





The relationship between childhood trauma and Internet gaming disorder among college students: A structural equation model

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BRIEF REPORT



ABSTRACT

Background: The aim of this study was to investigate the mechanisms of Internet gaming disorder (IGD) and the associated interaction effects of childhood trauma, depression and anxiety in college students. **Methods:** Participants were enrolled full-time as freshmen at a University in the Hunan province, China. All participants reported their socio-demographic characteristics and undertook a standardized assessment on childhood trauma, anxiety, depression and IGD. The effect of childhood trauma on university students' internet gaming behaviour mediated by anxiety and depression was analysed using structural equation modelling (SEM) using R 3.6.1. **Results:** In total, 922 freshmen participated in the study, with an approximately even male-to-female ratio. A mediation model with anxiety and depression as the mediators between childhood trauma and internet gaming behaviour allowing anxiety and depression to be correlated was tested using SEM. The SEM analysis revealed that a standardised total effect of childhood trauma on Internet gaming was 0.18, ($Z = 5.60$, 95% CI [0.02, 0.05], $P < 0.001$), with the direct effects of childhood trauma on Internet gaming being 0.11 ($Z = 3.41$, 95% CI [0.01, 0.03], $P = 0.001$), and the indirect effects being 0.02 ($Z = 2.32$, 95% CI [0.00, 0.01], $P = 0.020$) in the pathway of childhood trauma-depression-internet gaming; and 0.05 ($Z = 3.67$, 95% CI [0.00, 0.02], $P < 0.001$) in the pathway of childhood trauma-anxiety-Internet gaming. In addition, the two mediators anxiety and depression were significantly correlated ($r = 0.50$, $Z = 13.54$, 95% CI [3.50, 5.05], $P < 0.001$). **Conclusions:** The study revealed that childhood trauma had a significant impact on adolescents' Internet gaming behaviours among college students. Anxiety and depression both significantly mediated the relationship between childhood trauma and internet gaming and augmented its

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negative influence. Discussion of the need to understand the subtypes of childhood traumatic experience in relationship to addictive behaviours is included.

KEYWORDS

Internet gaming disorder, childhood trauma, college students, depressive symptoms, anxiety symptoms

INTRODUCTION

In the current Cyber age, there are many studies focused on the association between problematic behaviours or symptoms and Internet engagement (Brand, Young, Laier, Wolfling, & Potenza, 2016; Sigerson, Li, Cheung, Luk, & Cheng, 2017). However, the umbrella term 'Internet addiction' is over-simplistic. It fails to specify the various problematic behaviours resulting from Internet engagement and how these diverse behaviours could be caused by different underlying mechanisms (Kuss, Griffiths, & Pontes, 2017). The Diagnostic and Statistical Manual of Mental Disorders-5 (DSM-5) have proposed that there is a need to assess Internet gaming disorder (IGD), adding IGD to the 'emerging measures and models' section of mental conditions in need of further research (American Psychiatric Association, 2013). According to the DSM-5, IGD refers to problematic and repetitive use of Internet-based games. Internet gaming disorder was also proposed in the 11th revision of International Classification of Diseases (ICD-11) (Rumpf et al., 2018). Hence, the research area is attracting increasing attention.

Over the past decade, research on IGD has sharply increased. Research has demonstrated that IGD has a negative impact on mental health, well-being and everyday functioning (Sarda, Begue, Bry, & Gentile, 2016). There are a handful of studies that report the prevalence of IGD, however, this research is inconsistent, with the prevalence varying from 1.2% to 46% (Kircaburun, Griffiths, & Billieux, 2019; Lemmens, Valkenburg, & Gentile, 2015; Muller et al., 2015; Rehbein, Kliem, Baier, Mossle, & Petry, 2015; Wan & Chiou, 2006). Studies have also identified factors associated with IGD/problematic Internet use, which include depression, anxiety and childhood trauma (Kircaburun et al., 2019; Sarda et al., 2016; Yates, Gregor, & Haviland, 2012). Individuals with disorders such as depression and anxiety were reported to be at a higher risk of developing problematic gaming (Kircaburun et al., 2019). Furthermore, Sarda et al. (2016) reported that IGD was significantly associated with depression and anxiety. A previous study in University students further found that having a history which included a traumatic experience increased the likelihood of problematic Internet use (Dalbudak, Evren, Aldemir, & Evren, 2014). Moreover, Yates et al. (2012) suggested that college students with maltreatment during childhood were at a disproportionately high risk for excessive Internet use. As a

result the researchers suggested that emotion regulation should be the focus when providing therapeutic prevention and intervention to students (Yates et al., 2012). Kardefelt-Winther (2014) proposed that Internet addiction could be regarded as a compensatory coping strategy for psychological symptoms such as depression, anxiety and traumatic events (Kardefelt-Winther, 2014). IGD could then in return act as a maladaptive coping strategy when dealing with traumatic life events (Kircaburun et al., 2019). Thus, based on the literature, childhood trauma, depression and anxiety have been associated with IGD, while childhood trauma has appeared to result in depression and anxiety.

