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Relationship between internet addiction and mental health in adolescents

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Abstract:

BACKGROUND: Internet addiction (IA) currently is the major public health concern, especially in adolescents, although the results of previous reports are not generally uniform. This study was conducted to determine IA in adolescents and to examine the correlation of IA with mental health in adolescents.

METHODS: This cross-sectional study was conducted in 2019 in Ilam city. In this study, 362 persons were included using stratified cluster sampling; clusters were geographical area and schools. The valid questionnaires including Internet Addiction Test and 28-item General Health Questionnaire (GHQ-28) were used to interview. The correlation statistical technique was used to determine the association between the two variables. The significance level was considered <0.05 .

RESULTS: The mean \pm standard deviation age of the responders was 16.40 ± 2.47 years; the total score of IA and mental health was 43.02 ± 16.50 and 19.27 ± 9.72 , respectively. We found that 5.5% of the adolescents had a severe level of IA. The lack of control with anxiety, neglect work and social dysfunction, and neglect social life and severe depression in internet users were found to be statistically significant: $r(365) = 0.151, P < 0.033$; $r(365) = 0.126, P < 0.021$; and $r(365) = 0.125, P < 0.033$, two-tailed, respectively.

CONCLUSION: According to the results, the excessive use of internet, lack of control, and neglect social life are significantly correlated with mental health in adolescents; these results could be contribute to improve the theoretical models for IA in adolescents.

Keywords:

Adolescents, internet addiction, Iran, mental health, teenagers

Introduction

Internet addiction (IA) is defined as compulsive behaviors related to any online activity that affects daily life and leads to stress in social relationships.^[1] The IA among American college students is 12%^[2] and among Iranian medical students is 31.2%.^[3] In previous observed the link between excessive and improper use of internet with IA.^[4] The American Psychiatric Association defines IA as a disorder that is associated with mood disorders over a 2-month period and offers seven criteria for

its diagnosis (at least three criteria over 2 months), including tolerance, mobility symptoms, time spent using the internet more than initially intended, constant tendency to control behavior, spending time on internet-related matters, reduced social activity, jobs, fun in the effects of using the internet, and continued use despite awareness of its negative effects.^[5]

Given the majority of young population and also the large numbering of educated young people who are familiar with the internet, it seems that the internet can be considered as an influential media in our society;^[6] in addition, internet penetration in Iran is high

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and rapidly increasing.^[7] However, the most frequent and most vulnerable users of the internet are teenagers and youths who use the internet excessively.^[8]

IA is one of the major public health concerns, especially in adolescents, although the results are not generally uniform, and several studies have linked the relationship between IA with outcomes such as depression, anxiety, stress, and social.^[9-11] Further, Ozturk *et al.*'s study of 303 Turkish high-school students showed that a positive and significant correlation with depression score, irritability, anxiety, emotional disorders, behavioral problems, and hyperactivity with IA score.^[12] Adolescents need to be educated about how to use the internet because computers and the internet are becoming the most influential factors in adolescents' lives, and IA has negative effects on their academic performance, family relationships, and public health.^[13]

The present study evaluates IA among adolescents and also examines the correlation between IA and mental health in adolescents in Ilam city.

Methods

Setting and sample

This is a cross-sectional study; the population study was high-school and academic students in Ilam city aged from 13 to 18 years. The sample size $n = 362$ was estimation by ratio formula. Participants were selected by systematically cluster sampling. The types of clusters will include urban areas, school types, and classes; consequence of this, first, the urban areas were randomly selected, and then, within classes, girls and boys were selected in equal proportion. The data were completed using a questionnaire and manually by trained psychologists with a master's degree in psychology during a period of 4 months.

The inclusion criteria for entering the study were age 13–18 years, the ability to answer and complete the questionnaires, and also informed consent to participate in the study. Exclusion criteria were noncooperation at the time of completing the questionnaire and questionnaires being confused.

Measurement tools

Internet Addiction Test

Internet Addiction Test (IAT) is the most valid test for estimation of IA. IAT includes 20 questions and each question is rated on a Likert scale as 1–5 (never to always). Ultimately, users are divided into mild 20–49 scoring, moderate 50–79, and severe 80 and more. Further, six subscales include salience, excessive use, neglect work, anticipation, lack of control, and neglect social life. The validity and reliability of the

questionnaire in Iran were confirmed by the study of Mohammadsalehi *et al.* The alpha Cronbach's coefficient was calculated 0.917 (confidence interval 95%; 0.901–0.931);^[14] also in addition, this scale was calculated in this study (Cronbach's alpha = 0.921, $n = 362$).

