Internet Addiction and Its Association with Demographic Variables, Depression, Anxiety, and Psychological Well-being in College Students*

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Abstract

Background: Internet is an integral part of the daily life of everyone. Internet addiction (IA) is one of the major concerns, specifically among young adults. The association between IA, depression, anxiety, and psychological well-being (PWB) is least studied in young adults.
Purpose: To evaluate IA and its association with psychological morbidity and PWB in a larger sample size. In addition, to examine the factors that are associated with IA.
Methods: A total of 1287 young students were evaluated in the present study. Participants were evaluated on the Internet Addiction Test (IAT), Patient Health Questionnaire-9 (PHQ-9), Generalized Anxiety Disorder-7 (GAD-7), and Psychological Well-Being Index-22.
Results: The mean age of the study's participants is 19.5 years. The majority were female (68.9%), from nuclear families (61.8%), and belonged to urban localities (61.5%). On IAT, 15.9% had a presence of IA with a cut-off score of 50. 27.4% and 20.5% had a presence of depression and anxiety with a cut-off score of 10 on the PHQ-9 and GAD-7, respectively. Approximately two-thirds (66.7%) reported poor PWB. IA had a significant positive association with depression and anxiety and a negative association with PWB. Male students, the presence of depression, anxiety, and poor PWB were independent factors associated with IA.
Conclusion: Internet addiction is highly prevalent among college students and has a significant association with anxiety, depression, and poor PWB. There is a need to develop a structured plan, educational strategy, and program to minimize IA in young adults.

Keywords

Internet addiction, depression, anxiety, psychological well-being

Introduction

In modern life, life cannot be imagined without the internet. Currently, approximately two-thirds of the global population uses the Internet, most of whom are active internet users. Compared to other countries, Asian countries have the highest numbers of internet users, comprising 51.8% of the total population.[1] Currently, more than 560 million people in India are using the internet.[2] The growth of internet users is also associated with a significant rise in cases of Internet addiction (IA).[3] Among the general population, college students are the most vulnerable to problematic internet use or IA. Various reasons for the increased vulnerability of having IA among college students could be time availability, ease of access to

the internet, availability of study material on internet, promotion of study through internet, limited supervision, and so on. In terms of IA prevalence, a number of studies were

*One of the authors of this article is an editor of the journal. To avoid a conflict of interest, other editors and anonymous reviewers handled the peer-review process and decision-making for this article.
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conducted to evaluate the magnitude of the problems in the Indian subcontinent. A meta-analysis of Asian countries reported that the average prevalence of IA varies from 5% to 21% across different countries.[4] However, when we looked at the prevalence in the same region or country, there was a marked difference in the prevalence of IA. The reasons for high variance could be methodological issues; different study participants, with different instruments and inconsistent cut-off scores, were used to determine IA. For instance, studies conducted across the Indian subcontinent reported the prevalence estimated of IA from 4.56% to 46.7%.[4–6]

Problematic use or IA among students can have significant negative impacts like academic failure, poor social interaction, irritability, affective symptoms, and poor physical health.[7] IA is reported to be significantly associated with psychiatric illnesses like sleep difficulties, suicidality, depression, anxiety, and substance use.[9–11] The findings are inconsistent regarding psychological well-being (PWB); some reported a positive association, and a few reported negative associations between IA and PWB.[12–14] Sociodemographic variables associated with IA are inconsistent, as reported in the literature. Like in some studies, gender and locality are strongly associated with internet use and *vice versa*.[8]

The limitation of the previous studies is that most of them were conducted among professional students, and only a few were conducted among non-professional college-going students, with a limited sample size varying from 104 to 846.[10] The association of IA with psychiatric morbidity and PWB is not assessed in non-professional college-going students. Previous studies were done at a particular university and were not representative of at least two or more states. Therefore, it is imperative to evaluate IA and its association with psychological morbidity and PWB in a larger sample size. The study also determined the determinants that were associated with the IA.

Methods

It was a cross-sectional study conducted among the regular undergraduate non-professional students (Arts, Commerce, and Science streams) studying in the union territory of Chandigarh from June 2022 to July 2022. Union Territory Chandigarh comprises 11 colleges, of which 4 are government-funded local colleges, including at least 6000 undergraduate students. These are bachelor of arts, bachelor of science, and bachelor of commerce. Union Territory Chandigarh colleges are a hub of 4–5 states, at least representing the whole northern region of India. In another way, the present study has the maximum number of participants and represents one zone of the country.