Despite abundant studies on IGD, studies using a framework that explains the relationships amongst IGD, depression, anxiety and childhood trauma are non-existent. We therefore aimed to conduct a study to investigate the relationship between childhood trauma, depression, anxiety and IGD in Chinese college students. The current study examined the direct and indirect relationships between childhood trauma and IGD through the effect of depressive symptoms and anxiety symptoms. We hypothesised that childhood trauma would be directly associated with IGD and indirectly associated with IGD via depression and anxiety.

METHODS

Participants

A total of 941 Chinese students were recruited at a local Hunan University, China, between October 2018 and December 2018. Out of the 941 students, 922 completed the questionnaires. All eligible participants were full-time freshmen enrolled at the university.

Materials

Socio-demographic characteristics of the college students were collected, including ethnicity, gender, age, height, weight, whether they were an only child, yearly family income and the history of family mental illness.

The Childhood Trauma Questionnaire Short Form (CTQ-SF). The Childhood Trauma Questionnaire Short Form (CTQ-SF) consists of 28 items (25 clinical items and 3 validation items) on a 5-point Likert scale, which are scored from 1 (never true) to 5 (very often true). It covers five types of Childhood trauma: emotional abuse, emotional neglect, sexual abuse, physical neglect and physical abuse. The sum scores of the CTQ-SF ranges from 25 to 125 points, with a higher score indicating a higher severity of Childhood trauma (Bernstein et al., 2003). The reliability of the Chinese version of CTQ-SF scale has been confirmed (the Cronbach's alpha was 0.77) (Zhao, Zhang, Li, Zhou, Li, & Yang, 2005). Cronbach's alpha was 0.82 in the current sample.

The Generalized Anxiety Disorder-7 (GAD-7). Screening of anxiety symptoms was implemented by the GAD-7 scale. It is comprised of 7 items on a 4-point Likert scale. The total



score of the GAD-7 ranges from 0 to 21, with a higher score indicating a more severe level of anxiety. It has been reported that the Chinese version of GAD-7 exhibits good validity and reliability, with a Cronbach's alpha of 0.88 (Yu et al., 2016). Cronbach's alpha was 0.86 in the current sample.

The Quick Inventory of Depressive Symptomatology-Self-Report (QIDS-SR). The level of depressive symptoms was measured by the QIDS-SR scale, which contains nine types of depressive symptoms. The QIDS-SR consists of 16 items on a 4-point Likert scale and the total score ranges from 0 to 27, with a higher score indicating a more severe level of depressive symptoms. The reliability of the Chinese version of QIDS-SR has been confirmed by (Liu et al., 2013) (the Cronbach's alpha was 0.74). Cronbach's alpha was 0.70 in the current sample.

The Internet Gaming Disorder Scale (IGD). The 9-item IGD scale can assess Internet addiction based on the DSM-5 IGD criteria (Sigerson et al., 2017), which is the short version of the 20 item IGD scale (Pontes, Kiraly, Demetrovics, & Griffiths, 2014). Each item is answered by either yes or no (*yes* = 1 and *no* = 0). The sum of the IGD score ranges from 0 to 9, with a higher score indicating a higher possibility of IGD. The Chinese version of the IGD scale has been validated in China, with a Cronbach's alpha of 0.91 (Sigerson et al., 2017). Cronbach's alpha was 0.65 in the current sample.

Statistical Analysis

The data was analysed using R for Mac, version 3.6.1. We first ran the descriptive statistics of the socio-demographic characteristics among the college student population. Then, correlation tests were performed to explore the associations among CTQ, Anxiety, Depression and IGD. Finally, the model analysis was conducted using R LAVAAN package (Rosseel, 2012). The significance level was set as $\alpha = 0.05$ (two-tailed) in all data analysed.

Ethics. Ethical approval was obtained from the Ethics Committee of Second Xiangya Hospital, Central South University, China. All participants were fully informed about the purpose of this investigation, agreed to participate in this survey and provided written informed consent voluntarily.

