

Original Article

Investigating the Frequency of Depression and Anxiety and their Association with Cyberspace Use among Medical Students

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Abstract

Background and Aim: Rapid technological advances have led to increased use of cyberspace among medical students. Despite the benefits, there are concerns about the unwanted effects of excessive use of cyberspace on mental health. Depression and anxiety, two of the most common mental health disorders worldwide, have been of particular interest in this context. This study aimed to investigate the frequency of depression and anxiety among medical students and explore its association with Cyberspace use.

Materials and Methods: This cross-sectional descriptive-analytical study was conducted on 355 medical students of Ahvaz Jundishapur University of Medical Sciences using stratified random sampling. Data was collected through the following instruments: Demographic Information Questionnaire, Young's Internet Addiction Test, Beck Depression Inventory-II, and Beck Anxiety Inventory. Data analysis was conducted utilizing SPSS software version 26. Descriptive statistics and nonparametric tests (Spearman's correlation coefficient) were employed.

Results: The results revealed that 27.3% of participants exhibited severe depression, 13% displayed severe anxiety, and 10.7% manifested symptoms of internet addiction. There was a positive association among depression, anxiety, and internet addiction ($P < 0.0001$). Additionally, an inverse notable disparity between internet addiction and educational level was discovered ($P < 0.05$). Also, a significant correlation was shown between depression, anxiety, internet addiction, and marital status ($P < 0.05$).

Conclusion: The study indicated a notable correlation between cyberspace usage and the prevalence of depression and anxiety in medical students. Additional research is necessary to develop productive interventions that target the potential negative impacts of cyberspace usage on the mental well-being of medical students, consequently advancing the community healthcare system.

Keywords: Anxiety; Cyberspace, Depression, Internet addiction, Medical students

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Introduction

The rapid development of information and communication technologies has changed how people communicate and interact. One of the most popular technologies among young people is social networks (1). As of January 2023, an incredible 5.04 billion individuals are connected to the Internet worldwide, marking a fourfold increase from the previous decade and showing expectations for continued growth (2). The online world, also known as cyberspace, is now an integral part of modern life, which provides numerous benefits such as communication, information, entertainment, and education. However, some dangers are associated with excessive and inappropriate use (1, 3). This problem is often called "Internet addiction" or "Cyberspace addiction." It's a type of behavioural addiction where people compulsively use the Internet or use cyberspace excessively and irrationally (4). It is generally recognized as an individual's inability to regulate their Internet use, which disrupts normal functioning and leads to negative outcomes such as academic failure, reduced productivity, significant distress, and functional impairment. This issue is increasingly becoming a concern within the field of public health (4, 5). The phenomenon of Internet addiction has garnered increasing attention over the years due to its apparent high prevalence and its links to dysfunctional social behaviours and mood disorders (6). One psychological consequence of internet addiction is the increased risk of experiencing depression and anxiety (7). Depression is the most common psychiatric disorder, characterized by a depressed mood with feelings of sadness, loneliness, low self-confidence, and loss of interest in doing enjoyable activities (8, 9).

On the other hand, anxiety is the psychological and physiological result of excessive worry, often manifested as irritability, physical tension, and sleep disorders. Anxiety disorders are common psychiatric conditions usually linked with depression (10, 11). The global prevalence of anxiety and depression is increasing due to economic challenges, social factors, and certain medical conditions. For centuries, depression and anxiety have been identified as significant psychological concerns that affect the lives

of young people (12). Both depression and anxiety can adversely affect social relationships, daily functioning, and overall quality of life (13). Both conditions could lead to reduced learning efficiency in students and difficulties in interpersonal communication. These conditions are also associated with feelings of isolation, a critical risk factor for suicide (11). Furthermore, they can cause significant health risks, including heightened susceptibility to cardiovascular diseases, diabetes, and substance abuse (14). Meanwhile, students are growing dependent on the Internet and devote their substantial time to academic and extracurricular purposes (15). Depressed and anxious individuals turn to the Internet as a means of seeking relief from their emotional distress and anxious thoughts. They endeavour to substitute their distressing situations with the attractions of the digital realm or cyberspace (16). Therefore, Estimating the prevalence of mental illnesses is crucial for the development of effective mental health policies (17). A large number of studies illustrate a significant correlation between conditions of depression, anxiety, and internet addiction (18). The Study conducted on 263 adolescents in Tehran, Iran, revealed a strong and positive correlation between internet addiction and anxiety (16). Research conducted in India disclosed a substantial correlation between internet addiction, depression, and anxiety in undergraduate students, indicating a propensity for depressive and anxious manifestations with heightened internet usage among students (19).

