

Research Article

Parental Internet Addictive Behaviour and Internet Addiction in Adolescents: A Mediating Model through Parental Mental Health

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2016; **Published:** February 15, 2016**Abstract**

Background: The study aimed to further explore the relationship between parental Internet Addiction (IA) and the Internet Addiction among adolescents taking into consideration the stress levels of young people, and the role of parental mental health.

Methods: This was a population-based parent-and-adolescent dyad health survey utilizing a random sampling technique. IA for both parents and adolescents was measured by the Internet Addiction Test (IAT) designed by Young. The depression and stress level of parents and adolescents were assessed using the Depression, Anxiety and Stress Scale (DASS). The Sobel-Goodman method of mediation analysis was applied to the data.

Results: Of the total 1098 parent-and-adolescent dyads with usable information, 263 (24.0%) adolescents and 62 (5.7%) parents could be classified as moderate and severe problematic users of the Internet. About 14% (n=157) of adolescents could be classified with moderate to severe stress. Results suggested a significant indirect effect ($Z=4.76$, $p<0.001$), with more than one-third (34.7%) of the total effect of parental IA on adolescent IA attributable to the mediation effect of parental depression among those adolescent with a low level of stress.

Conclusion: The results of the study have provided some empirical evidence to support the hypothesis that the effect of parental IA on the adolescent IA, in part, is mediated through the mental health of the parent. The theoretical and clinical implications of the finding are discussed.

Keywords: Internet addiction; Parental mental health; Adolescents; Stress; Dyad study

Introduction

Internet Gaming Addiction (IGA) has been included as a potential behavioural addiction in the latest version of the Diagnostic and Statistical Manual of Mental Disorder V (DSM-V), although general Internet Addiction (IA) is yet to be recognized as a disorder [1]. However, IA has been identified as behaviour of concern relating to the use of information and communication technologies, particularly among adolescents [2].

A main component in Jessor's Problem Behaviour Theory in the understanding of IA in children and adolescents is the environment system, of which the main focus is familial and parental factors, such as parental behaviour and attitudes [3,4]. Recent studies have offered empirical evidence on the aetiological risk factors for IA among adolescents. In the latest review of 42 studies reported in the English and Chinese literature on the topic, it was found that a range of different familial and parental variables have been investigated [5]. These included family satisfaction [6,7]; dysfunctional family [6,8,9]; parental drinking [6,7,10]; family conflict or cohesion [6,11-13]; family communication [11,14,15]; parenting styles [9,16-19]; parental attitudes toward excessive Internet use [6,11]; and parental

supervision or monitoring [14,18,20,21]. The results suggested a significant association between divorced parents, single parent households, and adolescent IA with young people having these familial and parental characteristics more susceptible to IA [5].

In terms of parental Internet addictive behaviour as a possible risk factor, the author has reported a significant relationship between parent-and-adolescent IA [22]. The results of the dyad study suggested that parents' IA was significantly associated with the IA status of the offspring depending on the stress level of the adolescent [22]. However, in this interactive model of adolescent mental health in parent-and-adolescent IA, parental mental health was not included. On the other hand, another study by the author has also suggested that parental mental health, particularly depression, also plays an important role in adolescent internet behaviour [23]. It has been highlighted in the previous study that the relationship between parental depression and child's IA could be explained by the balancing effects of the risk and protective factors between the personal and environment systems on the behaviour system in the Problematic Behaviour Theory [23]. The presence of any potent risk factors in either or both of the two systems could result in the problematic behaviour in adolescents. In this study, personal depression could be considered as a risk factor of

the environment system that may interact with the other factors in the personal system of the child in influencing the behaviour system.

To further explore and to enhance the existing explanatory model, the current study examines the role of parental mental health in the parent-and-adolescent IA, taking into consideration of the adolescent's mental health status. It is hypothesized that parental mental health, particularly depression, plays a mediating role in the parent-and-adolescent IA. Furthermore, since association between parental-and-adolescent IA was insignificant in adolescents with moderate to severe levels of stress [22], it would be logical to deduce that the parental mental health mediating model also would not apply to this group. However, to thoroughly apply the analysis, the model will also be investigated in adolescents with moderate and severe levels of stress.

Methods

The study utilized a cross-sectional survey design of the parent-and-adolescent dyad. The study was conducted in Hong Kong in March 2014 among 13-17 year old high school adolescents. The sample was generated from the total adolescent population of adolescents who attended high schools within a specific local school region. The Hong Kong Education Bureau provided the list of registered high schools for random selection of two high schools within a local school region. A class was also randomly selected from each grade, from grades 7 to 11, of each school with all adolescents and their parents in the class invited to participate in the study. Institute ethics approval for the study was granted by the Hong Kong Institute of Education.

