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# ASSOCIATION BETWEEN INTERNET USE PATTERNS AND ANXIETY SYMPTOMS AMONG YOUNG ADULTS: A CROSS-SECTIONAL STUDY

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**Abstract**

**Background:** Internet and smartphone use have become integral components of daily life among young adults, providing opportunities for communication, education, entertainment, and social networking. However, excessive or maladaptive patterns of internet use have emerged as a growing public health concern, with increasing evidence suggesting associations with psychological distress, particularly anxiety. Understanding the relationship between internet use behaviors and anxiety symptoms is important for developing targeted preventive and intervention strategies. **Objectives:** To examine the association between internet use patterns and anxiety symptoms among young adults and to identify specific usage behaviors independently associated with clinically significant anxiety. **Methods:** This cross-sectional study included 320 young adults who completed the Internet Addiction Test (IAT) to assess problematic internet use and the Generalized Anxiety Disorder-7 (GAD-7) scale to evaluate anxiety symptoms. Additional data regarding internet use patterns, including daily duration of use, night-time usage, and primary online activities, were collected using a structured questionnaire. Correlation analyses were performed to evaluate relationships between IAT and GAD-7 scores. Anxiety prevalence was compared across categories of internet use, and multivariable logistic regression analysis was conducted to identify independent predictors of clinically significant anxiety, expressed as adjusted odds ratios (aORs). **Results:** Problematic internet use was identified in 96 participants (30%). IAT scores demonstrated a moderate positive correlation with anxiety symptoms ($r \approx 0.44$), indicating higher anxiety levels among individuals with greater problematic internet use. Multivariable analysis revealed that problematic internet use, prolonged daily internet exposure, and frequent night-time internet use were independently associated with clinically significant anxiety symptoms. **Conclusion:** Problematic internet use patterns are significantly associated with anxiety symptoms among young adults. These findings highlight the importance of awareness programs and behavioral interventions focusing on healthy internet-use habits, particularly reducing excessive and night-time use, to support psychological wellbeing.

**Keywords:** Internet addiction; Problematic internet use; Anxiety; GAD-7; Young adults; Screen time

## 1. Introduction

Internet and smartphone use has become nearly universal among young adults and plays a central role in communication, education, entertainment, and social interaction. While digital technologies offer substantial benefits, increasing concern has emerged regarding problematic or excessive internet use, which may adversely affect psychological wellbeing and daily functioning. A proportion of young adults develop maladaptive patterns of internet use characterized by impaired self-control, preoccupation with online activities, withdrawal-like symptoms when offline, and difficulty limiting screen time despite negative consequences. Such problematic internet use has been increasingly recognized as a behavioral health concern and has been associated with reduced academic performance, social difficulties, sleep disruption, and diminished quality of life [1,2]. Growing evidence suggests that problematic internet use is closely linked to mental health disorders, particularly anxiety and depression. Excessive engagement with social networking platforms, online gaming, streaming services, and other digital activities may contribute to heightened psychological distress through mechanisms such as social comparison, fear of missing out (FOMO), cyberbullying exposure, and disruption of normal sleep patterns [3]. Anxiety symptoms may also promote excessive internet use as a coping strategy, creating a potentially bidirectional relationship between internet use and mental health outcomes. Importantly, recent studies indicate that the pattern of internet use may be as important as the total duration of use. Factors such as night-time internet use, prolonged continuous screen exposure, frequent social media engagement, and perceived loss of control over online behavior have been associated with poorer psychological outcomes [4,5]. Validated instruments such as the Internet Addiction Test (IAT) and the Generalized Anxiety Disorder-7 (GAD-7) scale provide reliable methods for assessing problematic internet use and anxiety symptoms, respectively [6,7]. Understanding which specific internet-use behaviors are associated with anxiety is essential for developing effective prevention strategies and digital wellbeing interventions for young adults. Therefore, this study was conducted to examine the association between internet use patterns and anxiety symptoms among young adults and to identify usage behaviors independently associated with clinically significant anxiety.

**Aim:** To examine the association between internet use patterns and anxiety symptoms among young adults.

**Primary objective:** To determine the correlation between IAT scores and anxiety (GAD-7).

**Secondary objectives:** (i) To compare anxiety prevalence across use patterns; (ii) to identify use patterns independently associated with anxiety.

**Hypotheses:** Null ($H_0$) — internet use patterns are not associated with anxiety. Alternative ($H_1$) — problematic use patterns are associated with greater anxiety.

## 2. Materials and Methods

This study was reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cross-sectional studies.