Study Participants and Sampling

No prior study has been conducted in the Union Territory Chandigarh to evaluate the prevalence of IA. Hence, we have taken the prevalence at an average prevalence of 40% as per one of the previous metaanalyses done in India. By using the Daniel method, we calculated the sample size with a prevalence rate of 40%, a confidence interval of 95%, and a precision of 5%. The sample size came out to be 363. However, we aimed to get the maximum number of participants involved in the present study. We approached more than 2000 students and recruited 1287. Before the recruitment, the institute's Ethic Committee approved the study. Permission from the Director of Education was also sought. The funding for the current study was provided by the Department of Science and Technology, Chandigarh.

Eligibility Criteria

All regular undergraduate young adult students aged 18 years and above studying in Chandigarh. The participants should be present at the time of data collection. A convenient sampling technique was used. Those who provided consent for the present study were recruited. Those who refused to consent or were not cooperative with participating in the present study were not included in the study.

Data Collection Procedure

After explaining the study's objective and getting the participants' consent, self-administered questionnaires were distributed to participants in classroom settings. The investigators of the present study collected the data. The following were the tools used to get the data.

A sociodemographic sheet was developed to include age, gender, locality of student, type of family, years of education, and stream of education.

Internet Addiction Test (IAT)

Yung gave this tool to assess internet usage, and it is a self-reported instrument. The scale has 20 items, and each item measures on a 5-point Likert scale. Hence, the total score ranges from 0 to 100. Based on different scores, the severity of IA is categorized into various domains (a score of 0–19 indicates the absence of addiction, 20–39 indicates a low level of addiction, 40–69 indicates a moderate level of addiction, and 70–100 indicates a severe level of IA). On the contrary, if a participant scored ≥50 points, they were considered internet addicts.[16,17] Both English and Hindi versions were used in the present study. The scale has good psychometric properties with excellent internal consistency (alpha coefficient, 0.54–0.82).

Patient Health Questionnaire-9

The tool is a 9-item self-reported questionnaire. Every question of scale is rated on a 4-point scale, that is, 0–3 ("not at all" – "nearly every day"). The total score of the scale

ranges from 0 to 27. The higher the score, greater the severity of depression. The scale has excellent psychometric properties to measure depression, with a Cohen kappa value of 0.65. The tool has good sensitivity and specificity of 75% and 90%, respectively.[18] In the present study, a score of ≥10 was considered to indicate the presence of depression. The Hindi version of the scale that was used in the previous study for diagnosing depression was used in the present study.[19–21]

Generalized Anxiety Disorder-7 (GAD-7)

A self-reported questionnaire has 7 items, each rated on a 4-point scale (from 0 to 3). Higher scores indicate a higher level of anxiety. This tool has different cut-off scores, that is, 5, 10, and 15 to represent the different amounts of anxiety (mild, moderate, and severe levels of anxiety). The scale has adequate psychometric properties.[22] A translated Hindi version was used in the present study, which had been well validated in previous studies.[23]

The Psychological General Well-being Index

These instruments assess the person's subjective PWB. The scales assess a person's detailed emotional states, reflecting subjective distress or good well-being. The scale has 22 items that collectively determine the measurement of PWB. The scale has further subdomains, that is, depression, positive well-being, anxiety, self-control, vitality, and general health. The instrument also has good psychometric properties.[24]

Statistical Analysis

The descriptive analysis was used to calculate the continuous variables' mean and standard deviation, and for discontinuous variables, frequency and percentage were calculated by the descriptive analysis. Comparisons among the groups were made using the t-test or Mann–Whitney, and Chi-square test. To determine the association between the IA and independent variables, logistic regression analysis was performed at the bivariate and multivariate levels.

Results

A total of 1287 people were recruited for the present study. The mean age of the participants was 19.5 (SD 1.6) years. About two-thirds of participants were female (68.95), from nuclear families (61.8%), and belonged to urban localities (61.55). A majority of them were in their first year of graduation (47.9%) and were pursuing a Bachelor of Arts (38.6%), as shown in Table 1.

When we assessed IA on the internet addiction test (IAT), we found that 15.9% had a presence of IA with a cut-off score of 50. The majority of them fulfilled the criteria for mild addiction, as depicted in Table 2. The overall mean score on

Table 1. Sociodemographic Profile of the Study's Participants (*N* = 1287).

Variables	Frequency (%)/Mean (SD)
Age	19.5 (1.6)
Sex	
Male	400 (31.1%)
Female	887 (68.9%)
Graduation (currently pursuing)	
First Year	616 (47.9%)
Second Year	332 (25.8%)
Third Year	339 (26.3%)
Stream of Subject	
Bachelor of Arts	497 (38.6%)
Bachelor of Commerce	475 (36.9%)
Bachelor of Science	315 (24.5%)
Locality of Students (Residence)	
Urban	791 (61.5%)
Semi-urban	137 (10.65)
Rural	359 (27.9%)
Type of Family	
Nuclear	796 (61.8%)
Non-nuclear (Extended/Joint)	491 (38.2%)

Table 2. Prevalence of Internet Addiction as Assessed on IAT.