The study was conducted on campus within a period of a few weeks. With the endorsement of the school principal, selected adolescents and their parents were invited to participate in the study. All participating adolescents and parents signed a consent form indicating willful participation of the parent-and-adolescent dyad. After signing the consent form, both parents and adolescent were invited to fill in the Parent's or Adolescent's Health Survey questionnaires respectively. Completed questionnaires were returned to the school in a sealed envelope to safeguard the confidentiality of respondents.

A total of 1098 parent-and-adolescent dyads were recruited and responded to the survey providing usable information and allowed matching of parent-and-adolescent data. This represented a response rate of 95.3% of parents completing the questionnaire with 54 adolescents without a response from parents. Comparisons between those adolescents with a respondent parent and those whose parents did not respond indicated no statistically significant differences in all demographics, including age, sex, grade, and place of birth.

Measures

Similar questions were included in the Parent's and Adolescent's Health Survey Questionnaires with some specifically designed for parents or adolescents. The Internet Addiction Test (IAT) also known as the Young's Internet Addiction Scale (YIAS) designed by Young was used for assessing the IA of parents and adolescents [24]. Details of the instrument was reported in a previous study with information on the psychometric properties reported in the literature [22,24,25]. Based on the concepts and behaviors exhibited by pathological gamblers as defined by the DSM-IV diagnostic criteria, the IAT was

Table 1: Frequency (%) of the characteristics of child-and-parent dyad (N=1098).

Characteristics of respondents	Frequency (%)
Child characteristics	
Sex	
Male	483 (44.0)
Female	614 (56.0)
Age group	
15 years or older	620 (56.5)
<15 years	478 (43.5)
Place of residence	
Local	1056 (96.3)
Nearby city	41 (3.7)
Days accessing the Internet in the past week	
Everyday	764 (69.8)
4-6 days	129 (11.8)
3 days or less	202 (18.4)
Main device used to access the Internet	
Computer	508 (46.3)
Mobile	501 (45.7)
Others	88 (8.0)
Average time spending on the Internet	
3 hour or more/day	409 (37.9)
<3 hours/day	607 (62.1)
Average time spending play online games	
3 hour or more/day	197 (18.0)
<3 hours/day	900 (82.0)
Stress	
Moderate/severe	157 (14.3)
Normal/Mild	940 (85.7)
Parent's characteristics	
Sex	
Male	279 (25.5)
Female	814 (74.5)
Age group	
45 years or older	602 (56.5)
<45 years	464 (43.5)
Occupation	
Professional	160 (14.6)
Semi/Non-professional	157 (14.4)
Others	776 (71.0)
Depression	
Moderate/severe	68 (6.2)
Normal/Mild	1025 (93.8)

designed as a 20 item self-reported scale. Questions included in the scale specifically reflect typical behaviors of addiction relating to Internet use. An example question is: "How often you feel depressed, moody, or nervous when you are off-line, which goes away once you

are back on-line?" Respondents were asked to indicate the propensity of their responses on a Likert scale ranging from 1 (rarely) to 5 (always). The IAT was validated with good reliability of Cronbach's alpha values ranging from 0.54 to 0.82 for various factors [25]. A total score could be calculated with possible scores ranging from a minimum of 20 to a maximum of 100. In this study the total raw scores of both adolescent and parent were used in the analyses.

The mental health status of both parents and adolescents was measured using the Depression and Stress scale from the Depression, Anxiety and Stress Scale (DASS) for parents and adolescents respectively [26]. The reason for the focus on parental depression and adolescent stress was due to the finding of previous studies [22,23]. The details of the scale and psychometric properties were fully examined and reported in the aforementioned study and in the literature [26,27]. The DASS was designed for the assessment of stress, depressive symptoms, and anxiety with good psychometric properties including strong reliability and validity [26]. The authors of the scale emphasize the fact that as the DASS had been designed as a quantitative measure of distress along three axes, it was not meant to be a categorical assessment of clinical diagnosis [26]. Nevertheless, it could be used for identifying individuals who were of high risk of mental health problems with high scores in the subscales indicating a greater likelihood of depression, anxiety or stress. As the validity of DASS among adults has been demonstrated, it has also been recommended for use among children and adolescents [26,27]. Similar to the IAT, the raw scores of parental depression were used for analysis. However, for the stress level of adolescents, the score of the individual was classified according to the recommended categorization and dichotomized as in the previous study for consistency [22].

