*. 2006; 43(2):185–192. [PubMed: 16427966]
- Ko CH, Yen JY, Yen CF, Chen CS, Chen CC. The association between Internet addiction and psychiatric disorder: a review of the literature. *European Psychiatry*. 2012; 27(1):1–8. [PubMed: 22153731]
- Koronczai B, Kökönyei G, Róbert U, Bernadette K, Orsolya P, Katalin N, et al. The mediating effect of self-esteem, depression and anxiety between satisfaction with body appearance and problematic internet use. *The American journal of drug and alcohol abuse*. 2013; 39(4):259–265. [PubMed: 23841866]
- Kubarych TS, Prom-Wormley EC, Franz CE, Panizzon MS, Dale AM, Fischl B, et al. A multivariate twin study of hippocampal volume, self-esteem and well-being in middle-aged men. *Genes, Brain and Behavior*. 2012; 11(5):539–544.
- Leeman RF, Potenza MN. A targeted review of the neurobiology and genetics of behavioural addictions: an emerging area of research. *Canadian journal of psychiatry Revue canadienne de psychiatrie*. 2013; 58(5):260–273. [PubMed: 23756286]
- Li D, Li X, Wang Y, Zhao L, Bao Z, Wen F. School connectedness and problematic internet use in adolescents: a moderated mediation model of deviant peer affiliation and self-control. *Journal of abnormal child psychology*. 2013; 41(8):1231–1242. [PubMed: 23695186]
- Li X, Li D, Newman J. Parental behavioral and psychological control and problematic Internet use among Chinese adolescents: The mediating role of self-control. *Cyberpsychology, Behavior, and Social Networking*. 2013; 16(6):442–447.
- Liu TC, Desai RA, Krishnan-Sarin S, Cavallo DA, Potenza MN, et al. Problematic Internet use and health in adolescents: data from a high school survey in Connecticut. *Journal of Clinical Psychiatry*. 2011; 72(6):836–845. [PubMed: 21536002]
- Longshore D, Stein JA, Turner S. Reliability and validity of a self-control measure: Rejoinder. *Criminology*. 1998; 36:175.
- Low S, Shortt JW, Snyder J. Sibling influences on adolescent substance use: The role of modeling, collusion, and conflict. *Development and psychopathology*. 2012; 24(01):287–300. [PubMed: 22293010]
- Mason MJ, Mennis J, Linker J, Bares C, Zaharakis N. Peer Attitudes Effects on Adolescent Substance Use: The Moderating Role of Race and Gender. *Prevention Science*. 2014; 15(1):56–64. [PubMed: 23404666]
- McCutcheon VV, Scherrer JF, Grant JD, Hong X, Haber JR, Jacob T, et al. Parent, sibling and peer associations with subtypes of psychiatric and substance use disorder comorbidity in offspring. *Drug and Alcohol Dependence*. 2012; 128(1–2):20–29. [PubMed: 22921146]
- Meerkerk GJ, van den Eijnden RJ, Franken IHA, Garretsen HFL. Is compulsive internet use related to sensitivity to reward and punishment, and impulsivity? *Computers in Human Behavior*. 2010; 26(4):729–735.
- Moksnes UK, Espnes GA. Self-esteem and life satisfaction in adolescents—gender and age as potential moderators. *Quality of Life Research An International Journal of Quality of Life Aspects of Treatment Care & Rehabilitation*. 2013; 22(10):2921–2928.
- Özdemir Y, Kuzucu Y, Ak . Depression, loneliness and Internet addiction: How important is low self-control? *Computers in Human Behavior*. 2014; 34:284–290.
- Ozturk FO, Ekinci M, Ozturk O, Canan F. The Relationship of Affective Temperament and Emotional-Behavioral Difficulties to Internet Addiction in Turkish Teenagers. *ISRN psychiatry*. 2013