University students have easy access to the internet and flexible schedules, putting them at risk for problematic internet use (20). In the meantime, medical students are particularly vulnerable to depression and anxiety due to the high level of stress, pressure, competition, and the high demands and expectations of their academic and professional careers. Medical students must also deal with the emotional and ethical challenges when caring for patients, handling diseases, and facing mortality (21, 22). Additionally, they face many other challenges, such as long work hours and sleep deprivation, which can lead to emotional fatigue and limit their time for social and leisure activities. These factors can adversely affect their mental health and well-being, making them more susceptible to depression and anxiety (21). Depression and anxiety in medical students can detrimentally affect their personal and professional

advancement, such as impaired learning, reduced empathy, increased burnout, and decreased quality of patient care (23). Numerous studies have reported high rates of depression and anxiety among medical students, ranging from 20% to 60%, depending on the country, culture, and measurement tools (24, 25). In research involving a large group of university students in Turkey, 27.1% indicated symptoms of depression, while 47.1% demonstrated symptoms of anxiety. These rates were higher than the general population (26).

Given the prevalence and severity of depression and anxiety among medical students and the possible role of internet addiction in their occurrence, it is essential to investigate the relationship between these variables in this population, as this can provide valuable insights for the prevention and treatment of these mental disorders (27). Recent studies have indicated a connection between excessive internet use and mental health issues like depression and anxiety. However, the prevalence of these disorders and their association with cyberspace usage among medical students remains inadequately explored, particularly in Iran, where internet usage has grown significantly in recent years. Therefore, investigating the prevalence of depression and anxiety and their relationship with cyberspace usage in this population at Ahvaz Jundishapur University of Medical Sciences. The findings could provide valuable insights for educational institutions and mental health professionals in developing strategies to promote healthy internet use and mental well-being among medical students.

Methods

Study design and setting

This cross-sectional descriptive-analytical study was conducted over a six-month period (September 2022 to March 2023) and included all medical students at Jundishapur University of Medical Sciences in Ahvaz, Iran.

Participants and sampling

The study population included all medical students of Ahvaz Jundishapur University of Medical Sciences who were studying basic sciences, pathophysiology,

Externship, and Internship educational levels. Students who had not engaged in online activities in the previous six months, those unwilling to participate in the research or provide full cooperation in questionnaire completion, and individuals lacking proficiency in Persian were not included in this study.

Sample size and sampling technique

In the current study, the sample size was determined by identifying the total population of 1971 medical students from the Department of Medical School Education. Based on Morgan's table, the sample size was calculated to be 320. It was then increased to 355 to account for potential attrition. A stratified random sampling technique was employed with allocation proportional to the number of students in each level of education. In this regard, 125 basic science students, 53 physiopathology students, 107 Externs, and 70 Interns participated. After obtaining permission from the University Ethics Committee, a list of the names and contact numbers of all medical students studying at Ahvaz Jundishapur University of Medical Sciences was collected from the Department of Medical School Education. The next step was to reach out to students, explain the study objectives, and obtain informed consent. If they were willing to participate, they were sent a questionnaire via a hyperlink in "Google Forms" to complete.

Data collection tools and techniques

Data were gathered through a structured standard questionnaire deployed via "Google Forms" and distributed to eligible participants via an electronic hyperlink. The questionnaire was comprised of four sections, with all items presented in Persian.

Demographic Information Questionnaire

It consisted of questions related to age, gender, educational level, marital status, income status (low, moderate, high), and the frequency of internet usage.