Other information collected in the adolescent's survey included demographics, location of family residence, whether the adolescent was born in Hong Kong, and some details on the means and patterns of accessing the Internet. For parents, questions on sex, age, occupation, and access to the Internet were also included in the questionnaire.

Data analysis

Data were analyzed using the Stata V10.0 statistical software program. Descriptive analyses were conducted using percentages, means, and standard deviation. Since this was an exploratory study for examining parental depression as a possible mediating variable in the relationship between parental IA (treated as the independent variable) and adolescent IA (dependent variable), the Sobel-Goodman method of mediation analysis was applied to the data. Based on the previous finding on the role of stress in the relationship between parental IA and adolescent IA, mediation analysis was stratified according to the stress level of the adolescent. For all hypothesis testing, a 5% type I error rate was used.

Results

Parent-and-adolescent characteristics and outcome measures of the respondents were summarized in (Table 1). In terms of the stress level of adolescents, about 14% (n=157) of respondents were classified with moderate to severe stress with a mean of 4.9 (s.d.=4.0). For parents, 68 (6.2%) were classified as moderately to severely depressed according to the classification with a mean value of 1.5 (s.d.

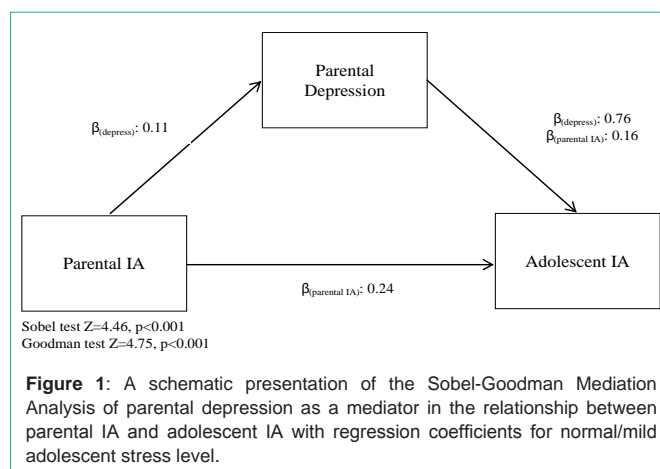


Figure 1: A schematic presentation of the Sobel-Goodman Mediation Analysis of parental depression as a mediator in the relationship between parental IA and adolescent IA with regression coefficients for normal/mild adolescent stress level.

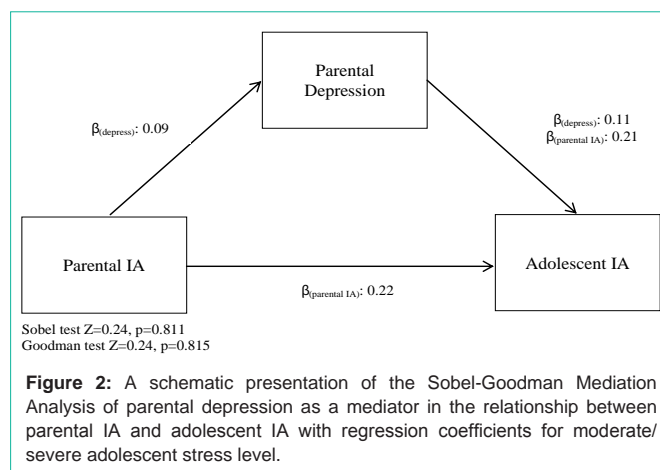


Figure 2: A schematic presentation of the Sobel-Goodman Mediation Analysis of parental depression as a mediator in the relationship between parental IA and adolescent IA with regression coefficients for moderate/severe adolescent stress level.

=2.6). In terms of the IA, 263 (24.0%) adolescents were classified as moderate and severe with a mean value of 41.7 (s.d.=12.4), where as sixty-two (5.7%) parents could be considered as having a moderate to severe problem with a mean of 28.6 (s.d.=9.9).

