RESEARCH ARTICLE

Correlation between Internet Addiction Disorder and Mental Health of Junior Middle School Students in Chengdu

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Abstract: Objective: To study the prevalence and main influencing factors of Internet addiction among junior middle school students in Chengdu, and to provide scientific basis for the prevention and intervention of Internet addiction. **Methods**: From September to December 2017, 3,607 junior middle school students were randomly selected from 8 middle schools in Chengdu by stratified cluster sampling, and investigated by self-made questionnaire. SPSS 19.0 software was used for χ^2 test and multiple linear regression analysis. **Results**: 174 of 3,607 junior middle school students in Chengdu were diagnosed with Internet addiction, and the detection rate of Internet addiction was 4.8%. There were significant differences in the scores of mental health, learning pressure, parent-child relationship and peer relationship between Internet addiction and non−internet addiction junior middle school students ($P < 0.05$). The results of multiple linear regression showed that family economic status, learning pressure, depression and anxiety were positively correlated with internet addiction, while parent-child relationship, peer relationship and social support were negatively correlated with Internet addiction ($P < 0.05$, $P < 0.01$). **Conclusion**: The detection rate of Internet addiction among junior middle school students in Chengdu is at a low level. Junior middle school students with low social support and high depression and anxiety have a higher risk of Internet addiction, which can be reduced by improving their mental health.

***Keywords*:** Junior school student; Internet addiction; Mental health; Influence factor

1. Introduction

Internet addiction disorder (IAD) refers to the uncontrollable Internet behavior impulse without the action of addictive substances, which is manifested in the obvious impairment of individual social and psychological

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functions due to excessive use of the Internet[1]. Adolescence is an important stage of physical and psychological development. However, due to the immature physical and psychological development and weak ability of self-management and control, teenagers are prone to have Internet addiction, which has an extremely adverse impact on the healthy growth of body and mind, and has attracted extensive social attention. In the 44th *Statistical Report on Internet Development in China* released by China Internet Network Information Center (CNNIC) in August 2019, it was pointed out that up to June 2019, the number of Internet users in China had reached 854 million, with Internet users aged 10-19 accounting for 16.9% of the total Internet users, professional students accounting for 26.0% of the Internet users[2], and the Internet addiction rate of middle school students was 5.97%-23.3%[3]. Junior middle school students have become a high-risk group of Internet addiction problems. The period of Junior middle school is also known as "psychological weaning period"[4]. Compared with primary school, junior middle school students have significant changes in psychology, with a certain degree of imbalance and contradiction, which makes junior middle school students face a series of psychological crises, which can easily lead to mental health problems if these psychological crises are not handled. There is no previous research on the correlation between Internet addiction and mental health of junior middle school students in Chengdu. Through the investigation and analysis of the prevalence status and main influencing factors of Internet addiction of junior middle school students in Chengdu, this study explores the relationship between Internet addiction and mental health, so as to provide a scientific basis for the prevention and intervention of Internet addiction behavior.

2. Object and Method

2.1. Object

From September to December 2017, the method of cluster random sampling was adopted to randomly select 8 junior middle schools (including key junior middle schools and ordinary junior middle schools) from Chengdu. 3-5 classes were randomly selected from each of the three grades of each junior middle school. All students in the class were taken as the object of the survey, and the number of students participating in the survey in each school was about 450. All respondents were informed and gave consent.

2.2. Method

Firstly, the teachers participating in the survey shall be trained to be familiar with the research background, research purpose and questionnaire content of the subject. They shall understand the survey process and the responsibilities of investigators, and the integrity rate is required to be ≥95%. The on-site survey was conducted in batches by grades. The school teacher arranged the students to conduct the survey in the classroom during class time. The self-administered questionnaire was applied, the research participants fill in the questionnaire by themselves. Before filling in, the teacher explained the requirements and precautions. The students completed the questionnaire anonymously and it was handed over on the spot. The time to complete the questionnaire was about 30-40 minutes.

