

Research Paper

Impact of Digital Fatigue on Attention Span among College Students

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ABSTRACT

This research examined the impact of digital fatigue on attention span among college students in the context of growing digital dependence in academic and personal life. The study was based on the premise that prolonged exposure to digital devices may contribute to cognitive exhaustion and reduced attentional functioning. A sample of 196 university students, comprising 95 females and 101 males, completed the Multidimensional Digital Fatigue Questionnaire and the Attention Control Scale. The data were analyzed using descriptive statistics, Pearson correlation, and independent samples t-test. The findings showed a significant negative correlation between digital fatigue and attention span, indicating that higher levels of digital fatigue were associated with lower attentional control. In addition, students with high digital fatigue scores demonstrated significantly lower attention span than students with low digital fatigue scores. The results suggest that digital fatigue is an important factor influencing attention among college students and may have implications for academic functioning and cognitive well-being.

Keywords: *Digital Fatigue, Attention Span, Attention Control, College Students, Cognitive Functioning*

The rapid expansion of digital technology has transformed the academic and personal lives of college students, making digital devices central to learning, communication, and entertainment. Smartphones, laptops, and tablets now facilitate access to information, online classes, academic resources, and social interaction almost continuously. While this digital integration has improved convenience and flexibility, it has also created new cognitive demands that may affect attention and mental efficiency.

A growing concern in this context is digital fatigue, which refers to a state of mental exhaustion arising from prolonged exposure to digital screens and continuous engagement with online content. Unlike general fatigue, digital fatigue is closely linked to sustained cognitive stimulation, frequent task-switching, and information overload. Research has shown that extended screen exposure and digital multitasking are associated with mental fatigue, cognitive exhaustion, and reduced academic functioning (Bapat, 2025). Similar concerns were reported in studies of online learning and virtual classrooms, where

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prolonged digital participation was associated with visual strain, reduced motivation, emotional tiredness, and difficulty sustaining attention (Briones et al., 2023; Romero-Rodríguez et al., 2023).

College students are particularly vulnerable to such effects because their academic routines often require prolonged use of digital platforms. In addition to coursework, students frequently engage with social media, streaming content, and messaging applications, all of which contribute to continuous exposure to digital stimuli. Evidence suggests that short-form media and high-frequency digital engagement can increase attention fragmentation and emotional exhaustion, especially when use becomes habitual and repetitive (Barnett, 2025; Opara et al., 2025). These patterns indicate that digital fatigue may arise not only from the duration of screen use but also from the cognitive intensity and structure of digital engagement.

Attention span, or the ability to maintain focus on task-relevant information over time, is a critical component of academic performance. It supports comprehension, learning, memory, and task completion. However, digital environments often compete for attention through notifications, rapid content switching, and multitasking demands. Experimental evidence has shown that even brief notifications can disrupt ongoing cognitive processing and temporarily capture attention away from the primary task (Fournier et al., 2026). Similarly, studies on smartphone use have found that habitual engagement with digital devices is linked to poorer sustained attention, distractibility, and task interruption (Dunlap, 2024; Parasin et al., 2024; Smit, 2022).

The relationship between digital fatigue and attention span can also be understood through broader cognitive frameworks. Prolonged digital engagement may place heavy demands on limited cognitive resources, creating a state of overload that reduces attentional control. Research has shown that problematic smartphone use is associated with increased cognitive failures, including forgetfulness and distractibility, suggesting that digital dependency may interfere with efficient cognitive functioning (Yaqoob et al., 2025). In addition, studies using neurophysiological methods have found that problematic smartphone users may maintain behavioral performance only by exerting greater neural effort, indicating compensatory processing under higher cognitive load (Ge et al., 2026).

Existing research also suggests that the nature of digital engagement matters as much as the amount of use. Extended screen time has been associated with continuous partial attention, fragmented concentration, and reduced capacity for sustained focus (Firat, 2025). Likewise, studies on digital media use have shown that short-term distractions are consistently observed, even if the long-term developmental impact on attention remains less certain (Baumgartner et al., 2024). Other findings indicate that while digital exposure may not always directly impair every aspect of attention, it is often associated with related outcomes such as poorer sleep quality, academic strain, and attention-related complaints (Montagni et al., 2016; Sahu et al., 2024; Zeyrek et al., 2024).