RESULTS

Sample Characteristics

Table 1 shows the socio-demographic data of the 922 individuals who participated in this study. Most of the Chinese college students were Han ethnic (92.3%), and the male-to-female ratio was approximately 50%. Most of the participants were 18–19 years old (71.8%) with a normal BMI (77.3%). About two-thirds of the participants had siblings (67.9%). Only 4.0% of the students reported that

their family income was inadequate and 7.0% reported that they had a family history of mental illness. 5.5% of the individuals met the criteria for IGD (cut-off score of 5).

Descriptive Statistics

Results from the correlation analysis showed that childhood trauma ($M = 35.32$, $SD = 8.10$) was significantly correlated with anxiety ($M = 3.14$, $SD = 3.22$), $r = 0.24$, $P < 0.001$ and with depression ($M = 4.61$, $SD = 3.17$), $r = 0.33$, $P < 0.001$ and with internet gaming disorder ($M = 1.38$, $SD = 1.61$), $r = 0.19$, $P < 0.001$. Internet gaming disorder was also significantly correlated with anxiety, $r = 0.20$, $P < 0.001$ and with depression, $r = 0.25$, $P < 0.001$. In addition, anxiety and depression were also highly correlated, $r = 0.59$, $P < 0.001$.

An independent t-test was conducted to test the gender difference in IGD scores. Result revealed that female students ($M = 1.43$, $SD = 1.70$) reported similar levels of Internet gaming disorder in comparison to male students ($M = 1.34$, $SD = 1.52$), $t(910) = 0.90$, $P = 0.368$.

Mediation Analysis

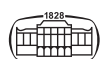
A mediation model with anxiety and depression being the mediators between childhood trauma and internet gaming, allowing anxiety and depression to be correlated was tested using SEM (Duan et al., 2019). The SEM analysis revealed

Table 1. Socio-demographic characteristics of college students

Characteristic	Number	Percent (%)
<i>Ethnic</i>		
Han	851	92.3
Others	71	7.7
<i>Gender</i>		
Men	447	48.5
Women	475	51.5
<i>Age</i>		
16–17	178	19.3
18–19	662	71.8
≥20	82	8.9
<i>BMI*</i>		
Thin	72	7.8
Normal	713	77.3
Overweight	107	11.6
Obesity	26	2.8
<i>Being the only child</i>		
Yes	295	32.1
No	625	67.9
<i>Yearly family income</i>		
Low	37	4.0
Average	442	48.0
High	441	48.0
<i>History of family mental illness</i>		
Yes	64	7.0
No	856	93.0
<i>IGD</i>		
Yes	50	5.5
No	862	94.5

Note: IDG = Internet Gaming Disorder.

*Different gender using different criteria.



that a standardised total effect of childhood trauma on Internet gaming disorder was 0.18, ($Z = 5.60$, 95% CI [0.02, 0.05], $P < 0.001$), with the direct effects of childhood trauma on Internet gaming being 0.11 ($Z = 3.41$, 95% CI [0.01, 0.03], $P = 0.001$), and the indirect effects being 0.02 ($Z = 2.32$, 95% CI [0.00, 0.01], $P = 0.020$) in the pathway of childhood trauma-depression-Internet gaming disorder; and 0.05 ($Z = 3.67$, 95% CI [0.00, 0.02], $P < 0.001$) in the pathway of childhood trauma-anxiety-Internet gaming disorder. In addition, the two mediators, anxiety and depression, were significantly correlated ($r = 0.50$, $Z = 13.54$, 95% CI [3.50, 5.05], $P < 0.001$) (Fig. 1).

DISCUSSION

We investigated the relationship between childhood trauma and IGD via the mediation effects of depression and anxiety. The results showed that childhood trauma impacted IGD directly and indirectly via depression and anxiety. Anxiety and depression partially mediated the effects of childhood trauma on IGD. These results are meaningful and have practical implications when conceptualized into a mediation framework. The proposed framework could be used by researchers in the field, such as clinicians to improve the prevention and treatment of IGD.

In the current sample, the prevalence of IGD in college students was 5.5%. As briefly mentioned in the introduction, the prevalence of IGD was reported in different studies ranging from 1.2% to 46%. The reported variations in prevalence could be due to the different settings, measurements and samples. Also, the DSM-5 stated that IGD was more prevalent in Asian countries compared to North America and Europe (American Psychiatric Association, 2013). The result in our report indicated that among university students in a semi-controlled environment (Chinese university students live in a communal building on the campus), the prevalence of Internet gaming is rather restricted. Previous studies also found that males were more likely to engage in Internet related

problematic behaviours (Durkee et al., 2012; Schimmenti et al., 2017), but we did not find gender difference in IGD.