2.3. Evaluation tools

The questionnaire includes three parts: (1) basic information and Internet access: the demographic characteristics of the respondents were collected, including gender, grade, educational level of parents, family economic status, accommodations in school, if they were the only child in the family, etc., as well as Internet

age, Internet surfing time, Internet equipment, etc. Learning stress dimension scale, parent-child relationship scale and peer relationship scale in adolescent life events scale were used to reflect learning stress, parent-child relationship and peer relationship respectively. The coefficients of Cronbach's α of the internal consistency test of the scale in this study are 0.748, 0.786 and 0.870 respectively. (2) Internet addiction status: Young's Diagnostic Questionnaire (YDQ) was used to measure the symptoms of Internet addiction in adolescents. The scale is a single dimension and a diagnostic scale for Internet addiction. It has 8 items. It is scored with 2 points (yes = 1 point, no = 0 point). Take the total score of the items as indicators. The higher the score, the more Internet addiction symptoms of teenagers. If the answer to ≥5 items is "yes", they will be judged as Internet addicts, otherwise they are Internet non addicts. The coefficients of Cronbach's α of the internal consistency test of the scale in this study is 0.775. (3) Social support, self-esteem, anxiety and depression were used to reflect the mental health status of junior middle school students. Social support: The Perceived Social Support Scale (PSSS) developed by Ziment *et al.* is used to measure the degree of support perceived by individuals from various social support sources (such as family, friends and others). There are 12 items in total, and the answers of each item are scored at 7 levels, from "extremely disagree" to "extremely agree", with 1-7 points respectively, and the full score is 84 points. The coefficients of Cronbach's α of the internal consistency test of the scale in this study is 0.963. Self-esteem: The Self-esteem Scale (SES) compiled by Rosenberg in 1965 was used to evaluate the overall feelings of individuals about self-worth and self-acceptance. There are 10 items in the scale, and they are scored at 4 levels, from "very inconsistent" to "very consistent", with 1-4 scores respectively. The coefficients of Cronbach's α of the internal consistency test of the scale in this study is 0.737. Anxiety: The Social Anxiety Scale (SAS) compiled by Scheier and Buss in 1975 was used. There are 6 items in the scale, which are scored at 5 levels, from "very inconsistent" to "very consistent", with 0-4 points respectively. The coefficients of Cronbach's α of the internal consistency test of the scale in this study is 0.772. Depression: The Center for Epidemiological Studies Depression Scale (CES-D) was used. There are 20 items in the scale, which are graded at 4 levels, from "never or occasionally" to "most of the time", with 0-3 points respectively, and the full score is 60 points. The respondents need to fill in the table according to their feelings in the last week. Depressive symptoms can be determined when the total score is ≥16, which can be further divided into 16-19 points as possible depressive symptoms and ≥20 points as depressive symptoms. The coefficients of Cronbach's α of the internal consistency test of the scale in this study is 0.889.

2.4. Statistical analysis

Table 1. Assignment of multiple linear regression variables

Variables	Assignment
Gender	1 = male, 2 = female
Father's educational level	1 = primary school or below, 2 = junior middle school, 3 = high school or technical secondary school, 4 = college or above
Mother's educational level	1 = primary school or below, 2 = junior middle school, 3 = high school or technical secondary school, 4 = college or above
Family economic status	1 = very poor, 2 = poor, 3 = average, 4 = good, 5 = very good
Learning pressure	Continuity data
Parent-child relationship	Continuity data
Peer relationship	Continuity data
Social support	Continuity data
Self-esteem	Continuity data
Anxious	Continuity data
Depression	Continuity data
Internet addiction	Continuity data

SPSS 19.0 was used to sort out and analyze the data. The measurement data in line with normal

distribution was expressed by $\bar{x} \pm s$; the counting data was expressed by frequency, composition ratio and rate; the comparison between groups was tested by χ^2; Multiple linear regression analysis and stepwise method are adopted for the analysis of influencing factors. The stepwise method is adopted. The inclusion standard of independent variables is 0.10 and the exclusion standard is 0.15. See **Table 1** for the assignment of variables. Inspection level $\alpha = 0.05$.

