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Prevalence of internet addiction during the COVID-19 outbreak and its psycho-demographic risk factors in a sample of Iranian people

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Abstract

Background: During the COVID-19 pandemic, there has been an unprecedented increase in the use of online services, providing fertile ground for Internet addiction in the community. Given the negative effects of Internet addiction on individuals and society, addressing this issue and its consequences seems crucial.

Objectives: This study aimed to investigate the prevalence of Internet addiction and psychodemographic risk factors among Iranian adults during the COVID-19 outbreak.

Methods: It was a cross-sectional, descriptive correlational study conducted from February to June 2021. A researcher-made demographic information questionnaire, the Depression, Anxiety, and Stress Scales (DASS-21), Young's Diagnostic Questionnaire (YDQ), the Corona Disease Anxiety Scale (CDAS), the Social and Emotional Loneliness Scale for Adults (SELSA-S), and the Petersburg Sleep Disorder Questionnaire (PSQI) were administered to 404 individuals (213 men and 191 women) who were internet users residing in Hamadan Province. To prevent the spread of COVID-19, accessible sampling and online survey methods were employed. The data were analyzed using Chi-square, independent t-test, and logistic regression techniques through SPSS-24 software.

Results: According to the findings, the prevalence of Internet addiction was 28.5%. Internet addiction was found to be more common among singles than married individuals (chi-square=7, p<0.000). No significant relationships were found between age, gender, educational level, and Internet addiction. A significant direct relationship was found between Internet addiction and the severity of sleep disorders (chi-square=14.14, p<0.00), depression (chi-square=24.74, p<0.000), and COVID-19 anxiety (chi-square=19.99, p<0.000). No significant association was found between feelings of loneliness and internet addiction. Both depression and sleep disorder scores were found to be significant predictors of Internet addiction, with odds ratio values of 1.07 and 1.06, respectively, indicating that an increase in depression score increases the likelihood of Internet addiction by 1.07 times (OR=1.07) and an increase in sleep disorder score increases the likelihood of Internet addiction by 1.06 times (OR=1.06).

Conclusion: Considering the high incidence of internet addiction in our current study and identifying the role of depression and sleep disorders in predicting internet addiction, it is crucial to educate the public on the potential risks associated with excessive internet usage and reduce these risk factors during the COVID-19 pandemic. Additionally, given the prevalence of internet addiction after the COVID-19 pandemic, it is imperative to alleviate societal restrictions.

Keywords: Internet addiction, COVID-19, Prevalence, Risk factor.

Introduction

The outbreak of COVID-19 began in China in December 2019 and spread rapidly throughout the country. Unfortunately, the COVID-19 pandemic has become one of the most pressing global health crises in a relatively short period of time. Given the high prevalence of the coronavirus, the World Health Organization (WHO) has urged people to adhere to social distancing measures, such as staying at home and observing lockdowns, in order to slow the spread of the virus. As a result, many individuals

have turned to remote work and online shopping. Moreover, due to the closure of schools and universities, students are now required to participate in online classes.[1]

Related to social distancing policies and the increased use of the internet, various studies have investigated the prevalence of internet addiction during the COVID-19 pandemic. A survey of 20,472 people in China, for instance, found that around one-third of the participants were moderately to severely addicted to the internet, and approximately half of them reported experiencing a higher level of internet addiction since the start of the pandemic.[2]

Moreover, CiST et al. believe that 4,734 Indonesian individuals believe that the prevalence of internet addiction after this pandemic was higher than before.[3] In Iran, a study on 350 young people, aged between 18 and 25, found that 50.29%, 18.29%, and 1.71% of the participants had mild, moderate, and severe internet addiction, respectively. Notably, only 29.71% of the participants had normal internet usage.[4]

Historically, Ivan Goldberg first introduced internet addiction in 1995 as an excessive and problematic form of internet usage that disrupts the daily lives of users.[5,6] The literature review confirms that internet addiction is associated with significant negative impacts on personal, social, and occupational functioning among individuals.[7] Nowadays, advanced neuroimaging technologies have vividly illuminated the changes that occur in the function and structure of the brain due to excessive internet usage, which are surprisingly similar to those observed in the brains of substance abusers.[8]

