



The Relationship Between Internet Addiction and Depression in the Iranian Users: A Systematic Review and Meta-analysis

Sattar Kikhavani¹, Shaban Roshani¹, Salahedin Aj¹, Kourosh Sayehmiri^{1,2*}

¹Psychosocial Injuries Research Center, Ilam University of Medical Sciences, Ilam, Iran

²Associate Professor, Department of Biostatistics, School of Medicine, Ilam University of Medical Sciences, Ilam, Iran

Abstract

Background and aims: Internet is one of the new technologies whose users are increasing, and internet addiction is defined as the excessive use of internet. One of the factors that influence internet addiction is depression. The purpose of our study was to investigate the relationship between internet addiction and depression in Iranian users using meta-analysis.

Methods: In our systematic review and meta-analysis, a total of 10 articles in Persian and English, published in local and international journals between 2008 and 2014 were selected through searching in PubMed, Scopus, Google Scholar, SID, Magiran, Medlib, and Irandoc databases, and the information were analyzed using a method of meta-analysis (random effects model). I-square test was used to examine heterogeneity. Data were analyzed by STATA version 11.2.

Results: There were significant correlations between internet addiction and depression ($P < 0.05$). Hence the mean risk differentiating criteria were estimated to be 0.55 (95% CI: 0.14 to 0.96). Subgroup analysis showed that the value of a university student was 0.46 (95% CI: 0.04 to 0.88) and of a high school student was 1.12 (95% CI: 0.90 to 1.34).

Conclusion: Our results indicated positive significant correlation between internet addiction and depression in adolescents and young adults in Iranian users. There was a positive correlation between internet addiction and depression as one of the most important psychological disorders. This issue requires further attention and study.

Keywords: Internet addiction, Depression, Systematic review, Meta-analysis

*Corresponding Author:

Kourosh Sayehmiri,
Tel: 09183410782,
Email:
sayehmiri@razi.tums.ac.ir

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Introduction

Internet is a new communication technology, used by all ages and in various fields. The internet itself is harmless, however excessive use of it today has become an important issue that differently affects mental and physical health of users. The term internet addiction was proposed for the first time in 1996 by Young and its diagnostic criteria were recorded by him.¹ Internet addiction indicators include (1) sense of fun on the internet, (2) sense of satisfaction with excessive use of internet, (3) feelings of restlessness, (4) moodiness, anger when slowing down or stopping the use of internet, (5) much online times, greater than what is planned, (6) alarmed by the loss of jobs and education, (7) lying-about time spent online, and (8) using the internet as a means to escape from problems.² Excessive use of the internet may cause mental, social, educational, and occupational problems, as well as physical problems such as eye pain, back pain, changes in sleep patterns and nutrition

in the users.^{3,4} Ghasemzadeh and colleagues studied the prevalence of internet addiction in 939 students in Tehran. Their study indicated that the prevalence of internet addiction was 3.2%.⁵ Various studies have been conducted on Iranian users of all ages, especially adolescents and young adults to demonstrate the prevalence of internet addiction among them.^{6,7}

Patients with internet addictions are those who suffer from shyness, depression, and loneliness. Several studies have also shown the relationship between internet addiction and phobia, bipolar disorder, interpersonal problems, anxiety, aggression, and depression.⁸⁻¹⁰ According to some studies, depression is reported as the most common psychiatric symptom associated with internet addiction among users.^{11,12} Regarding the results of research, partly inconsistent, on the relationship between internet use and depression, some studies have emphasized the positive impact of internet use on mental health. The results of these studies suggest decrease of depression

in adolescent internet users.^{13,14} While other studies indicate a negative association between depression and the use of the internet.^{15,16} Depression is considered one of the major mental disorders in all countries. Symptoms of depression can be noted as a lot of grief and anxiety, guilt, worthlessness, staying away from others, decreased appetite and sexual desire, insomnia, loss of interest in daily activities.¹⁷ Depressed people experience a variety of symptoms listed and the intensity may differ from mild to very severe.¹⁸

Despite numerous studies on the relationship between internet addiction and depression in Iran, the relationship between these 2 variables has not been studied in meta-analyses. The aim of this study was to investigate the relationship between internet addiction and depression by meta-analysis.