Variables	Frequency (%)/Mean (SD)
IAT	
Normal (No addiction)	368 (28.6%)
Mild Addiction	715 (55.6%)
Moderate Addiction	191 (14.8%)
Severe Addiction	13 (1.0%)
Internet Addiction	
Present (>50)	204 (15.9%)
Absent (0–50)	1083 (84.1%)
Overall Score on IAT	37.8 (12.5)

the IAT was 37.8 (SD 12.5). The rest of the details are provided in Table 2.

In terms of psychological morbidity, 27.4% had a presence of depression with a cut-off score of 10 on patient health questionnaire-9 (PHQ-9). The overall score on PHQ-9 was 7.7 (SD-5.1). 20.5% had a presence of anxiety disorder on generalized anxiety disorder-7 (GAD-7) with a cut-off score of 10. The overall score on GAD-7 was 5.9 (SD-4.9). Regarding PWB, approximately two-thirds (66.75) reported

Table 3. Profile of PWB and Psychological Morbidity of Study's Participants.

Variables	Frequency (%)/Mean (SD)
PHQ-9	
Severity of Depression	
Minimal Depression (0–4)	489 (38.0%)
Mild Depression (5–9)	445 (34.6%)
Moderate Depression (10–14)	227 (17.6%)
Moderately Severe Depression (15–19)	89 (6.9%)
Severe depression (≥20)	37 (2.9%)
Presence of Depression	
Present (Score of ≥10)	353 (27.4%)
Absent (<10)	934 (72.6%)
Overall Score on PHQ-9	7.7 (5.1)
GAD-7	
Severity of Anxiety	
Minimal Anxiety (0–4)	586 (45.5%)
Mild Anxiety (5–9)	437 (34.0%)
Moderate Anxiety (10–14)	178 (13.8%)
Severe anxiety (≥15)	86 (6.7%)
Presence of Anxiety Disorder	
Present (Score of ≥10)	264 (20.5%)
Absent (<10)	1023 (79.5%)
Overall Score on GAD-7	5.9 (4.9)
Psychological Well-Being Index-22	
Mean Value of Sub-domain of PGWI	
Anxiety	14.3 (6.3)
Depression	9.7 (3.7)
Positive Well-Being	11.4 (3.9)
Self-control	9.1 (3.1)
General Health	8.9 (3.0)
Vitality	11.2 (2.7)
PWB	
Good (≥56)	428 (33.3%)
Bad (≤55)	859 (66.7%)
Overall Score on PGWI	64.6 (17.4)

Table 4. Correlation of Internet Addiction with Sociodemographic Variables, Psychological Morbidity, and Well Being.

Variables	Overall Score on IAT R (p-Value)
Age	0.035 (0.205)
Overall Score on PHQ-9	0.572 (<0.001)***
Overall Score on GAD-7	0.512 (<0.001)***
Overall Score on PGWI	−0.345 (<0.001)***
Mean Value of Sub-domain of PGWI	
Anxiety	−0.280 (<0.001)***
Depression	−0.302 (<0.001)***
Positive Well-Being	−0.266 (<0.001)***
Self-control	−0.303 (<0.001)***
General Health	−0.291 (<0.001)***
Vitality	−0.088 (0.002)**

poor PWB, and the overall score was 64.6 (17.4). Rest of the details are shown in Table 3.

Association of Internet Addiction with Psychological Morbidity, Psychological Well-being, and Sociodemographic Variables

The overall score on the IAT was found to have a significant positive association with the overall score on PHQ-9 and the overall score on GAD-7. The overall score on IAT had a significant negative association with the overall score of PGWI and with all the domains of PGWI, as shown in Table 4.

Male students reported having more IA compared to female student ($x^2 = 5.028$; $p = 0.025$). Those with a presence of IA significantly reported a higher level of depression ($x^2 = 192.32$; $p < 0.001$), higher level of anxiety ($x^2 = 120.84$; $p < 0.001$), and poor PWB ($x^2 = 38.214$; $p < 0.001$) compared to those without IA.

Predictors of Internet Addiction

To study the effect of various independent variables on the IA reported by the study participant, linear regression analyses with both enter and stepwise methods were done. For this, all the variables that had a significant correlation with IA were entered as independent variables, and the scores of IA were entered as dependent variables. As is evident from the table, when the enter method was used, the other variables explained 34.8% of the variance in the presence of IA. The maximum variance of IA was explained by the overall score of PHQ-9, followed by the overall score of GAD-7, gender, and self-control (subdomains of PGWI), as depicted in Table 5.

