ORIGINAL RESEARCH

Investigation on Internet addiction disorder in adolescents in Anhui, People's Republic of China

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Background and aim: The purpose of this study was to describe the characteristics and prevalence of Internet addiction (IA) in adolescents so as to provide a scientific basis for the communities, schools, and families.

Methods: We conducted a survey by randomized cluster sampling on 5,249 students, grades ranging from 7 to 12, in Anhui province, People's Republic of China. The questionnaire consisted of general information and IA test. Chi-square test was used to compare the status of IA disorder (IAD).

Results: In our results, the overall detection rate of IAD and non-IAD in students was 8.7% (459/5,249) and 76.2% (4,000/5,249), respectively. The detection rate of IAD in males (12.3%) was higher than females (4.9%). The detection rate of IAD was statistically different between students from rural (8.2%) and urban (9.3%) areas, among students from different grades, between students from only-child families (9.5%) and non-only-child families (8.1%), and among students from different family types.

Conclusion: Prevalence of IA is high among Chinese adolescents. IAD has more effect on male students, single-child families, single-parent families, and higher grade students. We should take more care of male students, only-child students, and students living with their fathers, and related education should be strengthen for susceptible subjects of IDA.

Keywords: adolescents, addictive behavior, Internet, health surveys

Introduction

With the development of science and network technology, searching for information and contacting by email has become more convenient for us. But when this network came to be overused, a phenomenon called "Internet addiction (IA)" occurred.[1] Globally, users of Internet have already crossed the 3 billion mark.[2] People's Republic of China has 256 million adolescent Internet users as of January 2014, accounting for 71.8% of the overall number of adolescents.[3]

Internet addiction disorder (IAD), now more commonly called problematic Internet use, compulsive Internet use, Internet overuse, problematic computer use, and pathological computer use, was first proposed by the American psychiatrist Goldberg; it is a phenomenon caused by excessive use of the network and leads to social psychological damages. The American psychologists Beard and Wolf,[4] also proposed that IAD refers to the factor of this phenomenon is the network itself, such as network communication and some low-quality content online.[5]

Some researchers found that IAD is associated with personality,[6–8] self-esteem,[9,10] social support,[9] suicide ideation, disordered eating attitudes,[11] defense styles,[12] depressive symptoms,[3] physiological.[6] Although official diagnostic criteria do not exist, IA can be defined as the excessive, obsessive–compulsive, uncontrollable, use

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of Internet, which also causes significant distress and impairments in daily functioning.[13] It is imperative to recognize the antecedents of IA.[14]

About 25% of users fulfill IA criteria within the first 6 months of using the Internet. Many individuals initially feel intimidated by the computer, and gradually feel a sense of "competency and exhilaration from mastering the technology and learning to navigate the applications quickly by visual stimulation". The feeling of exhilaration can be explained by the way IAD sufferers often describe themselves as: bold, outgoing, open-minded, intellectually prideful, and assertive.[4] The prevalence rates of IA in Hong Kong adolescents ranged from 17% to 26.8% during the high school years.[15]

Researchers have tried to find out the determinants or risk factors associated with IA. Male,[16] stage of education, daily time spent on using Internet, most frequent time of Internet use, monthly cost of use, and tea consumption[17] were some of the factors found to be associated with IA.

This study aims to investigate the status of the use of Internet of university students in Anhui province, so as to offer useful information for prevention and intervention in the treatment of adolescent IAD.

Methods
Participants
Cluster sampling method was used to select 5,249 participants who came from four junior high schools and four high schools in Anhui (People's Republic of China).[18] In the People's Republic of China, the education is divided into three categories: basic education, higher education, and adult education. Basic education in People's Republic of China includes preschool education, primary education, and regular secondary education. Secondary education is divided into academic secondary education and specialized/vocational/technical secondary education. Academic secondary education consists of junior high school (grade range 7–9) and high school (grade range 10–12).

Measures
The questionnaire consisted of general information (school, sex, age, grade, ethnicity, family location, height, weight, whether only child, etc) and self-assessment IA scale (IA test).[19] IA test consisted of 20 items, and each item was rated on a 5-point scale ranging from "very rarely" (1) to "very frequently" (5). Total score for each item was calculated. Total score of all items was interpreted as follows: ≥50 points as IAD group and <50 points as non-IAD group.

Procedures
This study was conducted in close cooperation with the main heads of schools. After they granted permission for the classroom survey, the survey was then conducted in four middle schools and one university; all primary teachers at each educational class were informed and invited to participate with their respective class. Before participation, the students received written and oral information about the study, including information about confidentiality and the right not to participate. The survey was supervised by a member of our research team who also answered questions from the students. The questionnaire took ~45 minutes to complete during a school class. Meanwhile, the questionnaire was anonymous and no records or codes were obtained. Participants were well-informed on the scope and extent of the survey and consent of the parents was also obtained.

Statistical analysis
Epidata 3.0 software (http://www.epidata.dk/) was used to establish a database and entry data; SPSS 20.0 (IBM Corporation, Armonk, NY, USA) software was used for data analysis; chi-square test was used to compare the detection rate of IAD in adolescents for different variables.

Ethics
All participants were informed about the study, and written informed consent was obtained from both the schools and parents/students' guardians. The Institutional Review Board of the Wannan Medical College approved the study.