- Park S, Kang M, Kim E. Social relationship on problematic Internet use (PIU) among adolescents in South Korea: A moderated mediation model of self-esteem and self-control. *Computers in Human Behavior*. 2014; 38:349–357.
- Petry NM, O'Brien CP. Internet gaming disorder and the DSM-5. *Addiction*. 2013; 108(7):1186–1187. [PubMed: 23668389]
- Potenza MN. Non-substance addictive behaviors in the context of DSM-5. *Addictive behaviors*. 2014; 39:1–2. [PubMed: 24119712]
- Pressman SD, Cohen S. Does positive affect influence health? *Psychological bulletin*. 2005; 131(6): 925. [PubMed: 16351329]
- Qu Z, Zou. Juvenile delinquency: the role of self-control, family environment and parental monitoring. *Psychological Science*. 2009; 32(2):360–359.
- Song JM, Fan HY. A meta-analysis of the relationship between social support and subjective well-being. *Advances in psychological science*. 2013; 21(8):1357–1370.
- Spada MM, Langston B, Nik evi AV, Moneta GB. The role of metacognitions in problematic Internet use. *Computers in Human Behavior*. 2008; 24(5):2325–2335.
- Su WL, Lin XY. Internet addiction scale: a literatural analysis of how they are used in China. *China journal of health psychology*. 2014; 22(5):793–796.
- Tozzi L, Akre C, Fleury-Schubert A, Suris JC. Gambling among youths in Switzerland and its association with other addictive behaviours. *Schweizerische Medizinische Wochenschrift*. 2013:143.
- Tsai HF, Cheng SH, Yeh TL, Shih CC, Chen KC, Yang YC, et al. The risk factors of Internet addiction—a survey of university freshmen. *Psychiatry Research*. 2009; 167(3):294–299. [PubMed: 19395052]
- Wan CS, Chiou WB. Why are adolescents addicted to online gaming? An interview study in Taiwan. *CyberPsychology and Behavior*. 2006; 9(6):762–766. [PubMed: 17201603]
- Wang CW, Ho RTH, Chan CLW, Tse S. Exploring personality characteristics of Chinese adolescents with internet-related addictive behaviors: trait differences for gaming addiction and social networking addiction. *Addictive Behaviors*. 2015; 42:32–35. [PubMed: 25462651]
- Wang, XD.; Jiang, CQ.; Ma, H. Rating scales for mental health. Beijing: Chinese Mental Health Journal Press; 1999.
- Wellman B, Haythornthwaite C. The Internet in everyday life. *Contemporary Sociology*. 2001; 45(3): 363–382.
- Willoughby T. A short-term longitudinal study of Internet and computer game use by adolescent boys and girls: Prevalence, frequency of use, and psychosocial predictors. *Developmental Psychology*. 2008; 44(1):195–204. [PubMed: 18194017]
- Xiuqin H, Huimin Z, Mengchen L, Jinan W, Ying Z, Ran T. Mental health, personality, and parental rearing styles of adolescents with Internet addiction disorder. *Cyberpsychology Behavior & Social Networking*. 2010; 13(4):401–406.
- Yang SC, Tung CJ. Comparison of Internet addicts and non-addicts in Taiwanese high school. *Computers in Human Behavior*. 2007; 23(1):79–96.
- Yang Y, Wang DF. Retest of the bidimensional model of Rosenberg self-esteem scale. *Chinese mental health journal*. 2007; 21(9):603–605.
- Yau YH, Crowley MJ, Mayes LC, Potenza MN. Are Internet use and video-game-playing addictive behaviors? Biological, clinical and public health implications for youths and adults. *Minerva Psichiatrica*. 2012; 53(3):153–170. [PubMed: 24288435]
- Yau YH, Potenza MN, White MA. Problematic Internet use, mental health and impulse control in an online survey of adults. *Journal of Behavioral Addictions*. 2013; 2(2):72–72. [PubMed: 24294501]
- Yoo YS, Cho OH, Cha KS. Associations between overuse of the internet and mental health in adolescents. *Nursing & health sciences*. 2013; 16(2):193–200. [PubMed: 23991723]
- Young KS. Internet Addiction: The Emergence of a New Clinical Disorder. *CyberPsychology & Behavior*. 1998; 1(3):237–244.

Highlights

1. Problematic Internet use (PIU) is common amongst youth.
2. PIU is linked to poor well-being, self-esteem and self-control.
3. These factors may help identify at-risk youth for PIU.