As a result of the harm caused by internet addiction to people's bodies and minds, investigating the underlying causes of this problem can help with both prevention and therapy. Prior research has shown that variables such as anxiety, depression, loneliness, and sleep disorders are risk factors that increase the likelihood of internet addiction. Conversely, internet addiction itself exacerbates these risk factors, creating a vicious cycle.[9–12, 2]

The current prevalence of COVID-19 has led to an increase in the risk of internet addiction. Social isolation and home confinement due to the pandemic have exacerbated feelings of loneliness within the community. Moreover, altered daily routines and a decrease in both physical and social activities have contributed to a higher incidence of depression and sleep disorders.[13] Furthermore, the anxiety generated by COVID-19-related worries, particularly the dread of infection and death, might lead to more serious mental health problems.[14,15]

Objectives

Therefore, considering the current pandemic situation, the objectives of this study are to investigate: 1) The prevalence of internet addiction among participants. 2) Comparison of addicted and non-addicted participants regarding demographic variables such as age, gender, marital status, education level, and history of COVID-19 infection. 3) Comparison of addicted and non-addicted participants regarding psychological variables including anxiety, depression, loneliness, and sleep disorders. 4) Predicting the likelihood of internet addiction based on both demographic and psychological variables.

Methods

Study design

This descriptive-analytical cross-sectional study was conducted from February to June 2021. The participants were all internet users residing in Hamadan (Iran).

Sampling

Due to the constantly changing population size, Cochran's formula for unlimited communities was used to determine the sample size at a 95% confidence level. Therefore, 384 participants were selected. Moreover, to enhance the precision of sampling and consider the probability of participants' drop-out or incomplete completion of questionnaires, the final sample size was set at 404 individuals.

Data Collection

To reduce social contact and prevent the spread of COVID-19, we used available sampling and internet implementation to collect data. Specifically, a survey link was shared with three volunteers, who then distributed it within their respective educational and occupational groups on WhatsApp. They asked group members to complete the questionnaire if they wished. The inclusion criteria were being an internet user, and participants could withdraw from the study if they were dissatisfied with

taking part or if they did not complete the questionnaire fully.

Pittsburgh Sleep Quality Scale (PSQI)

The Pittsburgh Sleep Quality Questionnaire measures the quality and patterns of individuals' sleep over the past month. This questionnaire contains 18 items that measure 7 subscales including; subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleeping medication and daytime dysfunction. Participants respond to each item on a scale ranging from "none" (scores zero), "less than once a week" (score 1), "once or twice a week" (score 2), and "three or more times a week" (score 3). A total score above 5 indicates poor sleep quality. The validity and reliability of this questionnaire was calculated 80% and 93-98% respectively. Also, Cronbach's alpha coefficient of this questionnaire is 78 to 82%.[16] It is worth to mention, in the present study, the subscale of sleep disturbance was used and its reliability was calculated 0.85 using Cronbach's alpha method.

Social and Emotional Loneliness Scale for Adults (SELSA-S)

This scale, originally developed by DiTomasso et al.,[17] includes 15 items covering three factors of loneliness including: romantic (five items), family (five items) and social (five items) loneliness. The feeling of romantic loneliness is derived from the total scores of romantic and family subscales. The items are responded to on a 5-point scale, ranging from 1 = strongly disagree to 7 = strongly agree. All items except items 14 and 15 are scored in reverse, and obtaining a higher score indicates a greater sense of loneliness. The reported Cronbach's alpha coefficient is between 0.87 and 0.90, indicating the internal consistency of the scale. The validity of this instrument has been confirmed in multiple studies. Notably, in the study by Jokar and Salimi[18] conducted on students, the English version was translated into Persian according to Iranian culture. Additionally, item 15 was deleted due to a factor loading of less than 0.30, resulting in a total of 14 items. The Cronbach's alpha coefficient for the scale was reported to be 0.85. Fortunately, the findings confirmed the convergent and differential validity and showed that the scale has high validity in Iran. In the current study, the Cronbach's alpha value for the entire scale was obtained as 0.85.