Importantly, the effects of digital engagement may extend beyond mere screen time. Studies have reported that problematic patterns of use, rather than total hours alone, are more strongly associated with attentional difficulties. For example, greater dependence on smartphones and addictive digital habits have been linked to poorer performance on attentional tasks and higher levels of distraction (Ning et al., 2018; Zion, 2020). Similarly, research comparing different usage patterns suggests that the quality of digital interaction,

such as compulsive checking, short-video consumption, and constant app switching, may be especially relevant to cognitive outcomes (Chhangani et al., 2025; Rahayu et al., 2025).

Although several studies have examined screen time, smartphone use, digital distraction, and attention problems, fewer have specifically focused on **digital fatigue** as a subjective psychological experience that may connect digital engagement with attentional decline. This is an important gap, because fatigue may capture the lived cognitive cost of digital exposure more accurately than time-based measures alone. Studies that have explored related constructs suggest that digital overload, attention disruption, and mental exhaustion often occur together, but the specific contribution of fatigue to attentional functioning requires further investigation (Alotaibi et al., 2022; Anwar & Abbas, 2024; Jingqian, 2024).

In light of these concerns, the present study seeks to examine the relationship between digital fatigue and attention span among college students. By focusing on this association, the study aims to contribute to a more nuanced understanding of how digital engagement influences cognitive functioning in academic settings and to highlight digital fatigue as a meaningful factor in student attentional performance.

METHODOLOGY

Aim:

To examine the impact of digital fatigue on attention span among college students.

Objectives:

- To examine the level of digital fatigue among college students.
- To assess the attention span of college students using the Attention Control Scale.
- To investigate the relationship between digital fatigue and attention span among college students.
- To understand the impact of digital fatigue on the attention span of college students.

Hypothesis:

- **H1:** There will be a significant relationship between digital fatigue and attention span among college students.
- **H2:** Higher levels of digital fatigue will be associated with lower attention control among college students.
- **H3:** College students experiencing high digital fatigue will report significantly lower attention span compared to those with lower digital fatigue.

Variables:

1. **Independent variable:** digital fatigue
2. **Dependent variable:** attention span

Sample size:

The data was collected from 196 participants using purposive sampling, including undergraduate and postgraduate students from different colleges and universities. Out of 196 participants, 95 were females and 101 were males.

Inclusion and Exclusion criteria:

Inclusion criteria specified that students aged 18 years and above who were currently enrolled in college or university and regularly used digital devices such as smartphones, laptops, or tablets for academic or personal purposes were eligible to participate in the study.

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Any student who did not meet these criteria or was receiving treatment for any mental health condition was excluded from the study.

Research design

This research employed a quantitative correlational design. It examined the relationship between digital fatigue and attention span among college and university students using standardized psychological measures. The study relied on numerical data that could be objectively measured and statistically analyzed to determine the association between the variables.

Measures:

- 1. Attention Control Scale** –The first scale used was the Attention Control Scale (ACS), developed by Douglas Derryberry and Marjorie A. Reed in 2002. The scale is a self-report measure designed to assess individual differences in voluntary attention control, particularly the ability to maintain focus on relevant tasks and shift attention when required. It consists of 20 items rated on a 4-point Likert scale ranging from 1 (Almost Never) to 4 (Always). The total score ranges from 20 to 80, with higher scores indicating stronger attentional control and lower scores indicating difficulty in managing attention and resisting distractions. The scale measures two main dimensions: attentional focusing and attentional shifting. In the present study, the Attention Control Scale was used to assess the attention span and attentional control capabilities of college students in a standardized manner.
- 2. Multidimensional Digital Fatigue Questionnaire for University Students (FDU-24)** – The second scale used was the Multidimensional Digital Fatigue Questionnaire for University Students (FDU-24), developed by Lucy Angelica Yglesias Alva, Luis Alberto Estrada Alva, Lidia Marina Lizarzaburu Montero, and Adriana Elena Miranda Troncoso and published in 2025 in the *Journal of Educational and Social Research*. The scale was designed to assess digital fatigue among university students resulting from prolonged and intensive use of digital technologies. It consists of 24 items rated on a 5-point Likert scale ranging from 1 (Never) to 5 (Always). Higher scores indicate greater digital fatigue. The questionnaire measures four dimensions: physical fatigue, cognitive fatigue, emotional fatigue, and social fatigue. In the present study, the FDU-24 was used to measure the level of digital fatigue among college students, providing a comprehensive assessment of the physical, cognitive, emotional, and social strain associated with digital device use.