### 2.1 Study Design and Setting

A cross-sectional analytical study was conducted among young adults aged 18–30 years.. Participants were recruited through convenience sampling from colleges, universities, and community settings. The study aimed to evaluate the association between internet use patterns and anxiety symptoms in young adults. Data were collected using a structured self-administered questionnaire consisting of demographic details, internet-use characteristics, and validated psychometric instruments.

### 2.2 Ethical Considerations

The study protocol was reviewed and approved. All participants provided written informed consent before enrolment. Participation was voluntary, and respondents were assured of confidentiality and anonymity. No personally identifiable information was collected. The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki.

### 2.3 Participants

Young adults aged between 18 and 30 years who reported regular internet use and were willing to participate were eligible for inclusion. Individuals with a documented psychiatric illness currently receiving treatment, those unable to complete the questionnaire independently, and respondents with incomplete survey data were excluded from the analysis. A total of 320 participants fulfilled the eligibility criteria and were included in the final study sample.

### 2.4 Study Measures

Internet use was assessed using the Internet Addiction Test (IAT), a validated 20-item instrument that evaluates problematic internet-use behaviours. Participants were categorized according to established cut-off scores for problematic internet use. Additional information regarding average daily internet-use duration, night-time internet use, and dominant online activities such as social media, gaming, streaming, and academic use was collected. Anxiety symptoms were assessed using the Generalized Anxiety Disorder-7 (GAD-7) scale, with a score of ≥10 indicating clinically significant anxiety. Sleep quality was evaluated using the Pittsburgh Sleep Quality Index (PSQI).

### 2.5 Sample Size Calculation

The sample size was estimated to detect a correlation coefficient of $r = 0.20$ between internet addiction and anxiety scores, assuming a two-sided significance level ($\alpha$) of 0.05 and 90% statistical power. The minimum required sample size was approximately 258 participants. To improve precision and account for incomplete responses, 320 participants were enrolled.

### 2.6 Statistical Analysis

Data were entered into Microsoft Excel and analysed using SPSS. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Associations between IAT and GAD-7 scores were evaluated using Pearson or Spearman correlation coefficients as appropriate. The prevalence of clinically significant anxiety across internet-use categories was compared using the chi-square test. Multivariable logistic regression analysis was performed to identify independent predictors of clinically significant anxiety, and results were expressed as adjusted odds ratios (aORs) with 95% confidence intervals (CIs). A two-sided p-value of less than 0.05 was considered statistically significant.

## 3. Results

### 3.1 Participant characteristics

A total of 320 young adults were included in the analysis. The mean age of participants was 23 ± 3 years, and 170 (53%) were female. Most participants reported daily internet use for educational, social networking, entertainment, or communication purposes. Based on Internet Addiction Test (IAT) scores, 96 participants (30%) met the criteria for problematic internet use, while 224 (70%) were categorized as non-problematic users. Clinically significant anxiety, defined as a GAD-7 score of ≥10, was identified in 86 participants (27%). Poor sleep quality, assessed using the Pittsburgh Sleep Quality Index (PSQI), was also common among participants with higher levels of internet use. The prevalence of clinically significant anxiety differed substantially according to internet-use patterns (Table 1). Among participants with non-problematic internet use, 42 of 224 individuals (19%) exhibited clinically significant anxiety. In contrast, anxiety was observed in 44 of 96 participants (46%) with problematic internet use, representing a significantly higher prevalence ($p < 0.001$). Similarly, participants reporting frequent night-time or bedtime internet use demonstrated a higher prevalence of anxiety compared with those who did not engage in such use (37% vs. lower prevalence; $p < 0.001$). Extended internet use exceeding six hours per day was also associated with a greater frequency of anxiety symptoms, with 43 of 118 participants (36%) meeting the threshold for clinically significant anxiety ($p < 0.001$).

**Table 1.** Anxiety by internet use pattern.

| Use pattern | Clinically significant anxiety, n (%) | p |
|---|---|---|
| Non-problematic use (n = 224) | 42 (19) | reference |
| Problematic use (n = 96) | 44 (46) | <0.001 |
| Night-time/bedtime use (n = 142) | 52 (37) | <0.001 |
| >6 h daily use (n = 118) | 43 (36) | <0.001 |