General Health Questionnaire–28

The General Health Questionnaire (GHQ) was used to assess the mental health of the participants. The GHQ will estimate four aspects including severe depression, distress somatic symptoms, social dysfunction, and anxiety-insomnia. The Persian version of GHQ tools has been approved in Iran by Mohammadi *et al.* in 1999, 84.7 and 93.8% for sensitivity and specificity, respectively;^[15] the Cronbach's alpha in this study was calculated = 0.901 ($n = 362$). Person-to-person interview was used to all participants using a standard questionnaire.

Statistical analysis

Data were analyzed by IBM SPSS Statistics version 20.0 (IBM Corp., Armonk, NY, USA) using descriptive analysis (frequency [N] and percentage [%], as well as mean and standard deviation [SD]) and analytical analysis including correlation, analysis of variance, and multiple linear regression. The significance level was considered <0.05 .

Ethical approval

This study was approved by the Ethical Committee of the Ilam University of Medical Sciences (ID: IR.MEDILAM.REC.1397.127).

Results

We have obtained correlations of six IA subscales and four mental health subscales among adolescents, aged 13–18 years, in Table 1. The results showed that among six subscales of IA, four out of six were positive significant correlations with somatic symptoms, five out of six with anxiety and insomnia, five out of six with social dysfunction, and four out of six with severe depression. Some of the importance colorations in Table 1 include that the correlation between excessive use of internet and somatic symptoms factor was found to be positive statistically significant, $r(365) = 0.113$, $P < 0.032$, two-tailed. The correlation between the lack of control in internet users and anxiety and the insomnia factor was found to be statistically significant, $r(365) = 0.151$, $P < 0.033$, two-tailed. The correlation between neglect work in internet users and social dysfunction factor was found to be statistically significant, $r(365) = 0.126$, $P < 0.021$, two-tailed. The correlation between neglect social life in internet users and severe depression factor was found to be statistically significant, $r(365) = 0.125$, $P < 0.033$, two-tailed. In general, the results suggest

Table 1: The correlation matrix between Internet Addiction Test factors and total score with mental health factors and total score

Factors	Somatic symptoms	Anxiety, and insomnia	Social dysfunction	Severe depression	Total GHQ-28 scores	Saliency	Excessive use	Neglect work	Anticipation	Lack of control	Neglect social life	Total IAT scores
Somatic symptoms	1											
ρ	0.558**											0.101
P	0.000											0.045
Anxiety, and insomnia		1										
ρ	0.558**	1										0.126
P	0.000	0.000										0.024
Social dysfunction			1									
ρ	0.518**	0.506**	1									0.106
P	0.000	0.000	0.000									0.005
Severe depression				1								
ρ	0.511**	0.453**	0.545**	1								0.125
P	0.000	0.000	0.000	0.000								0.033
Total GHQ-28 scores					1							
ρ	0.826**	0.805**	0.777**	0.778**	1							0.197
P	0.000	0.000	0.000	0.000	0.000							0.025
Saliency						1						
ρ	0.188	0.186	0.125	0.121	0.100	1						0.724**
P	0.096	0.003	0.085	0.085	0.090	0.076						0.000
Excessive use							1					
ρ	0.113*	0.146	0.113	0.138	0.100	0.076	1					0.680**
P	0.032	0.088	0.001	0.076	0.090	0.076	0.000					0.000
Neglect work								1				
ρ	0.100	0.143	0.126	0.121	0.133	0.133	0.536**	1				0.589**
P	0.048	0.012	0.021	0.085	0.036	0.036	0.000	0.000				0.000
Anticipation									1			
ρ	0.172	0.109	0.141	0.132	0.142	0.492**	0.394**	0.373**	1			0.470**
P	0.072	0.062	0.034	0.047	0.026	0.000	0.000	0.000	0.000			0.000
Lack of control										1		
ρ	0.127*	0.151	0.159	0.186	0.103	0.533**	0.405**	0.383**	0.383**	1		0.605**
P	0.016	0.033	0.066	0.023	0.051	0.000	0.000	0.000	0.000	0.000		0.000
Neglect social life											1	
ρ	0.105*	0.125	0.139	0.125	0.145	0.545**	0.394**	0.356**	0.356**	0.330**	1	0.523**
P	0.047	0.038	0.063	0.033	0.092	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total IAT scores												1
ρ	0.101	0.126	0.106	0.125	0.197	0.724**	0.680**	0.589**	0.470**	0.605**	0.523**	1
P	0.045	0.024	0.005	0.033	0.025	0.000	0.000	0.000	0.000	0.000	0.000	0.000

**Correlation is significant at the 0.01 level (two-tailed), *Correlation is significant at the 0.05 level (two-tailed), ρ =Spearman's rank correlation coefficient, GHQ-28=General Health Questionnaire-28, IAT=Internet Addiction Test

that the total score of IA was significant correlation with mental health in adolescents, $r(365) = 0.197, P < 0.025$, two-tailed [Table 1].