Two separate models of parental depression as the mediating variable in the relationship between parent-and-adolescent IA were tested in according to the stress level of the adolescent, namely normal/mild and moderate/severe. The schematic representation of these models with the corresponding regression coefficients of each mediating pathway were presented in (Figures 1 & 2). The results obtained from the Sobel-Goodman test of mediation were also summarized in (Table 2). As shown, a significant mediating effect of parental depression on the parent-and-adolescent IA relationship was demonstrated among those adolescents with normal to mild stress levels (Sobel test $Z=4.46, p<0.001$; Goodman test $Z=4.75, p<0.001$). Results suggested a significant indirect effect ($Z=4.76, p<0.001$), with more than one-third (34.7%) of the total effect of parental IA on adolescent IA attributable to the mediation effect of parental depression (Table 2). On the other hand, as expected no mediating effect of parental depression was found in the relationship between parent-and-adolescent IA in adolescents with moderate/severe stress levels.

Discussion

This study aimed to examine the role of parental mental health,

Table 2: Results obtained from the sobel-goodman mediation analysis by stress levels of adolescent.

Results of the Sobel-Goodman analysis	
For Normal/Mild level of stress	
Indirect effect	Coefficient=0.08, Z=4.76, p<0.001
Direct effect	Coefficient=0.16, Z=3.92, p<0.001
Total effect	Coefficient=0.24, Z=6.50, p<0.001
Proportion of total effect mediated	0.347
Ratio of Indirect to Direct effects	0.532
Ratio of Total to Direct effects	1.532
For Moderate/Severe level of stress	
Indirect effect	Coefficient=0.01, Z=0.24, p=0.811
Direct effect	Coefficient=0.21, Z=1.77, p=0.080
Total effect	Coefficient=0.22, Z=1.98, p=0.050
Proportion of total effect mediated	0.045
Ratio of Indirect to Direct effects	0.047
Ratio of Total to Direct effects	1.047

particularly depression, as a mediator in the relationship of parent-and-adolescent IA. The results of the study have provided some empirical evidence to support the hypothesis that the effect of parental IA on the adolescent IA, in part, is mediated through the mental health of the parent. The mediating effect of parental mental health on the parent-and-adolescent IA relationship holds true among adolescents with normal to mild stress levels, but not in the group with moderate to severe levels as expected.

This is an exploratory study that focuses on the relationships of three main variables, parental IA as the independent of study variable, parental depression as the mediating variable, and adolescent IA as the independent or outcome variable. In the mediation analysis, no other variables, such as demographics and other co-morbidities, have been included as possible confounding variables in the relationship between parent-and-adolescent IA, thus the potential confounding effect of these variables have not been adjusted for. Moreover, the mediation models have been built upon the assumption that the causal pathway is in a direction from parent to child not in a reverse direction from child to parent. This assumption is based on logic and empirical evidence in other areas of additive behaviour [28,29].

The relationship between parents' IA and the IA of their adolescent children is complex but important. In a previous study, the author has discussed the influence of the parental IA on adolescent IA in light of Jessor's Problematic Behaviour Theory and the applications of the finding in the clinical treatment, management, and prevention of IA among young people [23]. The finding of this study provides further evidence for the influence of parental factors on the Internet behaviour of the off-spring, particularly the Internet behaviour and mental health of their own. Given that a large proportion of the effect of parental IA on the IA of their offspring has been shown to be mediated via their own depression, particularly among adolescents with a low stress levels, it suggests an interplay between parental IA, the mental health status of their offspring, and their own, which influences the offspring's IA. This is an area worthy of further pursuit.