### 3.2 Correlation and adjusted associations

A significant positive correlation was observed between IAT and GAD-7 scores, indicating that higher levels of problematic internet use were associated with increased anxiety symptoms ($r \approx 0.44$, $p < 0.001$). The correlation analysis demonstrated a moderate relationship between internet addiction severity and anxiety severity, suggesting that worsening internet-use behaviours were accompanied by progressively higher anxiety scores. Multivariable logistic regression analysis was performed to identify independent predictors of clinically significant anxiety after adjusting for potential confounding variables. Problematic internet use emerged as the strongest predictor of anxiety, with affected individuals demonstrating nearly threefold higher odds of clinically significant anxiety (aOR 2.8, 95% CI 1.8–4.4; $p < 0.001$). Poor sleep quality was independently associated with anxiety (aOR 2.4, 95% CI 1.5–3.8; $p < 0.001$), highlighting the interplay between sleep disturbances and psychological wellbeing. Night-time or bedtime internet use was also significantly associated with anxiety (aOR 2.2, 95% CI 1.4–3.5; $p < 0.01$), as was prolonged internet use exceeding six hours per day (aOR 2.1, 95% CI 1.3–3.3; $p < 0.01$). These findings indicate that both the intensity and timing of internet use contribute independently to anxiety symptoms among young adults.

**Table 2.** Adjusted associations with clinically significant anxiety.

| Factor | aOR | 95% CI | p |
|---|---|---|---|
| Problematic internet use | 2.8 | 1.8–4.4 | <0.001 |
| Poor sleep quality | 2.4 | 1.5–3.8 | <0.001 |
| Night-time/bedtime use | 2.2 | 1.4–3.5 | <0.01 |
| >6 h daily use | 2.1 | 1.3–3.3 | <0.01 |

Figure 1. Internet Addiction Test score versus anxiety (A) and sleep quality (B)