Young's Diagnostic Questionnaire (YDQ)

Yang developed this questionnaire based on the symptoms of impulse control disorder. A positive response to five or more questions suggests an internet addiction. The reliability of this questionnaire was 0.71, as calculated using Cronbach's alpha method. According to Alavi et al.,[19] the differential validity of this questionnaire was 0.62, its concurrent validity was 0.5, and its reliability obtained through Cronbach's alpha method was 0.65. In contrast, the reliability of the YDQ in the current study was 0.54, determined using the same method.

Depression Anxiety Stress Scales (DASS-21)

This questionnaire has been developed to measure three major negative emotional states: stress, anxiety and depression. It consists of 21 questions including three components, each of which has 7 subscales. Individuals are asked to circle a number from 0 to 3 based on how well each statement applies to them over the past week. The rating scale is as follows: 0 (Did not apply to me at all), 1 (Applied to me to some degree, or some of the time), 2 (practically applied to me to a considerable degree, or a good part of the time), 3 (practically applied to me very much, or most of the time). Since this scale is a shortened form of the 42-item scale, the final scores for each subscale should be doubled. According to Sahebi et al., this scale demonstrates adequate levels of validity among the Iranian population. Cronbach's alpha for the three scales of depression, anxiety, and stress were reported at 0.93, 0.88, 0.82, and 0.90, respectively.[20] In the current study, the reliability of the depression subscale was determined using Cronbach's alpha coefficient and found to be 0.89.

Corona Disease Anxiety scale (CDAS)

Alipour et al.,[21] developed this scale, which has 18 questions. Scoring is based on a four-point Likert scale (0-never, 3-always), and the instrument score is calculated with the total score of the items. Therefore, the range of scores is between 0 and 54, so that 0 to 16 represents mild anxiety, 17 to 29 indicates moderate anxiety, and 30 to 54 indicates severe anxiety. The validity of the CDAS was confirmed through factor analysis, and its reliability was

assessed using Cronbach's alpha method, which yielded a value of 0.91.[22] Notably, the reliability assessed by Cronbach's alpha in this study was 0.95.

Demographic Information Questionnaire

This researcher-made questionnaire contains five yes-or-no questions regarding age, gender, marital status, educational status, and history of COVID-19.

Statistical analysis

In descriptive statistics, the statistical indicators as frequency, mean and standard deviation were used. Besides, in inferential statistics, Student's t-test, Chi-square test and logistic regression were used to compare and examine the relationship between variables. Data were analyzed using SPSS 24 software.

Ethical considerations

The participants were requested not to write their names on the questionnaires and assured that all questionnaires, while maintaining confidentiality, would be collected solely for statistical purposes. Participants could withdraw from or leave the study at any time without providing a reason. Their personal information was safeguarded throughout our storage and usage period, in accordance with their rights to privacy. Every stage of this investigation-from start to finish-has received approval from the Islamic Azad University's ethics committee (Approval ID: IR.IAU.SRB.REC.1399.176).

Results

Results indicate that 404 people participated in this study altogether. The frequency distribution of participants by gender, marital status, educational attainment, and history of COVID-19 illness is presented in Table 1. Findings reveal that 28.5% of participants are internet-addicted. Among those addicted to the internet, most are male (15.6%), aged 40–60 years old (12.6%), unmarried (19.6%), and have low levels of education (7.2%). 46.1 percent of participants reported having a history of COVID-19 illness, with 25.8% being internet addicts. The chi-square test showed a statistically significant association between marital status and internet addiction (p<0.01), indicating that single individuals are more likely to be addicted to the internet compared to married individuals. No significant associations were found between age, gender, educational attainment, or history of COVID-19 illness and internet addiction using the chi-square test.