Young's Internet Addiction Test (YIAT)

This test, developed by Kimberly Young, is considered one of the most reliable tools in the assessment of internet addiction (28), consisting of 20 items scored on a five-point Likert scale (always = 5, often = 4, frequently = 3, occasionally = 2, rarely = 1) can classify individuals into normal internet users (total scores between 20 to 39), those who face problems due to

excessive use (total scores between 40 to 69), and those who are addicted and need treatment (total scores between 70 to 100). Numerous studies have affirmed the reliability and validity of this tool. In Iran, Mohammadalehi et al. concluded that the Persian-language version of YIAT has acceptable validity (0.74) and reliability (0.917), and it can accurately assess the characteristics of internet addiction among students (29).

Beck Depression Inventory-II (BDI-II)

It is a 21-item self-report questionnaire evaluating the severity of depressive symptoms and scored on a four-point Likert scale. Questions 16 and 18 relate to changes in sleep patterns and appetite and are scored from 0 to 7. The following scores can classify the overall level of depression: Absence or minimal depression (0 to 13), Mild depression (14 to 19), Moderate depression (20 to 28), and Severe depression (29 to 63). Various studies have examined the reliability and validity of this tool. Beck et al. found a high test-retest reliability coefficient (0.93) for BDI-II (30). In Iran, Ghassemzadeh et al. studied the psychometric properties of a Persian version of the BDI-II, finding a strong internal consistency (Cronbach's $\alpha = 0.87$) and satisfactory test-retest reliability ($r = 0.74$), indicating the Persian version of this instrument is suitable for evaluating depression in Persian-speaking populations (31).

Beck Anxiety Inventory (BAI)

This questionnaire is a self-report questionnaire that consists of 21 items, each describing one of the common symptoms of anxiety. This tool is scored using a four-point Likert scale (severely = 3, moderately = 2, mildly = 1, not at all = 0). In this way, a total score of 0 to 7 indicates the absence or minimum level of anxiety, 8 to 15 indicates mild anxiety, 16 to 25 indicates moderate anxiety, and 26 to 63 indicates severe anxiety. Studies have shown that this questionnaire has high validity and reliability. In their research, Beck et al. reported a high internal consistency coefficient (Cronbach's $\alpha = 0.92$) and a test-retest reliability (0.75) over a one-week interval (32). Internal research (Kaviani & Mousavi) on the Persian version of the BAI found acceptable reliability (0.72), validity (0.83), and a high Cronbach's α (0.92). This suggests that the Persian version of the

BAI is suitable for clinical assessment and research in the Iranian population (33).

Statistical analysis

Data analysis was performed using IBM SPSS Statistics software, version 26. The study included descriptive statistics, including frequency, percentage, mean, and standard deviation. First, the distribution of the data was assessed using the Kolmogorov-Smirnov test. The Spearman correlation coefficient (Spearman's rho) was then used to examine correlations in the quantitative data, alongside non-parametric tests such as Mann-Whitney U and Kruskal-Wallis for hypothesis testing. In addition, Fisher's Least Significant Difference (LSD) was used as a post-hoc test. A P value of 0.05 or less ($P \leq 0.05$) was considered statistically significant.

Results

The results showed that the mean age of the 355 participants was 21.63 years ($SD = 2.68$), with an age distribution of 52.7% females and 47.3% males, with the majority studying at the undergraduate level (35.2%), being single (79.4%), and having a moderate income (43.9%). The frequencies of the demographic variables in the study are shown in Table 1.

The normality of the data was assessed by employing the One-Sample Kolmogorov-Smirnov test. The findings, as detailed in Table 2, demonstrate a non-normal distribution ($P < 0.05$).

Consequently, non-parametric tests were employed to investigate the research hypotheses. As presented in Table 3, analysis of the study instrument scores revealed that 27.3% of participants exhibited clinically significant levels of depression, 13% displayed clinically significant anxiety, and 10.7% manifested symptoms of internet addiction.

As Table 4 indicates, employing Spearman's Correlation Coefficient and considering the significance level of the test, depression, anxiety, and internet addiction showed a statistically significant positive correlation with each other ($P < 0.0001$).