The means \pm SDs, maximum and minimum values, and skewness of age and all IA and mental health factors are presented in Table 2. The mean \pm SD age of the responders was 16.40 ± 2.47 ; the total score of IA and mental health was 43.02 ± 16.50 , and 19.27 ± 9.72 , respectively.

The mean of IA and mental health factors in terms of internet dependency and nondependency is shown in Figure 1. The mean of IA in all factors was higher in internet-dependent users, as well as in mental health factors, except somatic symptoms factor.

Among all subjects, only 20 (5.5%) had a severe level of IA; further, our results showed that an increasing score of mental health from mild to severe levels of IA [Table 3].

The mean of IA in mild, moderate, and severe IA was 19.4, 32.8, and 47.7, respectively [Figure 2].

In final step to predict of important factors associated to IA, the mental health subscales were included as dependent variables; the results showed that the main factors were somatic symptoms $\beta = 1.63, P = 0.003$, and social dysfunction $\beta = 0.877, P = 0.041$ [Table 4].

Discussion

Results of the current cross-sectional study showed that the mean of total and IA subscales was higher in dependent internet users. Among them, excessive use was the main problem in dependent users. Consistent with this finding in previous studies, prolong use of internet could be an accelerator to dependency to internet;^[16,17] in some other studies, spent more time with internet was related to higher psychological distress.^[18,19] Due to IA, the sufficient time for other personal and social activity will be reduced, including spending time with

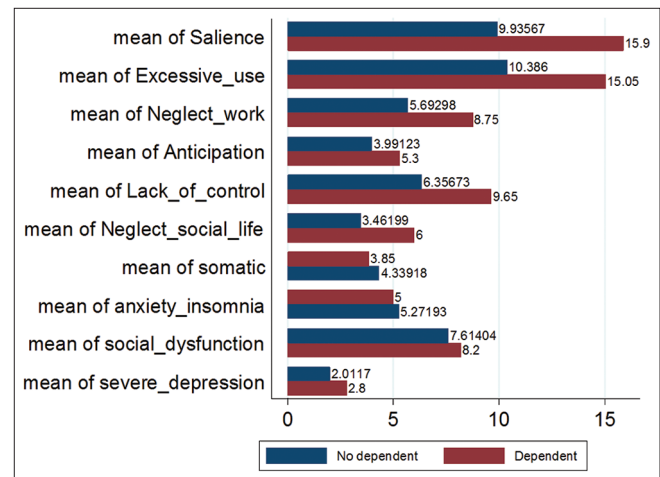


Figure 1: The mean of internet addiction test and General Health Questionnaire factors by dependent and nondependent of internet

Table 2: The descriptive statistics of age, Internet Addiction Test factors, and total score with mental health General Health Questionnaire factors and total score

Subscales	Minimum	Maximum	Mean \pm SD	Skewness
Age	0	20	16.40 \pm 2.472	-5.638
Somatic symptoms	0	17	4.31 \pm 3.349	1.184
Anxiety and insomnia	0	21	5.26 \pm 3.351	0.726
Social dysfunction	0	19	7.65 \pm 2.496	1.096
Severe depression	0	20	2.06 \pm 2.978	1.994
Total GHQ-28 scores	0	65	19.27 \pm 9.722	1.187
Saliency	0	24	10.27 \pm 4.666	0.195
Excessive use	0	23	10.64 \pm 4.705	0.095
Neglect work	0	15	5.86 \pm 3.094	0.732
Anticipation	0	10	4.06 \pm 2.175	0.477
Lack of control	0	15	6.54 \pm 3.450	0.305
Neglect social life	0	10	3.60 \pm 2.032	0.895
Total IAT scores	9	91	43.02 \pm 16.508	0.582

GHQ-28=General Health Questionnaire-28, IAT=Internet Addiction Test, SD=Standard deviation

Table 3: Differences in mental health factors among different Internet Addiction Test groups

IAT	n (%)	Mean \pm SD			
		Somatic symptoms	Anxiety and insomnia	Social dysfunction	Severe depression
Mild internet addiction	242 (66.9)	3.52 \pm 3.36	5.00 \pm 3.27	7.46 \pm 2.48	2.01 \pm 2.78
Moderate internet addiction	100 (27.6)	4.85 \pm 3.13	5.20 \pm 3.52	7.68 \pm 2.50	2.02 \pm 3.23
Severe level internet addiction	20 (5.5)	4.91 \pm 4.06	5.45 \pm 3.58	8.20 \pm 2.58	2.80 \pm 3.88
Total	362 (100)	4.31 \pm 3.34	5.26 \pm 3.35	7.65 \pm 2.49	2.06 \pm 2.97

