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Research Article

The prevalence of internet addiction and related factors among high school students in Babol in 2021

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Abstract

***Background*:** Internet addiction (IA) is increasingly recognized as a significant issue among adolescents, as it adversely affects their mental health and social interactions. This cross-sectional study was conducted in Babol, Iran in June 2021 to assess the prevalence of internet addiction and related demographic and psychological factors among high school.

***Methods*:** A total of 408 students aged 15–18 years were selected through multistage stratified random sampling. The Young Internet Addiction Test (IAT) and General Health Questionnaire (GHQ-28) were administered by trained researchers during school hours. Demographic data were collected through a structured form. Statistical tests (t-tests, one-way ANOVA, chi-square, regression) were applied using SPSS v22 (The significance level set at $p < 0.05$).

***Results*:** The results indicated that %27.9 of students had moderate internet addiction. Higher rates were observed among females (%35.7) and technical field students (%48.). Students with two children in the family or with only one working parent showed higher IA rates. The GHQ-28 mean score was significantly higher in the moderately addicted group (15.54 ± 7.52) compared to non-addicted students (10.62 ± 4.85) ($p<0.001$).

***Conclusion*:** The findings highlight the association between internet addiction and poor mental health. Routine screening and psychoeducational programs are recommended to promote healthier internet use. Future research should explore a wider range of factors influencing IA to develop comprehensive prevention strategies.

Keywords: Internet Addiction Disorder, Students, Mental Health, Cross-Sectional Studies, Risk Factors.

Introduction

The Internet has become a global phenomenon, significantly influencing various aspects of life, especially among teenagers (1). While it offers numerous advantages, improper and excessive use can lead to internet addiction (IA), a recognized global public health concern (2). Individuals with IA may withdraw from social and physical activities, experience changes in sleep patterns and energy levels, and develop mood issues when attempting to limit their online engagement (3). Certain online activities, such as problematic video gaming, excessive social media use, compulsive online pornography consumption, internet gambling, and compulsive searching, are linked to addictive behaviors. However, only problematic video gaming is officially recognized as a mental disorder (4).

Factors contributing to Internet addiction include demographic aspects such as gender, academic field, and family structure, as well as psychological factors like depression, anxiety, and low self-esteem. Easy access to smartphones for diverse activities such as browsing social media, gaming, entertainment, news, education and shopping (5), and a lack of alternative recreational activities further exacerbate the problem. Identifying these factors is crucial to developing effective prevention and intervention strategies for adolescents (6).

High school students increasingly rely on the Internet for socializing, academics, gaming, and entertainment (2), making Internet addiction a growing public health concern (5). The prevalence of internet addiction varies across studies, with rates ranging from 52.3% among students in Brazil (2) to 34.53% in Africa (7), 66% in India (8).

Iranian students, like their peers worldwide, face a considerable risk of phone and internet addiction due to the widespread accessibility of technology and social media platforms.

Research indicates that 53.7% of Iranian high school students are regular internet users, 37.5% exhibit mild addiction, and 8.8% show moderate addiction (9). Another study highlights an overall internet addiction rate of 25% (10).

High school students are in sensitive years of growth and development, and this issue can have deep negative effects on their physical, mental and social health. They may experience less attractiveness, success, competence and self-confidence due to constant comparison with their peers, and their anxiety level increases (11).

Moreover, excessive use of digital devices can result in physical ailments such as musculoskeletal pain and higher BMI (12), alongside mental health challenges such as loneliness (13), community violence, depression (14), suicidal thoughts (15), poor sleep quality, reduced academic performance (16), burnout, and decreased quality of life (17).

Studies have shown a significant negative relationship between internet addiction and mental health (5), highlighting issues such as poor physical condition, anxiety, depression, and social functioning (18). This is particularly evident among high school students, where internet addiction is associated with a decline in psychological well-being (19). Interestingly, a study in Peru found that students with IA experienced higher levels of anxiety but did not show a corresponding increase in depressive symptoms (20).