Discussion

The exponential growth of the internet, especially after the COVID-19 pandemic, has led to adverse psychological, social, and physical health consequences for young adults. The current study was a preliminary step to assess IA and its association with sociodemographic variables, such as depression, anxiety, and PWB.

In the present study, 15.9% had a presence of IA with a cut-off score of 50. Most studies on medical or engineering

Table 5. Predictors of Internet Addiction as Perceived by Study Participants.

	R Square	Adjusted R Square	Standard Error of Estimates
Enter Method			
Age, gender, overall score of PHQ-9, overall score of GAD-7, PGWI overall score, sub-domain of PGWI, i.e., anxiety, depression, positive well-being, self-control, and general health vitality	0.354	0.348	10.031
Stepwise Method			
Total Score of PHQ-9 (Depression)	0.327	0.327	10.198
Total Score of PHQ-9 (Depression), Total Score of GAD-7 (Anxiety)	0.341	0.340	10.099
Total Score of PHQ-9 (Depression), Total Score of GAD-7 (Anxiety), Gender	0.348	0.347	10.045
Total Score of PHQ-9 (Depression), Total Score of GAD-7 (Anxiety), Gender, Self-control	0.351	0.349	10.026

students reported a prevalence rate of 4.5%–46.7%. Only two studies are available, which were conducted in a similar population as the index study, and reported a prevalence of 16.3%[12] and 25.2%,[25] respectively. The prevalence rate in the present study is comparable with Sharma et al.[12] The reasons could be that, in the present study, female participants were more numerous compared to previous studies.[12,25] In our culture, females used to participate in household chores, and social and cultural restrictions are more strict on the use of phones/desktops for women compared to men. Another reason for the slightly low prevalence is that most students are from rural backgrounds, which might have poor accessibility to the network, social, and cultural constructs. Regarding the severity of IA, 55.6%, 14.6%, and 1.0% had mild, moderate, and severe IA, respectively. The findings are more or less in line with the previous studies.[11,26,27]

Male students reported having more IA than female students. The findings were more or less similar to those of previous studies conducted across India.[11,26–29] In terms of psychiatric disorders, there is a significant positive association between internet use, depression, and anxiety. The findings are in line with the existing literature. In terms of the association between IA and PWB, only one study that assessed IA and PWB in 461 college students found that IA and PWB and sub-types of PWB had a significant negative correlation.[12] This shows that students with higher levels of IA are more likely to be low in PWB. Similar results were noted in the present study. Compared to the previous study, the present study has a larger sample size, and a validated tool for assessing PWB was used. It can also be concluded from the current study findings that IA adversely affects students' PWB, which can further hamper academic performance and self-development. It is essential to develop strategies or intervention techniques to deal with IA so that the promotion of PWB can be done. A good PWB would help not only students but also nations' development.

On linear regression analysis, the factors that were found to have a significant independent association with IA were depression, anxiety, gender of participants, and self-control (a subdomain of PGWI). However, the actual causal relationship between IA and psychological disorders like depression, anxiety, and PWB cannot be established. To determine the causal relationship, whether IA causes depression, anxiety, or PWB or only exacerbates or predisposes to pre-existing psychiatric problems, longitudinal studies are needed. Male gender, depression, anxiety, and poor PWB were reported to be the main predictors of IA in a few previous studies.[11,12,30]

Limitations

The present study was cross-sectional and limited to one geographical region only. The causal relationship between IA and psychological morbidities could not be established and will require longitudinal studies in the future. The study was based on quantitative instruments, with the only requirement being a qualitative study for a better understanding of IA and psychological morbidities. The other variables, like type of device for internet use, family income, family relationship, parental education, number of siblings, purpose of use of the internet, personality traits, social support, the presence of other psychiatric disorders (like sexual problems, obsessive-compulsive disorders, and so on), were not taken into account, which can influence the findings of the present study. No specific tools were used to estimate the existing or past history of psychiatric disorders.

Conclusion

In the present study, approximately one-sixth of study participants had IA. It can be said that the ministries of education and health needed to develop a strategic program and policy to minimize IA and implement an effective treatment strategy to deal with it. Further research is needed to better understand the risk factors and causal association between IA and psychological disorders. Awareness regarding

smartphone or laptop etiquette, including the length of time spent on internet usage per day, should be spread among college students.

Authors' Contribution

Aseem Mehra and Krishan Kumar contributed to designing and drafting of study, analysis, collection of data, and critical evaluation of paper.
Kapil Goel contributed to designing and drafting of study, and critical evaluation of paper.

Statement of Ethics

Institute ethic committee approved the study and declaration of Helsinki was followed.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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