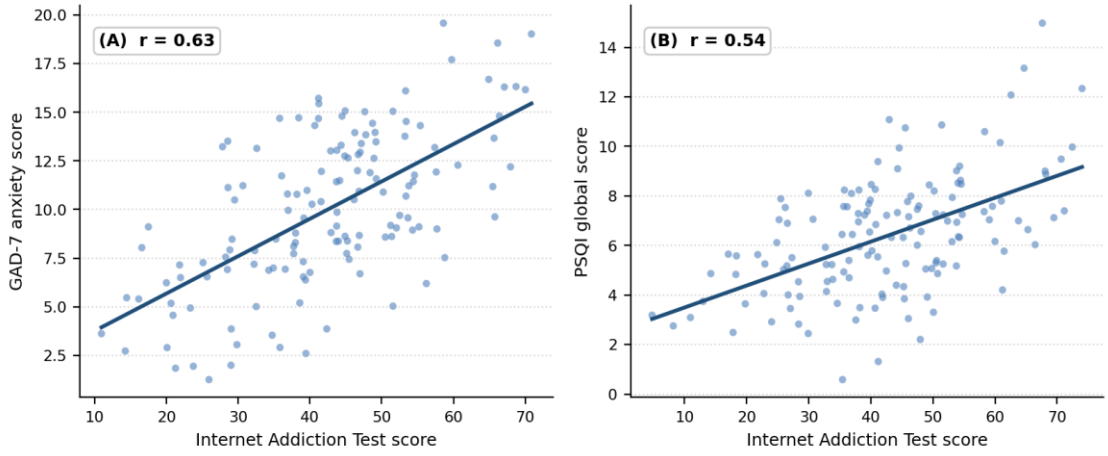



**Figure 1.** Internet Addiction Test score versus anxiety (A) and sleep quality (B) with linear regression line.

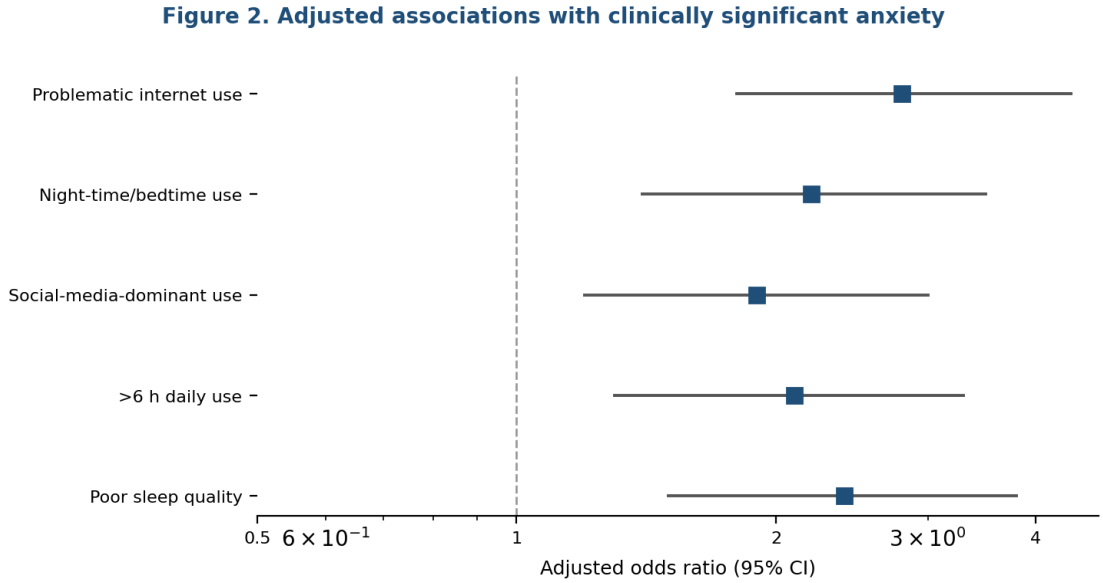



**Figure 2.** Adjusted associations with clinically significant anxiety.

## 4. Discussion

In this cross-sectional study of young adults, problematic internet use was significantly associated with clinically significant anxiety symptoms. Participants exhibiting problematic internet-use behaviors had substantially higher odds of anxiety than those with non-problematic use, and Internet Addiction Test (IAT) scores demonstrated a moderate positive correlation with anxiety severity. In addition, specific internet-use patterns, particularly night-time internet use and prolonged daily use exceeding six hours, were independently associated with anxiety after adjustment for potential confounding factors. These findings are consistent with a growing body of evidence suggesting that problematic digital engagement is closely linked to adverse mental health outcomes among young adults, including anxiety, depression, and psychological distress. Several mechanisms may explain the observed associations. Excessive internet use can displace activities that are essential for psychological wellbeing, including sleep, physical activity, face-to-face social interaction, and academic engagement. Young adults who spend prolonged periods online may experience increased exposure to social comparison, cyberbullying, misinformation, and emotionally negative content, all of which have been associated with elevated anxiety levels. Furthermore, online environments can reinforce maladaptive coping behaviors such as avoidance, reassurance-seeking, and compulsive checking, which may perpetuate anxiety symptoms. The independent associations observed for both night-time internet use and poor sleep quality support the hypothesis that sleep disruption represents an important pathway linking problematic internet use and anxiety. Exposure to screens during late-night hours may delay sleep onset, reduce sleep duration, and impair sleep quality, thereby contributing to emotional dysregulation and heightened anxiety.

An important finding of this study is that the relationship between internet use and anxiety appears to be influenced not only by the duration of use but also by the pattern and context of engagement. This suggests that interventions should focus on promoting healthier digital habits rather than solely reducing total screen time. Strategies such as limiting night-time device use, encouraging structured online activities, promoting digital self-regulation, and improving sleep hygiene may help mitigate anxiety-related outcomes. The strengths of this study include the use of validated instruments for assessing problematic internet use, anxiety, and sleep quality, as well as the evaluation of internet-use patterns beyond overall duration. Multivariable analysis enabled adjustment for key factors, including sleep quality, thereby strengthening the findings. Nevertheless, several limitations should be acknowledged. The cross-sectional design precludes conclusions regarding causality or directionality of the observed associations. All measures were self-reported and therefore susceptible to recall and reporting bias. Additionally, participants were recruited from a single setting, which may limit the generalizability of the findings to other populations. Anxiety was assessed using a screening

instrument rather than a formal clinical diagnosis. Future longitudinal studies are needed to clarify the temporal relationship between problematic internet use and anxiety symptoms. Interventional research evaluating digital-wellbeing programs, sleep-focused strategies, and behavioral interventions may help identify effective approaches for reducing anxiety and promoting healthier technology use among young adults.

## 5. Conclusion

Problematic internet use patterns were significantly associated with anxiety symptoms among young adults. In particular, problematic internet use, night-time internet engagement, prolonged daily use, and poor sleep quality were independently associated with clinically significant anxiety, even after adjustment for potential confounding factors. The findings suggest that the relationship between internet use and mental wellbeing is influenced not only by the amount of time spent online but also by how, when, and why the internet is used. These results highlight the importance of promoting healthy digital habits and balanced technology use among young adults. Awareness programmes, digital-wellbeing initiatives, and behavioural interventions that focus on reducing problematic use patterns, limiting night-time internet engagement, improving sleep hygiene, and encouraging self-regulation may help mitigate anxiety-related outcomes. Educational institutions, healthcare providers, and policymakers should consider incorporating digital wellness strategies into mental health promotion programmes targeting young populations. Given the cross-sectional nature of the study, causal relationships cannot be established, and further longitudinal research is required to determine the directionality of the association between internet use and anxiety. Future intervention studies should also evaluate the effectiveness of targeted digital-wellbeing programmes in improving psychological health outcomes. As this topic concerns mental wellbeing, individuals experiencing persistent anxiety symptoms should be encouraged to seek appropriate professional support and guidance from qualified healthcare providers.

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