These conflicting findings illustrate the complex interaction between internet addiction and mental health issues. The connection between internet addiction (IA) and mental health is multifaceted and reciprocal. Current research approaches are insufficient for fully validating the proposed models of this relationship. IA may lead to psychiatric disorders, or psychiatric issues may contribute to the development of IA. Both conditions may be influenced by biological, social, demographic, or psychological vulnerabilities (21).

Research on internet addiction frequently neglects significant social and mental health factors, focusing instead on specific populations or geographic regions (5, 22). As the risks associated with excessive internet use continue to grow, driven by evolving usage patterns and their potential adverse effects, the need for early screening measures, preventive strategies, and targeted interventions becomes increasingly urgent (18, 23). This study investigates the prevalence of internet addiction and its associated factors among high school students in Babol, Iran. The findings aim to provide valuable insights into internet usage patterns and promote healthier technology habits in developing societies like Iran.

Methods

A cross-sectional study was conducted in June 2021 in Babol, Iran, to assess the prevalence of internet addiction and its associated factors among high school students.

The final sample size was determined to be 408 students using the sample size estimation formula, based on a previous prevalence of 21.7% (18), with a 95% confidence level and a 4% margin of error, and a significance level (α) of 0.05

$$. n \geq \frac{z^2_{1-\frac{\alpha}{2}}\, p\,(1-p)}{d^2}$$

The inclusion criteria were: students enrolled in 10th to 12th grades, voluntary participation, and regular access to the internet. Exclusion criteria included students with diagnosed severe psychiatric disorders or those unwilling to complete the questionnaires.

The study employed a multistage stratified random sampling approach. Initially, a comprehensive list of high schools in Babol city was compiled. To ensure diverse representations across academic fields (mathematics,

experimental sciences, humanities, and technical) and genders, 4 schools (2 girls' schools and 2 boys' schools) were randomly selected from schools in different fields. A list of all the students in each grade (10th, 11th, and 12th) and their gender was subsequently prepared, and 102 students were randomly selected from each school via SPSS software.

Once the schools were selected, researchers coordinated with school authorities to obtain permission for conducting the study. Thereafter, students from each selected school were invited to participate voluntarily. Written consent was obtained from the participating students.

2.3. The Study Instrument

This study utilized the Young's internet Addiction Test (IAT), the General Health Questionnaire (GHQ-28), and demographic information such as age, gender, marital status, semester, type of school, field of study, level of education, means of using the internet, number of children in the family, occupation of the parents, type of school, location of internet access, devices used to connect to the internet, social networks used and reasons for using the internet (research, social networks, conversation or entertainment). Students filled out the questionnaires during school hours, which were distributed and collected by qualified researchers.

Young's internet Addiction Test (IAT)

The internet Addiction Test (IAT) was developed by Young. Research has shown that the IAT is a reliable and valid measure, and it has been extensively used in studies on internet addiction (24). It is a self- reported measure with 20 items on a 5-point Likert scale, resulting in a total score ranging from 20 to 100 points. On the basis of the score, individuals are classified as without dependence (20–39 points), problematic users or moderate dependence (40–69 points), severe dependence or internet addiction (70–100 points) (25). Validity and reliability of the Persian version of this questionnaire among Iranian students determined in good level. Using the simultaneous narrative method, Alavi et al. (26) reported that the questionnaire had validities of 0.81 and 0.78 and a differential validity of 0.62. Reliability was assessed through Cronbach's alpha (0.70), split-half correlation (0.64), and test–retest correlation (0.47).