3. Results

3.1. Basic information of respondents

A total of 3,673 questionnaires were collected in this survey, including 3,607 complete and effective questionnaires, with an effective recovery rate of 98.2%. Among 3,607 junior middle school students in Chengdu, there are 1,750 boys (48.5%) and 1,857 girls (51.5%); the number of students in the first, second and third grade of junior high school is 1,275 (35.3%), 1,190 (33.0%) and 1,142 (31.7%). The proportion of fathers and mothers with education level of college or above is the highest, which are 1,226 and 1,053 respectively; 1,440 students have good family economic conditions; 1,644 junior middle school students are resident students and 2,183 junior middle school students are the only child in their family. 6.4% of junior middle school students said they never surf the Internet, 27.8% of students have been online for 3-4 years, and 22.7% of students have been online for more than 6 years; 1,813 students (50.3%) spent less than 1 hour on the Internet every day, 19.5% spent 1-2 hours on the Internet and 10.8% spent 3-4 hours on the Internet every day; 91.0% of students use smart phones to surf the Internet.

Table 2. Comparison of detection rates of Internet addiction among junior middle school students with different characteristics in Chengdu

Features	Number of people	Internet addiction[b]	χ^2 value	*P* value
Gender			5.140	<0.05
Male	1 750	99 (5.7)		
Female	1 857	75 (4.0)		
Grade			3.307	0.191
First day	1 275	51 (4.0)		
The second day of junior high school	1 190	66(5.5)		
Junior three	1 142	57 (5.0)		
Father's education level[a]			26.710	<0.01
Primary school and below	219	23(10.5)		
Junior high school	934	54(5.8)		
High school or technical secondary school	829	37 (4.5)		
College degree or above	1 226	37(3.0)		
Mother's education level[a]			14.766	<0.01
Primary school and below	246	22 (8.9)		
Junior high school	932	43 (4.6)		
High school or technical secondary school	965	49 (5.1)		
College degree and above	1 053	35 (3.3)		
Family economic status [a]			35.769	<0.01
Good	1 440	67 (4.7)		
Common	1 925	77 (4.0)		
Difference	222	29 (13.1)		
Resident student [a]			2.814	0.093
Yes	1 644	89 (5.4)		
No	1 856	78 (4.2)		
Only child [a]			1.109	0.292
Yes	2 183	98 (4.5)		
No	1 308	69 (5.3)		

Note: [a:] some data are missing; [b:] the data outside the bracket is the number of people, and the data inside the bracket is the percentage (%).

3.2. Comparison of internet addiction detection rates of junior middle school students with different characteristics

A total of 174 students were diagnosed with Internet addiction in this survey, and the detection rate of Internet addiction was 4.8%. There were significant differences in the detection rate of Internet addiction among junior middle school students of different gender, father's educational level, mother's educational level and family economic status ($P < 0.05$, $P < 0.01$); there was no significant difference in the detection rate of Internet addiction among junior middle school students with different grades, whether they were the only child or not, whether they lived in school or not ($P > 0.05$). See **Table 2**.

3.3. Comparison of mental health status of junior middle school students with different Internet addiction conditions

There was statistical significance in the differences between junior middle school students with and without Internet addiction in scores, learning pressure, parent-child relationship and peer relationship ($P < 0.05$). The mental health status of junior middle school students in the Internet non addiction group was significantly better than that in the Internet addiction group. See **Table 3**.