Methods

Study Selection

This article was written according to PRISMA guidelines.¹⁹ The findings are based on theses and articles which were published in national and international journals. We searched the medical literature published in English and Persian databases including SID, Magiran, Medlib, Irandoc, Google Scholar, PubMed, ISI Web of Science, and Scopus between 2008 and 2014. Literature searches were conducted using the keywords: internet addiction, depression, Iran, meta-analysis, and related words. Qualified studies included epidemiologic research reports measuring correlation between the internet addiction and depression. All the papers which had these keywords in their titles or abstracts were included in the initial list and other irrelevant articles were crossed out. The most important bias in meta-analysis is: publication bias and selection bias. Publication bias was checked using Egger test. To reduce the possibility of selection bias in this study, criteria were clearly defined and studies and data collection from each study were performed by 2 researchers independently, and final list was chosen by consensus. Then, an information checklist for research papers consisting first authors' last names, year of publication, country wherein the study was carried out; mean \pm standard deviation (SD) in participants, sample size, odds ratio (OR) estimates with 95% CI, and mean difference was prepared for the final evaluation. Studies were excluded if they presented insufficient data; if they were mere reviews; or if they were not epidemiologic studies.^{8,20-23}

Statistical Analysis

Articles were combined based on the sample size, means and SDs. Because of the low number of articles

used and because these articles had been published in prestigious journals, quality criteria were not included in the analysis. The average variance was calculated using the formula of 2 integrated variances. The mean difference was computed using the formula:

$$\Omega = \frac{\mu_{case} - \mu_{control}}{\sigma}$$

where μ_{case} is the case mean, $\mu_{control}$ is the control mean, σ is the pooled standard deviation. σ^2 is calculated using:

$$\sigma^2 = (n_1\sigma_1^2 + n_2\sigma_2^2) / (n_1 + n_2 - 2)$$

where σ_1 and σ_2 are the variances of the case group and control group, respectively, and n_1 and n_2 equal the number of participants in each group. In order to evaluate the heterogeneity of the studies, Cochran's Q test and I² index were used. Due to significant heterogeneity in the studies, a model with random effects was used. In order to examine publication bias, Begg plot and regression method were used. A P value less than 5% ($P < 0.05$) was considered significant. Sensitivity analyses were pre-specified. Statistical analyses were performed using STATA version 11.2.

Results

The initial literature search identified 1583 publications, from which duplicate publications were excluded, and 249 articles that were published between 2003 and 2014 were selected and their abstracts were analyzed. Afterwards, 14 articles which included initial data were fully studied (Figure 1). A summary of characteristics of 9 studies that were included in this analysis are presented in Table 1.

After excluding duplicate articles and other publications according to the selection criteria (Figure 1), 5 cross-sectional, 2 descriptive, 1 descriptive and cross-sectional studies that had examined the association between depression and internet addiction were identified and used in the analysis. In the included articles, 4462 participants were involved.

Eight other studies reported significant inverse associations between internet addiction and depression. Hence the mean risk differentiating criteria were estimated to be 0.55 (95% CI: 0.14 to 0.96).

Subgroup analysis showed that the value of a university student in 7 studies was 0.46 (95% CI: 0.04 to 0.88) and of a high school student in 1 study was 1.12 (95% CI: 0.90 to 1.34).

Confidence intervals for each study and for each of the studies based on random effects are given in Figure 1. These charts are drawn based on the years