General Health Questionnaire (GHQ-28)

The GHQ-28, developed by Goldberg in 1978, is a widely used self-administered questionnaire to identify individuals at risk for mental disorders (27). It consists of 28 items that evaluate mental well-being in the past month across four areas: somatic symptoms (items 1–7), anxiety/sleeplessness (items 8–14), difficulties in social interactions (items 15–21), and major depression (items 22–28) (28). Scores are

calculated via a Likert scale (0, 1, 2, 3), with a total range of 0–84 (29). Lower scores indicate better mental health. The cut off for potential mental health issues is 22–24 points, and the optimal clinical cutoff for general health screening in the Iranian population is 24 points on the Likert scale, with a cutoff of 14 points for each subitem (29, 30).

The Persian version of the GHQ-28 questionnaire has been validated and found to be reliable in several independent studies conducted in Iran (31, 32), with strong internal consistency (Cronbach's alpha 0.78-0.97) and four factors accounting for 60% variance. GHQ-28 demonstrates appropriate internal consistency for general health assessment (32).

2.4. Data analysis

The data were analyzed via SPSS version 22 at a significance level of 0.05. Internet addiction was the dependent variable, whereas mental health, demographic variables, and internet usage were the independent variables. Independent t tests were used to compare the GHQ28 scores between students with and without moderate internet addiction. The chi-square test was used to examine the relationships between internet addiction and patient demographics. One-way ANOVA was used to analyze the effect of academic year on internet addiction. Stepwise regression with the backward method was used to investigate the impact of independent variables on internet addiction.

Ethical Approval

The study received approval from the Research Ethics Committee of Babol University of Medical Sciences (Approval Code: IR.MUBABOL.HRI.REC.1400.160).

Participants' information was strictly kept confidential and was not disclosed to any third parties, nor did the study impose any additional costs on participants. Before the research commenced, participants were thoroughly informed about the study's objectives, procedures, potential benefits, and risks, and their written informed consent was obtained. The study adhered to the principles outlined in the Declaration of Helsinki, upholding participants' autonomy, well-being, and ethical research standards.

Results

In this study, 408 high school students aged 15–18 years (M=16.93, SD=0.93) were examined, with 201 males (49.3%) and 207 females (50.7%). The most common educational field was experimental sciences, with 182 students (44.5%), and the majority of participants were in the twelfth grade (168 students or 41.2). Regarding academic disciplines, 182 students (44.5%) were in experimental sciences, 147 (36.0%) in mathematics, 50 (12.3%) in humanities, and 29 (7.1%) in technical fields. Based on grade level, 168 students (41.2%) were in the twelfth grade, 134 (32.8%) in the tenth grade, and 106 (26.0%) in the eleventh grade.

Concerning family structure, the majority of participants (51.7%) came from families with two children, while 104 (25.5%) had only one sibling, and 93 (22.8%) were from families with more than two children. In terms of school type, 209 students (51.2%) attended non-government schools and 199 (48.8%) were from government schools. All participants used mobile phones to access the internet, and 118 students (28.9%) also reported using laptops. The demographic characteristics of the participants are summarized in Table 1.

Prevalence of internet addiction

According to Young's questionnaire, 294 (72.1%) of the students were categorized as not having internet addiction, whereas 114 (27.9%) were categorized as having moderate internet addiction. No students were categorized as having mild or severe addiction (Table 2).

Factors influencing internet addiction

The overall mean score for the GHQ-28 was 10.62 ± 4.85 in the nonaddicted group and 15.54 ± 7.52 in the moderately addicted group. The results indicated that the mean GHQ-28 scores for students with moderate internet addiction were significantly higher than those for those without addiction ($p < 0.001$). Scores related to various dimensions of mental health, including physical health, anxiety, social functioning, and depression, were significantly higher in the group with moderate internet dependency than in the group without dependency. The information on the other subscales of the GHQ-28 is also presented in Table 3.

The association between internet addiction and demographic variables was analyzed using the chi-square test. The frequencies and percentages of moderate dependency across subgroups such as gender, field of study, grade, school type, number of children, and device usage are presented in Table 4.