Table 3. Comparison of scores of mental health status of junior middle school students with and without Internet addiction ($\bar{x} \pm s$, points)

Group	Number of people	Learning pressure	Parent-child relationship	Peer relationship	Social support	Self-esteem	Anxious	Depressed
Addiction group	174	10.15 ± 6.31	9.70 ± 2.98	12.80 ± 4.27	48.32 ± 21.29	28.06 ± 9.47	10.87 ± 5.28	23.84 ± 10.44
Non-addiction group	3,433	8.90 ± 4.59	11.54 ± 2.50	15.67 ± 3.53	62.67 ± 16.84	29.22 ± 7.08	9.76 ± 4.92	15.72 ± 10.34
t value		-3.4	9.4	10.26	10.75	2.07	-2.86	-10.04
P value		<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01

3.4. Analysis of influencing factors of junior middle school students' Internet Addiction

Taking the score of Internet addiction scale as the dependent variable, and the variables with statistical significance in univariate analysis, parent-child relationship, peer relationship, learning pressure and four mental health scales as the independent variables, multiple linear regression analysis was carried out. The results showed that family economic status, learning pressure, depression and anxiety were positively correlated with Internet addiction ($P < 0.05$, $P < 0.01$), while parent-child relationship, peer relationship and social support were negatively correlated with Internet addiction ($P < 0.01$). See **Table 4**.

4. Discussion

At present, the detection rate of Internet addiction among junior middle school students in China is 3.1%-12.7%, and the incidence of Internet addiction among adolescents aged 11-19 is 7.6%[5]. The results of this study show that the detection rate of Internet addiction among junior middle school students in Chengdu is 4.8%, which is at a low level, lower than the detection rate of Internet addiction among junior middle school students in Wuhan (7.71%)[6] and Tianjin (6.92%)[7], and higher than that of middle school students in Shanghai (2.3%)[8].

Table 4. Multiple linear regression analysis of Internet addiction among junior middle school students in Chengdu

Variables	*B*	*SE*	*t* value	*P* value	*β*
Family economic status	0.101	0.044	2.266	<0.05	0.038
Learning pressure	0.019	0.007	2.620	<0.01	0.046
Parent-child relationship	-0.136	0.014	-9.815	<0.01	-0.184
Peer relationship	-0.034	0.011	-3.152	<0.01	-0.065
Social support	-0.015	0.002	-6.694	<0.01	-0.140
Anxious	0.025	0.007	3.522	<0.01	0.063
Depression	0.026	0.004	6.900	<0.01	0.144

The results of multiple linear regression showed that the lower the score of social support, the higher the score of anxiety and depression scale and the higher the score of Internet addiction. In recent years, a large number of studies have found that the occurrence of adolescent Internet addiction is related to mental disorders. Foreign studies have shown that Internet addiction behavior is closely related to adolescents' emotional and psychological problems such as depression and anxiety[9]. Fu *et al.*[10] proposed that hostility and depression are the most relevant symptoms of Internet addiction, and there may be a two-way correlation between Internet addiction and mental symptoms. On the one hand, teenagers may alleviate mental symptoms through Internet, on the other hand, Internet addiction may lead to or further amplify mental symptoms. Social support is a pillar resource obtained by individuals from social relations. Qiu[11] found that social support of junior middle school students has a negative predictive effect on Internet addiction. Structural equation model shows that social support not only has a direct effect on Internet addiction, but also has an indirect effect on Internet addiction through loneliness. The research of Song *et al.*[12] on college students shows that the level of social support received by college students is negatively correlated with Internet addiction.

Standardized partial regression coefficient (β) shows that depression has the greatest impact on Internet addiction, and depressive symptoms can positively predict Internet addiction, which is consistent with the research results of Qiu[11] and Xiang[13]. Adolescence is the key period of psychological development and the frequently occurring stage of various mental health problems. Depression is a kind of emotional, behavioral, and physical and mental adverse reaction dominated by sadness, accompanied by grievance that is hard to dissipate, introversion and pain[14], which is the most common emotional problem of middle school students. As middle school students are in the stage of adolescence, the unique imbalance of physical and psychological development in this period is easy to cause depressive symptoms, while the imperfect psychological coping mechanism makes it difficult for junior middle school students to correctly deal with bad emotions and easy to vent and entertain themselves through the Internet. A large number of studies have demonstrated the correlation between depression and Internet addiction. The incidence of Internet addiction in students with depression is higher than that in students without depression[15]. The reason may be that students with depression are more likely to treat life negatively. When they face all kinds of troubles and pressures in life, they are likely to have negative emotions. If there is no reasonable way to release the pressure, the network with the characteristics of virtual, equality and self-satisfaction has become an ideal way for them to vent, and the Internet has become a way for depressed students to get rid of real life. Therefore, students with depression may be more inclined to isolate themselves and take the Internet as an alternative, which is very easy to form bad online behavior. In addition, students with depression tend to have weak self-control ability. If their psychological needs are not met in real life, they will spend more time and energy on the Internet to reduce and alleviate negative emotions. In the long term, they will become more and more dependent on the Internet and eventually develop into Internet addiction.