Basic sciences students showed the highest rates of severe depression (32.8%) and anxiety (16%). Meanwhile, analysis performed using the Kruskal-Wallis test indicated no significant correlation between depression and anxiety concerning educational level

($P > 0.05$). Notably, an inverse meaningful difference was observed between internet addiction and education level. Subsequent application of the LSD post hoc test indicated significant differences between basic sciences and Externship ($P = 0.009$) and between basic sciences and Internship educational levels ($P = 0.002$). The study revealed that the basic sciences field had the highest proportion of addicted students (19.2%), whereas the Internship level had the lowest proportion (10.4%). Moreover, findings from the

Mann-Whitney U test indicated a significant correlation between marital status and depression, anxiety, and internet addiction ($P < 0.05$), with singles exhibiting notably higher levels of these conditions compared to married individuals. Additionally, the Kruskal-Wallis test was employed to explore the association between variables and income status, revealing no significant link between depression, anxiety, and internet addiction and income status.

Table 1. Frequency distribution of demographic variables of the research participants

Variables		Frequency	Percent	Cumulative Percent
Gender	Female	187	52.7	52.7
	Male	168	47.3	100
	Total	355	100	-
Educational level	Basic Sciences	125	35.2	35.2
	Physiopathology	53	14.9	50.1
	Externship	107	30.1	80.3
	Internship	70	19.7	100
	Total	355	100	-
Marital status	Single	282	79.4	79.4
	Married	73	20.6	100
	Total	355	100	-
Income status	Low	132	37.2	37.2
	Moderate	156	43.9	81.1
	High	67	18.9	100
	Total	355	100	-

Table 2. One-Sample Kolmogorov-Smirnov test (N = 355)

Variables	Mean	Standard Deviation	Most Extreme Differences	P-value
Depression	21.1915	11.79425	Absolute	0.074
			Positive	0.074
			Negative	-0.046
			Test Statistic	0.074
			Absolute	0.132
Anxiety	13.6873	9.49343	Positive	0.132
			Negative	-0.084
			Test Statistic	0.132
			Absolute	0.062
Internet addiction	56.462	17.67233	Positive	0.042
			Negative	-0.062
			Test Statistic	0.062
			Absolute	0.062

c. Lilliefors Significance Correction

Table 3. Frequency distribution of research variables (Depression, Anxiety, and Internet addiction)

Variables		Frequency	Percent	Cumulative Percent
Depression	No depression	107	30.1	30.1
	Mild depression	67	18.9	49
	Moderate depression	84	23.7	72.7
	Severe depression	97	27.3	100
	Total	355	100	-
Anxiety	No anxiety	100	28.2	28.2
	Mild anxiety	140	39.4	67.6
	Moderate anxiety	69	19.4	87.0

	Severe anxiety	46	13.0	100
	Total	355	100	-
Internet addiction	Normal user	123	34.6	34.6
	Problem user	194	54.6	89.3
	Addict user	38	10.7	100
	Total	355	100	-

Table 4. Spearman's correlation coefficients and the significance levels between all research variables

		Depression	Anxiety	Internet Addiction	Age	Gender	Education al Level	Marital Status	Income Status
Depression	Spearman's Correlation Coefficient	1.000	0.611**	0.591**	-.0022	0.038	-0.046	-0.113*	0.019
	P-value	0.0001	0.0001	0.0001	0.682	0.476	0.393	0.033	0.723
Anxiety	Spearman's Correlation Coefficient	0.611**	10.000	0.553**	-0.084	-0.015	-0.062	-0.128*	0.015
	P-value	0.000	0.0001	0.0001	0.116	0.774	0.242	0.016	0.771
Internet addiction	Spearman's Correlation Coefficient	0.591**	0.553**	10.000	- 0.148**	0.059	- 0.176**	-0.112*	0.044
	P-value	0.000	0.0001	0.0001	0.005	0.271	0.001	0.035	0.412
Age	Spearman's Correlation Coefficient	-0.022	-0.084	- 0.148**	10	-0.028	0.894**	0.240**	0.065
	P-value	0.682	0.116	0.005	0.0001	0.599	0.0001	0.0001	0.219
Gender	Spearman's Correlation Coefficient	0.038	-0.015	0.059	-0.028	1	-0.019	-0.119*	0.001
	P-value	0.476	0.774	0.271	0.599	0.0001	0.727	0.025	0.981
Educational Level	Spearman's Correlation Coefficient	-0.046	-0.062	- 0.176**	0.894**	-0.019	10	0.242**	0.023
	P-value	0.393	0.242	0.001	0.0001	0.727	0.0001	0.0001	0.67
Marital Status	Spearman's Correlation Coefficient	-0.113*	-0.128*	-0.112*	0.240**	- 0.119*	0.242**	10.000	0.136*
	P-value	0.033	0.016	0.035	0.0001	0.025	0.0001	0.0001	0.010
Income Status	Spearman's Correlation Coefficient	0.019	0.015	0.044	0.065	0.001	0.023	00.136*	10.000
	P-value	0.723	0.771	0.412	0.219	0.981	0.67	0.01	0.0001