Procedure:

The research followed a structured procedure to ensure systematic and reliable data collection. Participants were reached through academic networks and student organisations and were invited to take part voluntarily by completing an online form. Before the questionnaire was administered, each participant was given an informed consent form explaining the purpose of the study, assuring confidentiality of responses, and clarifying that participation was voluntary with the right to withdraw at any time without penalty.

After providing consent, respondents completed the questionnaire, which included sections for demographic details such as age and gender, followed by the Multidimensional Digital Fatigue Questionnaire (FDU-24) and the Attention Control Scale. Participants were instructed to respond honestly and at their own pace. After data collection, the responses were checked for completeness, and incomplete forms were discarded. The final data were entered into Microsoft Excel and then transferred to SPSS for statistical analysis.

RESULTS*Descriptive Statistics***Table 1 Descriptive Statistics of Research Variables (N = 196)**

Variable	N	Minimum	Maximum	Mean	SD
Attention Span	196	34	75	49.14	6.09
Digital Fatigue	196	37	107	75.38	16.45

The descriptive statistics show that the mean score of attention span was 49.14 (SD = 6.09), while the mean score of digital fatigue was 75.38 (SD = 16.45). The scores indicate considerable variability among the participants, suggesting differences in the way students maintain attention and experience digital pressure.

*Correlation Analysis***Table 2 Attention Control and Digital Fatigue Correlation**

Variable	N	r (Pearson Correlation Coefficient)	Significance
Attention Span	196	-0.605	p < 0.001**
Digital Fatigue	196	-0.605	p < 0.001**

**Significant at .001 level

The Pearson correlation showed a significant negative relationship between digital fatigue and attention span, $r = -0.605$, $p < .001$. This indicates that higher digital fatigue is associated with lower attention span among university students. In practical terms, students who experience greater mental and physical strain from prolonged digital use are also more likely to report reduced concentration.

This finding supports the first hypothesis of the study, which proposed a significant relationship between digital fatigue and attention span. The negative direction of the correlation also supports the assumption that higher digital fatigue is associated with lower attentional control among college students.

*Independent Sample t-Test***Table 3 Comparison of Attention Span Between Low and High Digital Fatigue Groups**

Digital Fatigue Group	N	Mean	SD
Low Digital Fatigue	85	52.90	5.81
High Digital Fatigue	111	46.26	4.54

An independent samples t-test was conducted to compare attention span between students with low and high levels of digital fatigue. The results indicated that students experiencing low digital fatigue (M = 52.90, SD = 5.81) reported significantly higher attention span compared to students experiencing high digital fatigue (M = 46.26, SD = 4.54). The difference between the two groups was statistically significant, $t(194) = 8.979$, $p < .001$.

This finding supports the second hypothesis, which proposed that college students experiencing high digital fatigue would report significantly lower attention span compared to those with lower digital fatigue.

DISCUSSION

The research investigated the relationship between digital fatigue and attention span among university students. It examined whether higher levels of digital fatigue were associated with lower attentional control and whether students with high and low digital fatigue differed significantly in attention span. Three hypotheses were tested.

Hypothesis 1 proposed that digital fatigue would be significantly related to attention span, and the results supported this hypothesis. The correlation analysis showed a strong negative relationship between digital fatigue and attention span, indicating that students who experienced greater digital fatigue tended to report lower attentional control. This suggests that prolonged exposure to digital devices may reduce the ability to maintain focus and sustain attention on relevant tasks.