Results
In our results, the overall detection rate of IAD and non-IAD in students was 8.7% (459/5,249) and 76.2% (4,000/5,249). Table 1 shows the main characteristics of students included. Table 2 reveals that the detection rate of IAD in males (12.3%) was higher than that of females (4.9%), and the detection rate of IAD was statistically different between students from rural (8.2%) and urban (9.3%) areas, among students from different grades, between students from only-child family (9.5%) and non-only-child family (8.1%), and among students from different family types.

Discussion
The development of Internet has made a great effect on our work, study, and life, as well as created a series of social problems. Recently, research found that the prevalence of IA is 6.0% among adolescent Internet users.[20] We also obtained similar results in our study, where the overall detection

Table 1 Main characteristics of young adolescents included in this study

Variable	n	%
Sex		
Male	2,703	51.50
Female	2,546	48.50
Location		
Rural	2,850	54.30
Urban	2,399	45.70
Education grade		
7	806	15.36
8	1,221	23.26
9	1,443	27.49
10	1,010	19.24
11	361	6.88
12	408	7.77
Only-child		
Yes	2,468	47.02
No	2,781	52.98
Family types		
Parents	4,780	91.06
Mother only	148	2.82
Father only	85	1.62
Other	236	4.50

rate of IAD was 8.7%. Additionally, the detection rate of IA in male students was higher than female students, the possible reason being maybe that personality and behavior are different between males and females. This difference between the two sexes may also explain that males are more

Table 2 The detection rate of IAD in young adolescents using different variables (%)

Variable	IAD	Non-IAD	Missing	χ^2	P-value
Sex				98.909	0.000
Male	333 (12.3)	2,019 (74.7)	351 (13.0)		
Female	126 (4.9)	1,981 (77.8)	439 (17.2)		
Location				119.484	0.000
Rural	235 (8.2)	2,045 (71.8)	570 (20.0)		
Urban	224 (9.3)	1,955 (81.5)	220 (9.2)		
Education grade				288.994	0.000
7	50 (6.2)	532 (66.0)	224 (27.8)		
8	92 (7.5)	881 (72.2)	248 (20.3)		
9	127 (8.8)	1,150 (79.7)	166 (11.5)		
10	68 (6.7)	808 (80.0)	134 (13.3)		
11	49 (13.6)	304 (84.2)	8 (2.2)		
12	73 (17.9)	325 (79.7)	10 (2.5)		
Only-child				54.055	0.000
Yes	234 (9.5)	1,957 (79.3)	277 (11.2)		
No	225 (8.1)	2,043 (73.5)	513 (18.4)		
Family types				17.379	0.000
Parents	422 (8.8)	3,649 (76.3)	709 (14.8)		
Mother only	12 (8.1)	118 (79.7)	18 (12.2)		
Father only	10 (11.8)	67 (78.8)	8 (9.4)		
Other	15 (6.4)	166 (70.3)	55 (23.3)		

Abbreviation: IAD, Internet addiction disorder.

involved in online activities, such as gaming, pornography, and gambling, which can lead to pathological Internet use. In this study, the incidence of IA for students from the rural and urban areas was significantly different, which may be explained by the fact that adolescents from rural areas have less opportunity to access Internet.

The results also showed that the detection rate of teen IA among different grades was significantly different. The IA rate increased with grade. The possible reason may be that higher grade students are more comfortable with surfing the Internet and faced less constraints from their parents.

Our survey showed that IA rate of only-child students is higher than that of non-only-child students. The Chinese Communist Party government has been forcefully promoting its one-child policy for 3 decades. One-child policy in the city performed better than rural areas, thus the only-child proportion in the city is much higher than in rural areas. In recent years, computer and Internet ownership has dramatically increased in cities, which promotes Internet use for students.

This study also suggests that the incidence of students IA is different among different family types. In addition, students living with their fathers have a higher incidence of IA, which could be caused by lack of mothers' education and care.

Measurement
Strengthen the mental health education
For adolescents, the purpose of mental health education is physical and mental development of youth in a scientific way, which can effectively help teenagers to improve self-control, promote self-regulation and persuasion, and resist the temptation of Internet. In addition, the health education department should help teenagers understanding of the network, distinguish the differences between real world and online world, and correct their own attitude toward the Internet.

Establish a harmonious home environment
In single-parent families, children have higher incidence of IA. Children cannot get enough warmth from a single parent, which hinders the development of children's healthy personality and comprehensive quality. Internet provides children a free and open space; they get freedom of spirit and mental catharsis on the Internet. The desire for communication makes them escape from real life, and to gradually be addicted to the Internet. Parents should create a warm and harmonious family environment, so that children experience a feeling of warmth from the family.

Conclusion

Prevalence of IA is high among Chinese adolescents. IAD has more effect on male students, single-child families, single-parent families, and higher grade students. More care must be taken of male students, only-child students, and students living with their fathers, and related education should be strengthened for susceptible subjects of IAD.

Author contributions

YY and YJ, study concept and design; LH and XZ, analysis and interpretation of data; YK and WG, statistical analysis; YY, funding obtained; YY study supervision. All authors contributed toward data analysis, drafting and revising the paper and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work.

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