Consistent with previous study, we found that childhood trauma was a strong predictor of depression and anxiety (Chen, Gillespie, Zhao, Xi, Ren, & McLean, 2018; Dalbudak et al., 2014). Childhood trauma could also affect IGD directly and indirectly via symptoms of depression and anxiety. It is likely that people with previous traumatic experiences may use maladaptive coping strategies (Ehlers & Clark, 2000), such as internet gaming. The addiction to Internet gaming could be used to avoid focussing on trauma and trauma related distress, such as depression and anxiety. However, the application of dysfunctional coping strategies could impede the cognitive processing of traumatic experiences and would be detrimental to the healing process (Schimmenti et al., 2017). In addition, previous study indicated that childhood trauma was associated with other problematic internet use such as cyberbullying, while childhood trauma was directly and indirectly associated with cyberbullying via Cluster B personality traits (i.e. antisocial, narcissistic, histrionic and borderline) (Kircaburun, Dementrovs, Király, & Griffiths, 2018). The different personality trait could play an important mediating role in the relationship between childhood trauma and IGD. Future following up studies on IGD should examine the effect of personality traits.

The current results have significant clinical implications. Our results suggest that addressing childhood trauma, depression and anxiety together could more effectively help college students reduce their IGD. We recommended that IGD among college students be further explored using both clinical and epidemiological methods. Clinical interventions should strive to address the motives behind Internet related problems (Schimmenti et al., 2017), and tailored interventions should focus on the whole picture including the individual's past experiences rather than merely aiming to treat the IGD. We call for education institutes to provide treatment for students with IGD. For example, mindfulness-based intervention is reported to be effective in treating IGD symptoms (Sanacora et al., 2017), possibly because mindfulness training aims to achieve a deep understanding of the self and forgiveness of the past.

There are several limitations to the current study that should be noted. First, causality among the variables cannot be guaranteed due to the cross-sectional design. Future longitudinal studies are required to explore the relationship between childhood trauma and IGD. Second, the sample was collected in one university, which may limit the generalizability. Third, the core addiction indicators in the different IGD screening instruments were inconsistent from each other (Torres-Rodriguez, Griffiths, & Carbonell, 2018). Researchers have questioned the suitability of specific instruments for different settings, since studies may emphasize different aspects of IGD (King, Haagsma, Delfabbro, Gradisar, & Griffiths, 2013). Future studies with representative samples and more robust measures are needed to verify the findings. Fourth,

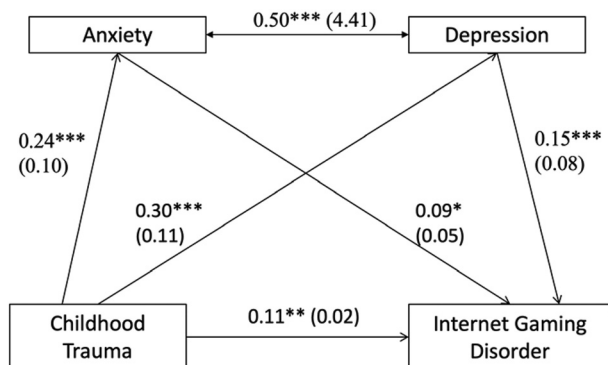


Figure 1. Final model with the standardized coefficients, and unstandardized coefficients presented in the parentheses. Note. * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$



although the model was significant, the effect sizes were relatively small. IGD could be impacted by a lot of other variables. Internet-related disorders should be considered within an integrative theoretical framework, covering the aspects of biopsychological factors, social factors, psychopathological factors, personality traits and other specific motivations (Brand, Young, Laier, Wolfling, & Potenza, 2016; Kircaburun, Demetrovics, Király, & Griffiths, 2018). We recommended that future studies use comprehensive measurements covering multiple factors.

In conclusion, our research sheds new light on the understanding of IGD using a mediation framework model, which explores the relationship between childhood trauma, depression, anxiety and IGD. The results can be applied to clinical practice in order to facilitate IGD prevention and promote treatment interventions. Future studies should investigate other potential underlying mechanisms that may lead to the development of IGD, providing a more comprehensive understanding of the issue.

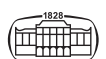
Author's contribution: Study design: SL, OJ, CR, GJ, WH, CL, ZK. Data collection: SL, GJ, WH, CL, ZK. Data analysis: WY, WA, DZ, PK, HZ, WH, OJ, YH, SQ. Data interpretation: WY, WA, DZ, PK, HZ, CR, ZK. Manuscript preparation: SL, WY, WA, YY, CR, CS, PK, HZ, SQ. All authors had full access to all data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

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Conflict of interest: The authors declare no conflict of interest.

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