Relationships between internet addiction and demographic characteristics

The associations between internet addiction and various demographic factors were examined using the chi-square test. A significant relationship was observed between internet addiction and gender ($p < 0.001$). Among females, 35.7% had moderate dependency, while this rate was 19.9% among males. Field of study was also significantly associated with internet addiction ($p = 0.035$), with the highest rate in technical fields (48.3%) and the lowest in humanities (23.6%).

The analysis showed that all students used mobile phones to access the internet. However, a statistically significant difference was found in laptop usage between groups ($p < 0.001$). Students with only one employed parent, particularly where only the mother was employed, showed higher rates of moderate dependency ($p < 0.001$). Families with more than two children also showed a significant association with increased internet addiction ($p = 0.007$).

The associations between use of different social media platforms and internet addiction were examined. Significant relationships were observed with Instagram (p = 0.005) and WhatsApp (p = 0.004), while Telegram use did not show a significant difference (p = 0.301). Other variables such as grade level, school ownership type, and use of educational institutes were not significantly associated with dependency levels (See Tabe4).

To identify independent predictors of moderate internet addiction, a logistic regression analysis was conducted using a backward elimination method.

After removing non-significant variables, the final model retained only those factors that were both statistically significant and contextually relevant.

As shown in Table5, higher age and being female were associated with increased odds of moderate internet addiction. In terms of field of study, students in experimental sciences and humanities had significantly lower odds of addiction compared to those in technical fields. Furthermore, not using WhatsApp and not owning a laptop were both independently associated with higher risk. Family structure also played a role: students from smaller families (with one or two children) were significantly less likely to exhibit moderate internet addiction.

Table1. Demographic characteristics of the participants

Variable		Frequency N (%)
Age (mean ± SD) years	**0.93 ±16.86**	
Gender		
	Male	(49.3) 201
	Female	(50.7) 207
Field of study		
	Mathematics	(36) 147
	Experimental science	(44.5) 182
	human	(12.3) 50
	technical	(7.1) 29
Grade of high school		
	the tenth	(32.8) 134
	the eleventh	(26) 106
	twelfth	(41.2) 168
Type of school		
	Government	(48.8) 199
	Nongovernment	(51.2) 209
Number of children		
	1	(25.5) 104
	2	(51.7) 211
	>2	(22.8) 93

Note: Demographic characteristics of the participants; frequency, percentage

Table 2. Frequency of internet addiction in high school students

Variable		Frequency N (%)
Type of dependency	Without dependency	294 (72.1)
	Mild dependency	0
	Moderate dependency	114 (27.9)
	Severe dependency	0

Note: Type of dependency of the participants; frequency, percentage

Table 3. The means of internet addiction according to mental health subscales

Variable	Without dependency (mean ± SD)	Moderate dependency (mean ± SD)	P value*
GHQ-28 total score	62.10 ± 41.85	15.54 ± 57.52	0.001*<
Somatic symptoms	3.60 ± 10.67	4.91 ± 14.33	0.001*<
Anxiety	4.61 ± 12.29	4.26 ± 16.40	0.001*<
Social dysfunction	2.82 ±13.18	4.17 ± 17.13	0.001*<
depression	3.99 ± 10.54	6.17 ± 16.61	0.001*<

Note: The result is statistically significant at the 5% level (P<0.05 *). Independent t tests were used

Table 4. Relationships between internet addiction among high school students and demographic variables