*0. Correlation is significant at the 00.05 level

**0. Correlation is significant at the 00.01 level

Discussion

This study aimed to investigate the prevalence of depression and anxiety disorders among medical students and their possible correlation with cyberspace usage. The results revealed a positive correlation between depression and anxiety with internet addiction, suggesting that the more depressed and anxious students are, the more likely they are to

overuse cyberspace. It may be because cyberspace provides a sense of control, security, and gratification that the students lack in their real lives and may also offer a distraction from the negative emotions and thoughts that the students experience due to their depression and anxiety. Accordingly, it may also interfere with the student's academic performance, social relationships, and self-esteem, which may further aggravate their depression and anxiety. These findings

are consistent with previous studies that have reported high rates of depression and anxiety among medical students and their association with internet addiction. In a sample of 3616 college students around Taiwan, the prevalence of Internet addiction among students was high and associated with Increased symptoms of depression, higher anticipated positive results from internet use, longer duration and lower ability to resist internet use, higher levels of impulsivity, less satisfaction with academic achievements, and having an insecure attachment style (34).

A study of 300 medical students in Hamadan, western Iran, found that excessive use of cyberspace significantly increased the risk of depression (35). In this regard, research conducted on 332 students in California found that internet addiction could potentially predict impulsivity and anxiety, indicating a significant link to mental health problems (36). The high prevalence of depression and anxiety in medical students in Iran could be attributed to various factors, such as the characteristics and challenges of medical education and practice, the traits and personalities of the students, and the social, cultural, and religious context of Iran (37-39). It might also be influenced by the lack of awareness, recognition, and treatment of mental health issues among medical students due to the stigma, denial, or fear of seeking help (37, 40-43). There was a significant difference between internet addiction and educational level, with the highest scores among basic sciences students. One possible explanation for this correlation is that basic science students have more access and opportunity to use the internet than other students due to the availability of devices, networks, and free time. This finding was in line with the study of Mboya et al. (44) and Chaudhari et al. in India (45). These findings were not consistent with the outcomes reported by Khazaei et al. in Kermanshah, Iran (46), Sahraian et al. in Shiraz, Iran (47), and Mainul et al. in Malaysia (48). Discrepancies in the results could be attributed to variations in educational curricula, environmental influences, and cultural distinctions. The positive correlation between depression, anxiety, and internet addiction based on marital status indicates that single students are more depressed and anxious than married students and that they are more addicted to the internet. It may be because single students may feel lonelier and isolated

(49) and lack the emotional and social support that married students have (50). Single students may also have lower self-esteem and self-worth and experience more stigma and discrimination because of their marital status (51, 52), which is similar to the findings of several studies, such as those conducted by Babadi-Akashe et al. in Shahrekord, Iran (53), Farhani et al. in Tehran and Karaj, Iran (54).

This study, like others, had limitations. A cross-sectional design, self-reported questionnaires, and Iranian cultural and contextual aspects are some of our limitations. These may restrict result applicability and long-term conclusions but do not impact the accuracy of the study results. In this regard, we recommend conducting research that involves longitudinal follow-ups, in which identical factors are assessed at various intervals, to gain a comprehensive understanding of depression, anxiety, and internet addiction among medical students over time.

Conclusion

Our study findings underscore the need for comprehensive guidelines addressing the prevention, screening, and intervening of mental health issues associated with cyberspace use among medical students. These results highlight the importance of promoting a balanced approach to cyberspace use in the medical education sector.

Ethical Considerations

The research was conducted under the Code of Ethics (IR.PNU.REC.1402.407) granted by Payam-e Noor University.

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Conflict of Interest

The authors declare no conflict of interest.

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