The chi-square test revealed a significant direct relationship between the severity of COVID-19 anxiety and internet addiction (p<0.000), as well as between the severity of depression and internet addiction (p<0.000), and between the severity of sleep disorders and internet addiction (p<0.001). These findings suggest that individuals with severe COVID-19 anxiety, depression, or sleep disorders are more likely to be addicted to the internet compared to those with moderate or mild levels of these conditions. Additionally, independent t-tests found no significant association between feelings of loneliness and internet addiction.

Logistic regression was used to demonstrate the effect of demographic and psychological variables on the probability of internet addiction (equal to or greater than 5). A total of 404 individuals were included in the analysis. The results of the omnibus test showed the evaluation of the overall logistic regression model and addressed the extent to which the model explains and efficiency. According to the results of this test, the general model, which included all predictive variables, was statistically significant (p<0.000, df=13 and 54.09=two). This model accurately predicted the probability of internet addiction in 28.7% of individuals based on predictive variables, while the overall prediction accuracy was 75%. Moreover, Cox & Snell R-squared and Nagelkerke R-squared values revealed that independent variables could explain 12.5 to 18% of the variance in internet addiction.

Table 3 displays the regression coefficients, Wald statistics, significance level, and corresponding degrees of freedom, as well as probability values for each predictor variable. The findings indicate that depression and sleep disorders can predict the likelihood of internet addiction with a probability ratio of 1.07 and 1.06, respectively. In other words, an increase in the depression score raises the risk of internet addiction by approximately 1.07 times, while an increase in the sleep disorder score raises the risk by approximately 1.06 times.

Table-1. Comparison of demographic risk factors between the IA and non-IA groups

Psycho-social risk factors		non-IA	IA	χ2 or t	p
		N(%) or Mean (SD)	N(%) or Mean (SD)		
COVID-19 anxiety	Normal	77 (19.1)	16.4	19.99	0.000
	Moderate	87 (21.5)	21. (5.2)		
	Severe	125(30.9)	78 (19.3)		
Depression	Normal	76 (18.8)	10 (2.5)	24.74	0.000
	Moderate	75 (18.6)	20 (5)		
	Severe	138 (34.2)	85 (21)		
Sleep disorder	Normal	9 (2.2)	0 (0)	14.14	0.0001
	Moderate	99 (24.5)	22 (5.4)		
	Severe	181 (44.8)	93 (23)		
Loneliness		32.87 (9.53)	32.12 (10.17)	0.70	0.48

Table-2. Comparison of psychological risk factors between the IA and non-IA groups

Psycho-social risk factors		non-IA	IA	χ2 or t	p
		N(%) or Mean (SD)	N(%) or Mean (SD)		
COVID-19 anxiety	Normal	77 (19.1)	16 (4)	19.99	0.000
	Moderate	87 (21.5)	21 (5.2)		
	Severe	125 (30.9)	78 (19.3)		
Depression	Normal	76 (18.80	10 (2.5)	24.74	0.000
	Moderate	75 (18.6)	20 (5)		
	Severe	138 (34.2)	85 (21)		
Sleep disorder	Normal	9 (2.2)	0 (0)	14.14	0.0001
	Moderate	99 924.5)	22 (5.4)		
	Severe	181 (44.8)	93 (23)		
Loneliness		32.87 (9.53)	32.12 (10.17)	0.70	0.48

Table-3. Regression Logistic regression predicting the likelihood of internet addiction