Variables		Without dependency (mean ± SD)	Moderate dependency (mean ± SD)	Pvalue*
Gender	Male	161 (80.1)	(19.9) 40	0.001<
	Female	133 (64.3)	(35.7) 74	
Field of study	Mathematics	107 (72.8)	40 (27.2)	0.035
	Experimental science	139 (76.4)	43 (23.6)	
	human	33 (66)	17 (34)	
	technical	15 (51.7)	14 (48.3)	
Grade of high school	the tenth	(72.4) 97	(27.6) 37	0.671
	the eleventh	(68.9) 73	(31.1) 33	
	twelfth	(73.8) 124	(26.2) 44	
Home	yes	(71.8) 290	(28.2) 114	0.211
	no	(100) 4	0	
School	yes	(71.9) 64	(28.1) 25	0.972
	no	(72.1) 230	(27.9) 89	
Educational Institue	yes	(71.9) 64	(38.7) 12	0/165
	no	(72.1) 230	(27.1) 102	
Telegram	yes	(69) 100	(31) 45	**0.301**
	no	(73.8) 194	(26.2) 69	
WhatsApp	yes	(76) 225	(24) 71	**0.004**
	no	(61.6) 69	(38.4) 43	
Instagram	yes	(66.5) 151	(36.5) 76	**0.005**
	no	(79) 143	(21) 38	
other	yes	(58.3) 21	(41.7) 15	**0.055**
	no	(73.4) 273	(26.6) 99	

				0
Cell phone	yes	(72.1) 294	(27.9) 114	
	no	0	0	
laptop	yes	(84.7) 100	(15.3) 18	**0.001<**
	no	(66.9) 194	(33.1) 96	
Type of school	Government	(68.3) 136	(31.7) 63	**0.103**
	Nongovernment	(75.6) 158	(24.4) 51	
Number of children	1	(76.9) 80	(23.1) 24	**0.007**
	2	(75.4) 159	(24.6) 52	
	>2	(59.1) 155	(40.9) 38	
Employment status of parents	Only father employed	(73.9) 210	(26.1) 74	**0.001<**
	Only mother employed	(18.7) 3	(81.3) 13	
	Both parents employed	(75) 81	(25) 27	

Note: The result is statistically significant at the 5% level. The chi-square test was used

Discussion

The findings from this cross-sectional study offer significant insights into the prevalence of internet addiction (IA) among high school students in Babol, Iran, revealing that 27.9% of participants exhibited moderate levels of IA.

This finding is consistent with recent studies that have shown varying levels of internet addiction among adolescents, with a small percentage classified as internet addicts and a larger portion at risk of developing addiction. Prevalence rates range from 1.1% to 33.1% at risk in Bushehr (18), whereas in research in Sanandaj, approximately 25% of individuals were at risk (10), whereas 5.1% and 53.7% of individuals at risk in Isfahan (22) and 27.6% and 2.9% of those in Tehran were at risk, respectively (5). However, some available research suggests that the prevalence of moderate to severe addiction ranges from approximately 20% to 30% among secondary school students (20, 33). The global nature of internet addiction among young people is evident and transcends cultural and geographical boundaries. The variation in estimated prevalence appears to be due to differences in screening methods, sampling approaches, study settings, and study populations.

Our results further revealed a significant association between higher general health questionnaire (GHQ-28) scores and internet addiction, which is consistent with existing research that strongly links IA to various mental health issues in adolescents, including anxiety, neglect of work and social life, and social dysfunction (34).

The results of Ebrahimi et al.'s research also revealed that there is a direct relationship between internet addiction and the physical condition, anxiety, depression and social performance of high school students (18). The elevated GHQ-28 scores observed in the moderately addicted group suggest that internet addiction is not merely a behavioral concern but is intricately connected to the overall mental well-being of adolescents. This highlights the necessity for mental health professionals to recognize and address internet addiction as a potential indicator of broader psychological issues. Conducting longitudinal studies can provide insights into the long-term effects of internet use on mental health, helping to clarify any potential associations over time.

One of the most notable findings of our study was the higher prevalence of moderate IA among female students (%35.7) compared to male students (%19.9). This gender disparity remained significant in the regression model (AOR = 0.28; 95% CI: 0.15–0.51; p < 0.001), indicating that female students had higher odds of IA. This gender disparity is consistent with other research. A possible explanation is that boys often participate in more extracurricular activities, while girls may be more engaged in online communication to seek peer recognition and emotional support (35, 36).