The regression results show that peer relationship is negatively correlated with junior middle school

students' Internet addiction, which is consistent with the research results of Liu *et al.*[16]. Peer relationship is the protective factor of teenagers' Internet addiction. Liu *et al.*[17] found that the more dissatisfied and anxious adolescents are about peer communication, the more likely they are to develop Internet addiction. Chen *et al.*[18] found that the better the quality of adolescent peer relationship, the lower the risk of developing Internet addiction. Peer relationship can not only cultivate teenagers' ability to adapt to the society and gain the experience of communicating with others, but also enable teenagers to obtain a sense of identity, security and social support. Teenagers with poor peer relationship cannot share with others due to emotional fluctuations will seek interpersonal relationship as compensation on the network, obtain emotional comfort, and are easy to vent their bad emotions through the network. The results of this study show that learning stress is positively correlated with Internet addiction. The current educational environment focuses on students' academic performance. Students' academic burden is generally heavy and their psychological pressure is large. Once the pressure exceeds their bearing range, they may have rebellious emotions and even weariness. While the Internet is a convenient place to escape academic pressure, but long-term addiction to the Internet and lack of time to take into account their studies will worsen their academic performance, increase their learning pressure and make it more difficult to deal with, thus forming a vicious circle[19].

With the development of science and technology, the Internet has penetrated into all fields of life, and it is inevitable for students to use the Internet. Therefore, the prevention and control of Internet addiction among primary and secondary school students cannot be ignored. It requires education and attention from families, schools and society, and the policy of prevention first and early intervention should be adopted. Schools and students' parents should not only pay attention to students' academic performance, but also pay close attention to the dynamic development and changes of junior middle school students' psychology, giving them more attention. Junior middle school students' mental health education should be strengthened. Targeted psychological and behavioral intervention measures should be applied, and psychological courses be carried out to help junior middle school students adjust their bad emotions, cultivate a positive and optimistic attitude and reasonable communication methods. Establish a peer group of mutual trust to feel the care and love from peers, and meet interpersonal needs in classmate interaction, thus improve self-confidence and self-esteem. In this way, they can improve social support, reduce depression and anxiety, and prevent and alleviate junior middle school students' Internet addiction.

Conflict of interest

The authors believe that there is no economic interest or other relationship with individuals and organizations.

References

1. Dong Y, Li H. Relationship between Depression and Internet Addiction among College Students in Western Liaoning. Modern Preventive Medicine 2018; 45(16): 3069-3072.
2. China Internet Network Information Center (CNNIC). (The 44th Statistical Report on Internet Development in China. Available from: http://www.cnnic.net.cn/.
3. Liu S, Zhi X, Fang J, *et al*. Study on the Internet Addiction Status and Influencing Factors Among Middle School Students in Tianjin. Chinese Journal of Prevention and Control of Chronic Diseases 2017; 25(3): 176-179.
4. Yao L, Pan L. Investigation on Mental Health Status and Influencing Factors in 3,190 Junior Middle School