Variables		B	SE	Wald	df	Sig	Exp (B)= OR	95% C.I. for EXP (B)	
								Lower	Upper
Age	Up to 20	0	0	0	0	0	REF	0	0
	20 to 40	-0.29	0.6	0.23	1	0.63	0.75	0.23	2.42
	40 to 60	0.02	0.3	0.008	1	0.93	1.03	0.57	1.86
Gender	Male	0	0	0	0	0	REF	0	0
	Female	-0.48	0.27	3.2	1	0.07	0.61	0.36	1.04
Marital status	Married	0	0	0	0	0	REF	0	0
	Single	-0.5	0.29	3.03	1	0.08	0.6	0.3	1.06
Education	Under-educated	0	0	0	0	0	REF	0	0
	Diploma	0.63	0.66	0.91	1	0.34	1.88	0.51	6.9
	Associate degree	-0.37	0.49	0.57	1	0.45	0.69	0.26	1.81
	Bachelor	0.06	0.4	0.02	1	0.89	1.06	0.48	2.34
	Master/ higher	-0.07	0.38	0.03	1	0.85	0.93	0.44	1.98
History COVID-19	Yes	0	0	0	0	0	REF	0	0
	No	0.24	0.25	0.92	1	0.33	1.28	0.77	2.11
Feeling loneliness		0.004	0.014	0.087	1	0.768	1.004	0.977	1.032
Anxiety		0.015	0.016	0.884	1	0.347	1.015	0.984	1.048
Depression		0.068	0.033	4.176	1	0.041	1.070	1.003	1.143
Sleep disorder		0.062	0.030	4.330	1	0.037	1.064	1.004	1.127
Constant		-2.782	0.724	14.766	1	0.000	0.062		

Abbreviations: OR: odds ratio; CI: confidence interval. REF: reference group.

Discussion

This study aimed to investigate the prevalence of internet addiction and psycho-demographic risk factors during the COVID-19 outbreak among a sample of Iranian individuals. Based on the findings, the current prevalence rate of internet addiction in Iran stands at 28.5%, which is significantly higher than before the outbreak.[23,24] These findings are consistent with previous studies that compared internet addiction rates before and after the COVID-19 pandemic in various countries.[2-4] As people adhere to quarantine and social distancing measures due to the pandemic, they have been forced into solitude, leading many to rely heavily on social media to cope with feelings of isolation and loneliness. Unfortunately, this increased reliance can result in severe consequences, including internet addiction and related mental health issues.

Notably, in such situations, internet addiction provides a temporary, inconsistent, and transient solution to an existing distressing condition rather than an actual psychopathological condition. Therefore, before using the label "addiction" to describe individuals, careful consideration and examination of the specific circumstances and reasons underlying their excessive use of media are necessary. In other words, the term "Internet addict" in this context should be used cautiously.[25]

Regarding demographic characteristics, the results showed that there were no significant differences between men and women in the rate of internet addiction. This result is consistent with Atashpour et al.'s findings.[26]

In fact, this result illustrates the current intellectual growth and shifting attitudes towards gender, as well as the equal use of opportunities by both men and women in societies. On the other hand, with the rising number of women enrolling in universities, they are becoming more tech-savvy.[5] Regarding the relationship between marital status and internet addiction, the results showed that internet addiction is more common in single individuals than in married ones, which is consistent with the findings of MohammadBeigi et al.'s study.[27] Single individuals are more likely to have access to the internet since they don't have the stress of married life. Regarding the relationship between age and internet addiction, the findings revealed that there is no significant correlation between age and internet addiction.

This result is consistent with the study of Mohammadi et al.[28] It can be concluded that the expansion of technology and the prevalence of COVID-19, which forced older people to use online services and younger people to attend online school, may lead to these results. Regarding the relationship between education and internet addiction, the findings revealed a lack of significant correlation between the level of education and internet addiction. This outcome may be attributed to nearly equivalent welfare conditions existing across different educational levels, which aligns with the study by Mohammad Beigi et al.[27]