They may feel more pressure to conform to social norms and expectations set by their peers online, leading to increased internet use to fit in and a dependency on online validation and social acceptance (37). However, other studies suggest that social media addiction is a primary predictor of internet addiction for both genders (38). More research is needed on internet addiction and gender effects to provide a comprehensive understanding of this complex phenomenon.

Our study also revealed that students in technical fields presented the highest rates of IA (48.3%), a finding that echoes previous research suggesting that students in more technology-focused disciplines may be more inclined to engage in excessive internet use (39). This may reflect curriculum differences or varying digital exposure, and the need for educational institutions to address the potential risks associated with high internet usage in these fields, promoting balanced online behaviors through targeted interventions.

The correlation between internet addiction and family structure found in our study warrants further discussion. Specifically, students from families with two children presented the highest levels of IA. This finding may reflect unique familial dynamics and parental attention patterns, suggesting that family size could impact the emotional and social support adolescents receive.

According to the findings of Liu et al.'s study, living in an extended family and having a low family income were factors that reduced the risk of internet addiction (40).

Furthermore, the increased prevalence of IA among students with only one working parent aligns with findings indicating that lower parental involvement can lead to higher risks of internet addiction, as male gender, mother's employment, and family financial status were also associated with increased addiction risk in another study (41).

These findings emphasize the importance of considering family dynamics in developing prevention measures, and addressing these factors can be effective in mitigating internet addiction.

Limitations

The cross-sectional design of this study limits the ability to draw causal conclusions. The study focuses exclusively on high school students in Babol, Iran, limiting its generalizability to adolescents from other cultural, socioeconomic, or geographic backgrounds. Including a more diverse sample would enhance the broader applicability of the findings. Longitudinal studies could also better elucidate the temporal relationships between internet use and addiction, providing valuable insights for intervention strategies. Additionally, Self-reported data from the IAT and GHQ-28 may introduce biases like social desirability and recall bias, impacting accuracy.

Future research

Future research should focus on developing and evaluating targeted interventions to reduce internet

addiction among adolescents, parents, schools, and community resources.

Qualitative methods, such as interviews and focus groups, can offer valuable insights into the motivations driving internet use and the personal experiences of adolescents. Additionally, research should account for the cultural context of internet use, as differences in technology adoption and social norms may shape addiction patterns across various populations.

Future studies should explore a wider range of contributing factors, including psychological dimensions like personality traits and peer influence, to develop a more holistic understanding of internet addiction in adolescents.

Application in Clinical Practice

Mental health professionals should be mindful of internet addiction among adolescents and incorporate screening tools into routine assessments to identify at-risk students early. Educational programs should be developed for students and parents to promote healthy internet use, educating them about the risks of excessive use and strategies for balanced online behaviors.

Conclusion

This cross-sectional study examined the prevalence of internet addiction among high school students in Babol, Iran, and revealed that 27.9% exhibited moderate levels of internet addiction. The results indicate significant associations between internet addiction and factors such as gender, educational field, and family structure, with female students and those in technical fields showing higher rates of moderate addiction. The study also underscores the importance of the home environment and parental employment status in influencing students' internet usage and potential addiction. Understanding these characteristics is crucial for developing targeted interventions aimed at reducing internet addiction among adolescents by addressing specific demographic influences.

Authors' contributions

Study concept and design: RH, SJ, MEH, and HS. Analysis and interpretation of data: RH, MEH, SH. Critical revision of the manuscript RH, MEH, SSM. Data collection: MAL, Data collection: SSM, Writing an article: MEH. RH. All the authors had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

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Author's contribution

Study concept and design: RH, SJ, MEH, and HS. Analysis and interpretation of data: RH, MEH, SH. Critical revision of the manuscript RH, MEH, SSM. Data collection: MAL, Data collection: SSM, Writing an article: MEH. RH. All the authors had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

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