Hypothesis 2 predicted that higher digital fatigue would be associated with lower attention span, and this prediction was also supported. The negative direction of the correlation showed that as digital fatigue increased, attention span decreased. This pattern suggests that continuous screen exposure, digital multitasking, and cognitive overload may interfere with the effective regulation of attention. Students who reported higher fatigue from digital use were therefore more likely to experience difficulty in concentrating and resisting distractions.

Hypothesis 3 proposed that students with high digital fatigue would report significantly lower attention span than students with low digital fatigue, and the data supported this hypothesis. The independent samples t-test showed that students in the low digital fatigue group scored higher on attention span than those in the high digital fatigue group. This indicates that the level of fatigue associated with digital engagement has a meaningful effect on attentional functioning among university students.

The findings are consistent with the idea that prolonged and intensive use of digital devices can deplete cognitive resources. Digital fatigue reflects not only mental exhaustion but also physical and emotional strain, which may weaken attentional control over time. Students experiencing higher digital fatigue may find it harder to focus, maintain concentration, and manage distractors effectively. This can ultimately affect academic performance, especially in tasks that require sustained attention and mental effort.

Attention span in this context refers to the ability to focus on task-relevant information, ignore irrelevant stimuli, and allocate cognitive resources efficiently. The present findings suggest that digital fatigue disrupts these processes and reduces the capacity for sustained concentration. The variability in scores also indicates that the effect of digital fatigue may differ across individuals. Some students may be more resistant to prolonged digital engagement, while others may be more vulnerable to fatigue-related attention problems. These differences may be linked to personal self-regulation, coping style, digital habits, and time management practices.

Limitations

The research employed a cross-sectional design; therefore causal inferences cannot be made. Although a significant negative relationship was found between digital fatigue and attention span, the direction of causality cannot be established. It is possible that lower attentional capacity may also contribute to greater digital fatigue, rather than digital fatigue being the only factor influencing attention.

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All data were obtained through self-report questionnaires, which may introduce response bias. Participants may have responded in socially desirable ways, misunderstood some items, or given answers based on their perception rather than actual behaviour. This may have affected the accuracy of the findings. The study did not include several contextual and individual variables that may influence digital fatigue and attention span. Factors such as sleep quality, academic workload, stress, purpose of digital use, personality traits, and coping strategies were not assessed. These variables may have influenced the relationship observed in the present study.

The sample was limited to university students, which restricts generalisation to other groups. Students from different academic settings, age groups, or occupational backgrounds may show different patterns of digital fatigue and attentional functioning. In addition, the sample was not equally divided by gender, which may also limit broader interpretation. The study also did not examine the duration, timing, or intensity of digital use in detail. Without information about how long students used digital devices, when they used them, or how continuous the exposure was, it is difficult to distinguish between short-term and long-term effects of digital fatigue.

Future Implications

Future research should adopt longitudinal designs to observe how digital fatigue and attention span change over time. Tracking students across semesters or before and after changes in digital habits would help clarify the direction of the relationship and determine whether fatigue leads to reduced attention or whether attentional difficulties contribute to fatigue. Experimental interventions should be included to reduce digital fatigue. Planned screen breaks, attention training, digital well-being programmes, ergonomic practices, and healthy study routines could be tested in controlled settings to examine whether they improve attentional functioning. A broader and more diverse sample would strengthen generalisability.

Mixed-method approaches may also be useful. Combining quantitative data with qualitative methods such as interviews, focus groups, or diaries may provide a deeper understanding of how students experience digital fatigue and how they manage its effects in daily life. Educational institutions can use these findings to develop awareness programmes and strategies that promote healthy digital habits. Workshops on time management, screen balance, and cognitive well-being may help students reduce fatigue and support better attention in academic settings.

CONCLUSION

The research examined the relationship between digital fatigue and attention span among university students. Findings indicate that students who experience higher levels of digital fatigue tend to have lower attention span and weaker attentional control. The results support all three hypotheses of the study. In addition, the comparison of groups showed that students with high digital fatigue scored significantly lower on attention span than those with low digital fatigue. Overall, the findings suggest that digital fatigue is an important factor affecting students' ability to sustain and regulate attention. The study highlights the need to manage digital exposure and adopt practical strategies to protect cognitive functioning and support academic performance.

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Conflict of Interest

The author(s) declared no conflict of interest.

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