The results of an independent t-test showed that there was no significant difference between feelings of loneliness and internet addiction, which is inconsistent with the findings of Hojjati et al.[29] As a possible explanation, it can be said that due to the COVID-19 pandemic, all members of society are currently required to follow lockdown and social distancing rules, resulting in a common feeling of loneliness among people.[30] As a result, there was no significant difference between internet addicts and non-internet addicts in terms of feelings of loneliness. On the other hand, the results of chi-square testing revealed a significant direct relationship between the severity of COVID-19 anxiety, depression, and sleep disorders and internet addiction. In fact, individuals with severe COVID-19 anxiety, depressive disorders, or sleep disorders reported higher levels of internet addiction. These findings are consistent with previous research by Nouri and Sadeghian.[31] Additionally, logistic regression analysis revealed that only depression and sleep disorders were significant predictors of internet addiction. In conclusion, there appears to be a bidirectional relationship between anxiety, depression, sleep disorders, and internet addiction. On one hand, individuals experiencing high levels of anxiety may utilize the internet excessively to avoid or distract themselves from their anxious thoughts. Conversely, limited access to the internet could exacerbate anxiety symptoms in those dependent on the internet. Similarly, depression, as a profound and persistent mental health issue, can also contribute to internet addiction. In fact, depressed individuals may turn to the internet as a

means of escaping their unhappiness, thereby providing an alternate source of comfort when real-life experiences are unfulfilling. As a consequence, depression may occur as a result of internet addiction, and sometimes it can be one of its negative consequences. Additionally, sleep disorders have a two-sided relationship with internet addiction; in fact, sleep disorders may develop as a result of internet addiction, as individuals with sleep disorders tend to spend more time online.[31] A literature review reveals that individuals hooked on the internet tend to stay up later.[32] However, our current study differs from previous research in that we found that while marriage status and COVID-19 anxiety are associated with internet addiction, these factors lose their significance when entering a regression equation alongside depression and sleep disorders, highlighting the crucial role of depression and sleep problems in predicting internet addiction during the COVID-19 pandemic. In other words, the extended duration of the COVID-19 epidemic in Iran, along with its high incidence and fatality rate, combined with social isolation measures and lockdown policies, contribute to developing depression and sleep difficulties, which in turn increase the likelihood of internet addiction.

It is worth noting that both depression and sleep disorder are highly correlated, while sleep disorder is itself considered a symptom of depression. However, the exact relationship between depression, sleep disorders, and Internet addiction remains unclear, as these disorders may either contribute to or result from Internet addiction. As a result, individuals who are addicted to the Internet may experience negative consequences such as depression and sleep disorders, which require further investigation.

One of the limitations of the current study is the online survey, which limits the generalizability of the data. Another point worth noting is that since the study was conducted in Hamadan Province, generalizing the results to other cities in Iran requires caution. Due to the cross-sectional nature of the research, it is challenging to draw long-term conclusions about its impact. Notwithstanding these limitations, the present findings imply that mental health professionals must closely evaluate and address Internet addiction and symptoms of mental disorders like depression and sleep disorders in the post-pandemic era.

As such, it is recommended that future investigations assess whether the rise in Internet addiction persists following COVID-19 or if the prevalence of Internet addiction declines as restrictions are lifted.

Conclusions

It is of utmost importance to consider the detrimental impact of excessive internet and social media usage on individuals as they resume their offline lives and relationships in the post-COVID-19 era. To address this issue, longitudinal studies are necessary to examine the effects of the COVID-19 pandemic on social media use in various populations and cultural settings. Moreover, fostering media literacy among users can be essential in developing alternative means of socialization that do not perpetuate harmful digital habits.

Acknowledgment

Competing interests

The authors declare that they have no competing interests.

Abbreviations

Depression, Anxiety, and Stress Scales: DASS-21; Young's Diagnostic Questionnaire: YDQ; Corona Disease Anxiety Scale: CDAS; Social and Emotional Loneliness Scale for Adults: SELSA-S; Petersburg Sleep Disorder Questionnaire: PSQI; Coronavirus disease 2019: COVID-19; World Health Organization: WHO.

Authors' contributions

Author read and approved the final manuscript. She takes responsibility for the integrity of the data and the accuracy of the data analysis.

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Availability of data and materials

The data used in this study are available from corresponding author on request.

Ethics approval and consent to participate

The study was conducted in accordance with the

Declaration of Helsinki, and institutional review board (IR.IAU.SRB. REC.1399.176).

Consent for publication

By submitting this document, the authors declare their consent for the final accepted version of the manuscript to be considered for publication.

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