Students. Chinese Journal of School Doctor 2015; 29(2): 86-87.
5. Cai P. Chuzhongsheng Wangluo Chengyin Qingxiang yu Jiating Gongneng, Shehui Zhichi, Yingfu Zhichi Fangshi de Guanxi Yanjiu (A Study on the Relationship Between Internet Addiction Tendency and Family Function, Social Support and Coping Style of Junior Middle School Students). Guangzhou: South China Normal University; 2007.
6. Song X, Zheng L, Li Y, *et al*. Wuhanshi Yinianji Xuesheng Wangluo Chengyin Xianzhuang ji Qi Yingxiang Yinsu Yanjiu (Study on the Current Situation and Influencing Factors of Internet Addiction Among First Grade Students in Wuhan). Chinese Journal of Epidemiology 2010; 31(1): 14-17.
7. Song G, Li R, Liu C, *et al*. The Epidemiological Survey on the Internet Addiction of Students in Tianjin. Chinese Journal of Prevention and Control of Chronic Non-Communicable Diseases 2008; 16(2): 153-155, 158.
8. Sun L, Luo C, Zhou Y, *et al*. Shanghaishi Zhongxuesheng Yiyu Zhengzhuang he Wangluo Chengyin Xingwei de Xiangguanxing (Correlation Between Depressive Symptoms and Internet Addiction Behavior of Middle School Students in Shanghai). Chinese Journal of School Health 2019; 40(3): 445-447.
9. Lai C, Mak K, Watanabe H, *et al*. The Mediating Role of Internet Addiction in Depression, Social Anxiety, and Subjective Psychosocial Well-Being Among Adolescents in Six Asian Countries: A Structural Equation Modelling Approach. Public Health 2015;129(9): 1224-1236.
10. Fu W, Hao J. Qingshaonian Wangluo Chengyin yu Jingshen Zhangai Yanjiu Xianzhuang (Research Status of Adolescent Internet Addiction and Mental Disorders). Chinese Journal of School Health 2019; 40(4): 634-637.
11. Qiu L. Chuzhongsheng Shehui Zhichi he Gudugan dui Wangluo Chengyin de Yingxiang yu Ganyu Yanjiu (A Study on the Influence and Intervention of Social Support and Loneliness on Internet Addiction among Junior Middle School Students). [MSc Thesis]. Zhengzhou: Zhengzhou University; 2018.
12. Song G, Kong F, Liu M, *et al*. The Mediating Effect of College Student's Loneliness between Social Support and Internet Addiction Tendency. Chinese Journal of Clinical Psychology 2010; 18(3): 67-69.
13. Xiang H, Ma X. Study on the Risk Factors of Some College Students with Internet Addiction in Guizhou. Modern Preventive Medicine 2012; 39(4): 922-924.
14. Zhu Y, Sun Y, Hao J, *et al*. Negative Life Events and Internet Addiction: The Mediating Role of Depression. Chinese Journal of School Health 2019; 40(10): 1499-1502.
15. Yang L, Zhang Z, Hao J, *et al*. Qingshaonian Wangluo Chengyin yu Zisha Xingwei de Xiangguan Guanxi (Correlation between Internet Addiction and Suicidal Behavior in Adolescents). Chinese Journal of Epidemiology 2010; 31(10): 1115-1119.
16. Liu Y, Yan Z. Peer Relationship of Middle School Students and Their Internet Addiction: The Mediation Effect of Loneliness. Journal of Jimei University (Education Science Edition) 2016; 17(3): 37-40.
17. Liu C, Kuo F. A Study of Internet Addiction Through the Lens of the Interpersonal Theory. Cyberpsychology, Behavior, and Social Networking 2007; 10(6): 799-804.
18. Chen Y, Li R, Zhang P, *et al*. The Effect of Peer Attachment on Adolescents' Internet Addiction: A Moderated Mediating Effect. Chinese Journal of Clinical Psychology 2018; 26(6): 1091-1095.
19. Sun R, Tong Y, Zheng X, *et al*. Case-Control Study on the Risk Factors of Internet Addiction Disorder Tendency Among Adolescents. Modern Preventive Medicine 2017; 44(12): 2127-2130.