IAT=Internet addiction test, SD=Standard deviation

friends and family; this problem could be developed to increased loneliness and depression and consequently IA.^[20]

Our result showed that dependency to internet is linked with mental health subscales, including social dysfunction and severe depression. Further, we found the significant correlation between neglect work in internet users and social dysfunction. Use of internet could be decreased the social activities; therefore, social relationship could be a determinative factor for IA; however, in some studies, use of web-based educational programs was not associate to IA;^[21,22] further, Tokunaga in 2017 in own meta-analysis found that loneliness and depression were significantly linked to IA.^[23] Being of certain psychological and cognitive risk factors may increase the risk of IA in adolescents, including social anxiety and depression;^[21,24,25] further, the high prevalence of social anxiety and depression in the community in subjects was reported in IA.^[26,27]

Some literature is consistent with our results; we found lack of control in internet users linked to anxiety and insomnia; and also, we found neglect social life in internet users more common in subjects with severe depression. As reported in previous studies, sleep disorders are

comorbid with depression and also severe depression is a risk factor for IA.^[28] In addition to this, some reports demonstrated that IA is significant risk factor for sleep disorders and severe depression;^[29] therefore, these correlations will be complicated to interpretation also to better causal relationships; longitudinal studies could be designed.

In addition, we found that IA increased with age. This is consistent with other studies that revealed usages from internet in younger age related to higher IA,^[30] although they are inconsistent with some other findings.^[31,32] Some study reported more IA in lower age groups. Hence, it seems that control of teens at a younger age to reduce internet usage can be prevented from IA.^[33] Some have claimed lower IA in higher academic performance students, and also, participation in extracurricular activities can be a proactive factor for IA.^[25]

This cross-sectional study revealed that 5.5% of the participants had a severe level IA. This finding is lower than prevalence of IA in other countries; for example, a study in Korea reported that 28.6% of junior high-school students were problematic users^[34] and in China reported 2.4%–31.1% of IA.^[35,36] These differences between countries may be related to countries' variation in internet access, other social and economic factors, and the methodology of the studies.

Some limitations of this study are worthy to attention; the questionnaires were self-report result, some in some bias including recall bias may be are exist unwittingly. The present one was a cross-sectional study; therefore, the results should be interpreted with caution.

Conclusion

This study was conducted in teenagers; the total and subscale means of IA subscales were higher in dependent internet users, and the excessive use was the main problem in those. Results showed that excessive use, lack of control, and neglect social life are significantly correlation with severe depression, and also the positive significant correlation was observed between

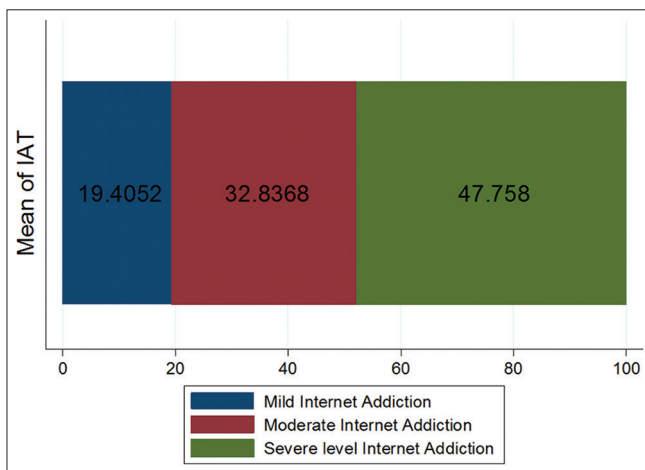


Figure 2: The mean of Internet Addiction Test in mild, moderate, and severe internet addiction

Table 4: Relationship between Internet Addiction Test score and mental health factors

Model 1	Coefficients ^a				Significant
	Unstandardized coefficients		Standardized coefficients	t	
	B	SE	B		
Constant	57.747	6.503		8.880	0.000
Age	0.905	0.352	0.135	-2.568	0.011
Somatic symptoms	1.630	0.549	0.330	-2.968	0.003
Social dysfunction	0.877	0.616	0.257	-0.612	0.041
Severe depression	0.734	0.527	0.242	-0.445	0.057
Total GHQ-28 scores	0.846	0.329	0.321	1.661	0.008

^aDependent variable: Total IAT scores. GHQ-28=General Health Questionnaire-28, IAT=Internet Addiction Test, SE=Standard error

mental health and IA. The results of this study could be contributing to improve the theoretical models for IA. According to the results, educational programs for students, in high schools and universities, on how to use the internet properly will be necessary. Causal relationship between mental health and IA needs to be investigated in longitudinal studies.

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Conflicts of interest

There are no conflicts of interest.

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