References

- Diagnostic and Statistical Manual of Mental Disorders. 5th edn. Washington DC: American Psychiatric Association. 2013.
- Shotton MA. The costs and benefits of "computer addiction". *Behav Inf Technol*. 1991; 10: 219-230.
- Jessor R. Problem-behavior theory, psychosocial development, and adolescent problem drinking. *J Addict*. 1987; 82: 331-342.
- Jessor R, Costa FM, Kruger PM, Turbin MS. A developmental study of heavy episodic drinking among college adolescents: The role of psychosocial and behavioural protective and risk factors. *J Studies on Alcohol*. 2006; 67: 86-94.
- Li W, Garland EI, Howard MO. Family factors in Internet addiction among Chinese youth: A review of English-and Chinese-language studies. *Comput Hum Behav*. 2014; 31: 393-411.
- Yen JY, Yen CF, Chen CC, Chen SH, Ko CH. Family factors of internet addiction and substance use experience in Taiwanese adolescents. *Cyberpsychol Behav*. 2007; 10: 323-329.
- Lam LT, Peng ZW, Mai JC, Jing J. Factors associated with Internet addiction among adolescents. *Cyberpsychol Behav*. 2009; 12: 551-555.
- Tsitsika A, Critselis E, Louizou A, Janikian M, Freskou A, Marangou E, et al. Determinants of Internet addiction among adolescents: a case-control study. *Scientific World Journal*. 2011; 11: 866-874.
- Xu J, Shen LX, Yan CH, Hu H, Yang F, Wang L, et al. Parent-adolescent interaction and risk of adolescent internet addiction: a population-based study in Shanghai. *BMC Psychiatry*. 2014; 14: 112.
- Jang MH, Ji ES. Gender differences in associations between parental problem drinking and early adolescents' internet addiction. *J Spec Pediatr Nurs*. 2012; 17: 288-300.
- Park SK, Kim JY, Cho CB. Prevalence of Internet addiction and correlations with family factors among South Korean adolescents. *Adolescence*. 2008; 43: 895-909.
- Siomos K, Floros G, Fisoun V, Evaggelia D, Farkonas N, Sergentani E, et al. Evolution of Internet addiction in Greek adolescent students over a two-year period: the impact of parental bonding. *Eur Child Adolesc Psychiatry*. 2012; 21: 211-219.
- Wu X, Chen X, Han J, Meng H, Luo J, Nydegger L. Prevalence and factors of addictive Internet use among adolescents in Wuhan, China: interactions of parental relationship with age and hyperactivity-impulsivity. *PLoS One*. 2013; 8: e61782.
- Van den Eijnden RJ, Spijkerman R, Vermulst AA, Van Rooij AJ, Engels. Compulsive Internet Use among adolescents: Bidirectional parent-child relationships. *J Abnorm Child Psychol*. 2010; 38:77-89.
- Liu QX, Fang XY, Deng LY, Zhang JT. Parent-adolescent communication, parental Internet use and Internet-specific norms and pathological Internet use among Chinese adolescents. *Comput Hum Behav*. 2012; 28:1269-1275.
- Huang X, Zhang H, Li M, Wang J, Zhang Y, Tao R. Mental health, personality, and parental rearing styles of adolescents with Internet addiction disorder. *Cyberpsychol Behav Soc Netw*. 2010; 13: 401-406.
- Durkee T, Kaess M, Carli V, Parzer P, Wasserman C, Floderus B, et al. Prevalence of pathological internet use among adolescents in Europe: demographic and social factors. *Addiction*. 2012; 107: 2210-2222.
- Yang CY, Sato T, Yamawaki N, Miyata M. Prevalence and risk factors of Internet Addiction: a cross-national comparison of Japanese and Chinese university students. *Transcult Psychiatry*. 2013; 50: 263-279.
- Kalaitzaki AE, Birtchnell J. The impact of early parenting bonding on young adults' Internet addiction, through the mediation effects of negative relating to others and sadness. *Addict Behav*. 2014; 39:733-736.
- Lin CH, Lin SL, Wu CP. The effects of parental monitoring and leisure boredom on adolescents' Internet addiction. *Adolescence*. 2009; 44: 993-1004.

21. Kwon JH, Chung CS, Lee J. The effects of escape from self and interpersonal relationship on the pathological use of Internet games. *Community Ment Health J.* 2011; 47: 113-121.
22. Lam LT, Wong EM2. Stress moderates the relationship between problematic Internet use by parents and problematic Internet use by adolescents. *J Adolesc Health.* 2015; 56: 300-306.
23. Lam LT. Parental mental health and Internet Addiction in adolescents. *Addict Behav.* 2015; 42: 20-23.
24. Young KS. The Pathological use of the Internet Test. Center for On-Line Addictions.
25. Widyanto L, Mc Murran M. The psychometric properties of the internet addiction test. *Cyberpsychol Behav.* 2004; 7: 443-450.
26. Antony MM, Bieling PJ, Cox BJ, Enns MW, Swinson RP. Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales in clinical groups and a community sample. *Psycholo Assess.* 1998; 10: 176-181.
27. Szabó M, Lovibond PF. Anxiety, depression and tension/stress in adolescents. *J Psychopath Behav Assess.* 2006; 28:195-205.
28. Yule AM, Wilens TE, Martelon MK, Simon A, Biederman J. Does exposure to parental substance use disorders increase substance use disorder risk in offspring? A 5-year follow-up study. *Am J Addict.* 2013; 22: 460-465.
29. Buu A, Dipiazza C, Wang J, Puttler LI, Fitzgerald HE, Zucker RA. Parent, family, and neighborhood effects on the development of child substance use and other psychopathology from preschool to the start of adulthood. *J Stud Alcohol Drugs.* 2009; 70: 489-498.