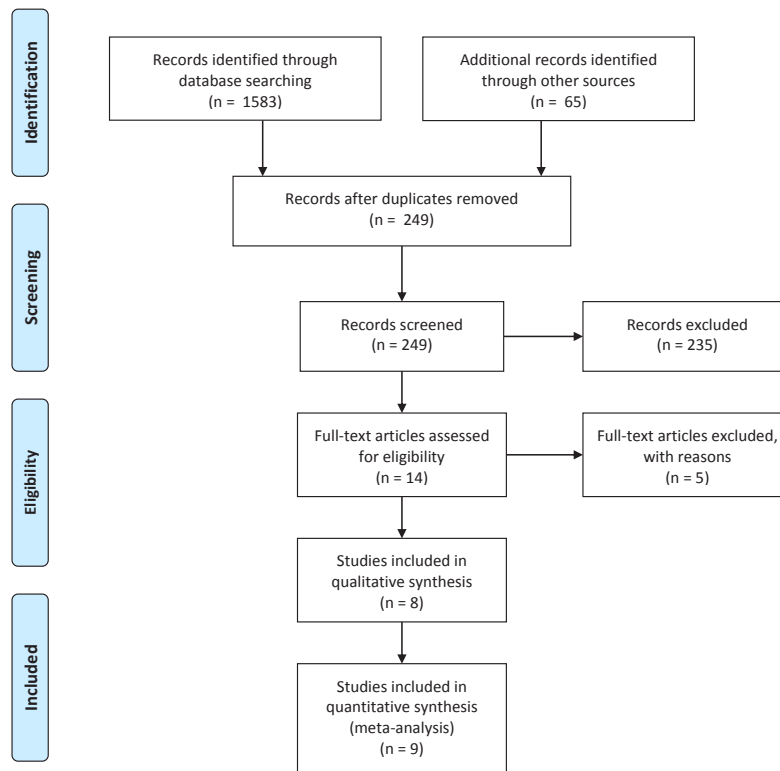


Figure 1. Study Flowchart.

of research and the authors' names. According to publication bias figure, the effect of bias in these studies was not significant (Figure 2). In fact, most studies were located inside the Funnel plot, demonstrating that the results of most relevant studies performed in Iran, were included in the analysis (Figure 3).

Discussion

The current meta-analysis evaluated the relationship between internet addiction and depression in a total sample of 4462 participants in Iran during 2008-2014. The present meta-analysis found a significant correlation between internet addiction and depression

Table 1. Characteristics of the Study (the Relationship Between Internet Addiction and Depression)

First Author	Year of Publication	City	Population	No. of Users Addicted to Internet	No. of Normal Users	Mean± SD		SMD	95% CI for SMD*	
						Case	Control		Lower	Upper
Khoshakhlagh ¹⁶	2012	Isfahan	University student	-	-	15.01±3.61	-	-	-	-
Alavi ²⁴	2011	Isfahan	University student	37	213	15.61±8.88	9.28±7.93	0.78	0.43	1.14
Alavi ²⁵	2012	Isfahan	University student	38	362	2.63±3.83	3.61±4.87	-0.20	-0.54	0.13
Nastizai ²⁶	2009	Sistan and Baluchestan	University student	124	251	5.70 ±4.70	5.02 ±4.12	0.16	-0.06	0.37
Masoodnia ²⁷	2013	Yazd	High school student	116	419	0.81±0.33	0.44±0.33	1.12	0.90	1.34
Kajjba ²⁸	2014	Isfahan	University student	67	83	2.70±0.24	2.20±0.72	0.89	0.56	1.23
Lashgarara ²⁹	2012	Tehran	University student	77	152	6.60±5.70	2.50±0.88	1.21	0.92	1.51
Pirzadeh ³⁰	2011	Isfahan	University student	99	24	7.24±6.21	3.60±4.52	0.61	0.16	1.07
Bahri ²	2011	Gonabad	University student	38	276	2.63±3.83	3.61±4.87	-0.21	-0.55	0.13

Abbreviation: SMD, Standard mean difference.

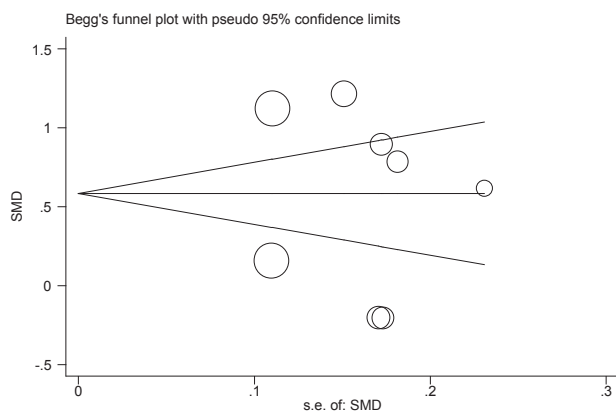


Figure 2. Begg's Funnel Plot for Publication Bias in the Standard Mean Difference (SMD) Analysis. The diameter of each circle represents the weight in the meta-analysis.