Table 1

Socio-Demographic Data

	Types of Internet Use			X ²	p
	Adaptive Use n (%)	Maladaptive Use n (%)	Problematic Use n (%)		
Gender					
Male	489(40.5)	117(45.0)	46(54.1)	7.13	.028
Female	717(59.5)	143(55.0)	39(45.9)		
Grade					
Junior High School	503(41.7)	126(48.5)	44(51.8)	6.60	.037
Senior High School	704(58.3)	124(51.5)	41(48.2)		
Single Child					
Yes	985(81.7)	203(78.1)	71(83.5)	2.14	.343
No	221(18.3)	57(21.9)	14(16.5)		
Single Parent					
Yes	89(7.4)	31(11.9)	10(11.8)	7.11	.029
No	1118(92.6)	229(88.1)	75(88.2)		
Living Expense Per Month					
<500 RMB	310(26.7)	56(22.1)	20(24.7)	15.12	.019
500–1000 RMB	393(33.9)	74(29.2)	26(32.1)		
1000–1500RMB	242(20.8)	49(19.4)	19(23.5)		
>1500RMB	216(18.6)	74(29.2)	16(19.8)		
Father's Education Level					
Primary School Or Below	244(21.2)	57(22.7)	24(29.6)	9.21	.325
Junior High School	368(32.0)	70(27.9)	21(25.9)		
Senior High School	186(16.2)	43(17.1)	17(21.0)		
Undergraduate	267(23.2)	55(21.9)	14(17.3)		
Post-Graduate Or Above	86(7.5)	26(10.4)	5(6.2)		
Mother's Education Level					
Primary School Or Below	240(20.8)	60(23.8)	19(23.8)	3.79	.876
Junior High School	412(35.7)	77(30.6)	26(32.5)		
Senior High School	193(16.7)	48(19.0)	13(16.3)		

	Types of Internet Use			χ^2	p
	Adaptive Use n (%)	Maladaptive Use n (%)	Problematic Use n (%)		
Undergraduate	249(21.6)	52(20.6)	18(22.5)	45.98	.0000
Post-Graduate Or Above	61(5.3)	15(6.0)	4(5.0)		
Family income per-month					
<1000 RMB	34 (3.0)	15(6.1)	12(15.2)		
1000–5000RMB	513(45.2)	81(32.8)	26(32.9)		
5000–10000RMB	406(35.8)	92(37.2)	25(31.6)		
>10000RMB	182(16.0)	59(23.9)	16(20.3)		

Table 2
Associations between Problematic Internet Use Severity and Measures of Wellbeing, Self-Esteem, and Self-Control.

	Adaptive Use	Maladaptive Use	Problematic Use	<i>F</i>	<i>p</i> value
	Mean(SD)	Mean(SD)	Mean(SD)		
Well-Being	47.51(10.42)	43.08(9.49)	38.89(11.29)	42.86	<.001
Self-Esteem	31.11(3.19)	29.95(3.49)	29.26(3.99)	23.52	<.001
Impulsivity	15.61(3.63)	17.20(3.68)	17.21(3.28)	26.08	<.001
Self-control					
Self-Centered	14.47(3.93)	16.57(4.50)	17.29(4.38)	43.19	<.001
Simple Task	10.46(2.79)	11.45(2.96)	10.69(2.88)	17.93	<.001

Table 3

Multivariate-adjusted odds ratios

	Maladaptive Use vs. Adaptive Use		Pathological Use vs. Maladaptive Use		Pathological Use vs. Adaptive Use	
	OR	95% CI	OR	95% CI	OR	95% CI
Gender						
Male	REF	---	REF	---	REF	---
Female	0.821	0.606–1.110	0.671	0.389–1.155	0.586*	0.354–0.968
Grade						
Junior High School	REF	---	REF	---	REF	---
Senior High School	1.010	0.735–1.386	1.163	0.661–2.044	1.062	0.629–1.788
Single Parent						
Yes	REF	---	REF	---	REF	---
No	0.699	0.424–1.150	1.603	0.643–3.991	0.882	0.379–2.051
Living Expense Per Month						
<500RMB	REF	---	REF	---	REF	---
500–1000RMB	1.129	0.740–1.721	1.043	0.494–2.197	1.180	0.583–2.389
1000–1500RMB	1.108	0.688–1.782	1.172	0.493–2.786	1.168	0.529–2.573
>1500RMB	1.549	0.965–2.484	0.763	0.319–1.822	1.375	0.606–3.117
Family Income Per Month						
<1000RMB	REF	---	REF	---	REF	---
1000–5000RMB	0.397*	0.190–0.829	0.349*	0.130–0.931	0.189*	0.076–0.464
5000–10000RMB	0.657	0.308–1.397	0.302*	0.106–0.855	0.249*	0.097–0.638
>10000RMB	0.810	0.363–1.806	0.352	0.115–1.072	0.334*	0.115–0.963
Wellbeing	0.975*	0.958–0.992	0.972	0.941–1.003	.959*	0.932–0.985
Self-Esteem	0.926*	0.880–0.973	0.987	0.911–1.069	.921	0.848–1.000
Impulsive	1.114*	1.065–1.165	0.990	0.907–1.079	1.092*	1.012–1.176
Self-Centered	1.070*	1.028–1.113	1.038	0.971–1.108	1.116*	1.045–1.190
Simple Task	1.122*	1.062–1.185	1.005	0.915–1.103	1.110*	1.013–1.215

* $p < 0.05$