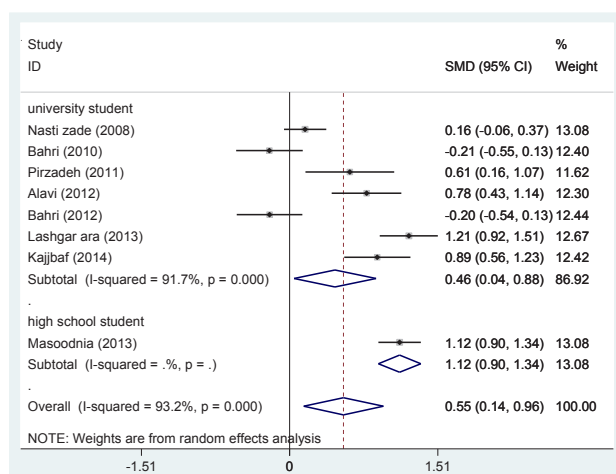


Figure 3. Meta-analysis of the Association Between Internet Addiction and Depression. Squares show estimate of effect size in each study and segments show 95% confidence intervals for effect size. In this chart, studies are ordered based on the year of publication and author s' names, based on random effects.

($P < 0.05$) in adolescents and university students. The results of Morgan study showed a significant positive correlation ($P < 0.001$) between internet addiction and depression as was shown in our study.¹⁴ The mean risk differentiating criteria in our meta-analysis were estimated to be 0.55 (95% CI: 0.14 to 0.96). Subgroup analysis showed that the value of a university student was 0.46 (95% CI: 0.04 to 0.88). Delbudak indicated a positive association between internet addiction and depression in university students, confirming our study results.³¹ The mean risk differentiating criteria in a high school student was 1.12 (95% CI: 0.90 to 1.34). The results of Ha et al about the association between internet addiction and depression in adolescents was also consistent with the results of our study.¹¹

The highest mean differences between the normal users and those addicted to the internet belonged to the studies of Masoudnia (1.12) and Lashgarara (1.21) in

our meta-analysis.^{27,29} In a Korean study, the correlation between internet addiction and depression was 67% that showed the highest percentage of co-morbidity with internet addiction among all psychological disorders.³² It was also consistent with the reports from an Indian study.³³ Odds ratio (OR) in a Turkish study between internet addiction and depression was estimated to be 1.180.³⁴ This study showed that the risk of depression in internet users was 18% more than that in others. Therefore, these studies conducted in Asian countries indicated a strong relationship between internet addiction and depression. Although other studies conducted in European countries also confirmed these results.^{12,35}

The lowest mean differences between the users addicted to the internet and the normal users belonged to the study of Alavi et al.²⁵ Because of low mean differences in this study, lack of control, and the length of time, the individuals had used the internet excessively; therefore, the effect of excessive internet use over an extended period of time on an individual's psychological well-being could not be assessed. Shaw et al showed that internet use can decrease depression.³⁶

We had some limitations in our study. Firstly we could not survey cause and effect mechanisms founding internet addiction and depression, because most studies were cross-sectional. Secondly, the relationship between internet addiction and depression could not be predicted, because there exist intercurrent factors such as environmental stress, family structure, family training, and gender.^{37,38} The low number of studies that were examined, and the lack of studies on the same data were other limitations. Another limitation of our meta-analysis was the lack of study on other age groups except for adolescents and young people. Finally, most of the subjects included in this meta-analysis were university students from Isfahan. Further studies are required to investigate other users in various cities of Iran. Further research is also required to arrive at a consensus on the definition of internet addiction and evaluate the relationship between internet addiction and depression.

Conclusion

This meta-analysis and systematic review found a significant correlation between internet addiction and depression as one of the most important psychological disorders in adolescents and university students. Therefore, one way to reduce depression among adolescents and students is decreasing internet addiction. This issue requires further attention and study.

Ethical Approval

Not applicable.

Conflict of Interest Disclosures

None to be declared.

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