



Original Article

Association Between Smartphone Screen Time and Fatigue Among Youth: A Cross-Sectional Study

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ABSTRACT

Background: Smartphone use has become an integral part of daily life among youth. Excessive screen time has been associated with various adverse health outcomes, including fatigue, sleep disturbances, and reduced physical activity. However, evidence regarding the relationship between smartphone screen time and fatigue among Indian youth remains limited.

Objectives: To determine the association between smartphone screen time and fatigue among youth and to identify sociodemographic and behavioral factors associated with fatigue.

Methods: A cross-sectional study was conducted among 400 youth aged 18–24 years from four randomly selected colleges. Data were collected using a pretested semi-structured questionnaire that included sociodemographic characteristics, smartphone usage patterns, and behavioral factors. Daily smartphone screen time was obtained from the Digital Wellbeing/Screen Time feature of participants' smartphones. Fatigue was assessed using the Fatigue Assessment Scale (FAS). Data were analyzed using SPSS version 25.0.

Results: The mean daily smartphone screen time was 5.63 ± 2.14 hours/day. Overall, 47.0% of participants experienced fatigue. A significant association was observed between screen time and fatigue ($p < 0.001$), with fatigue prevalence increasing from 20.59% among participants with screen time < 2 hours/day to 62.71% among those with screen time > 8 hours/day. Fatigue was significantly associated with female gender, smartphone use before sleep, inadequate physical activity and sleep duration < 7 hours/day ($p < 0.05$).

Conclusion: Nearly half of the youth experienced fatigue, and higher smartphone screen time was significantly associated with increased fatigue.

Keywords: Smartphone, Screen Time, Fatigue, Youth, College Students, Digital Well-being.

INTRODUCTION

The rapid advancement of digital technology has led to a substantial increase in smartphone ownership and usage worldwide, particularly among young people. Smartphones have become an integral part of daily life, serving multiple purposes such as communication, education, entertainment, social networking, and access to information. While these devices offer numerous benefits, their excessive use has raised concerns regarding potential adverse health effects. Young adults and adolescents are especially vulnerable to prolonged screen exposure due to academic demands, social media engagement, and recreational activities, resulting in increased daily screen time [1,2].

Fatigue is a common health complaint characterized by a subjective feeling of tiredness, lack of energy, reduced motivation, and diminished physical or mental performance. In recent years, increasing attention has been directed toward the relationship between excessive smartphone use and fatigue. Prolonged screen exposure may contribute to fatigue through several mechanisms, including mental overload, continuous cognitive stimulation, reduced physical activity, disruption of

circadian rhythms, and impaired sleep quality. The constant availability of digital content and frequent notifications may further contribute to mental exhaustion and reduced recovery time [3,4].

Previous studies have reported associations between prolonged smartphone use and various health outcomes, including sleep disturbances, anxiety, depression, musculoskeletal complaints, and reduced academic performance. Fatigue may represent an important intermediary outcome linking excessive screen time with these adverse health effects. However, despite the growing prevalence of smartphone use among youth, evidence regarding the association between smartphone screen time and fatigue remains limited, particularly in the Indian context. Understanding this relationship is important for developing evidence-based interventions aimed at promoting healthy digital habits among young people [5,6,7].

In view of the increasing dependence on smartphones and the potential health consequences of excessive screen exposure, the present study aims to assess the association between smartphone screen time and fatigue among youth. The findings of this study may contribute to a better understanding of the impact of digital technology on youth health and provide valuable information for public health strategies, educational institutions, and healthcare professionals to promote responsible smartphone use and prevent fatigue-related health problems.

AIM:

To determine the relationship between smartphone screen time and fatigue levels among youth and to identify factors associated with increased fatigue in this population.

OBJECTIVES:

1. To estimate the average daily smartphone screen time among youth.
2. To assess the prevalence and severity of fatigue using the Fatigue Assessment Scale (FAS).
3. To determine the association between smartphone screen time and fatigue levels.
4. To identify sociodemographic and behavioral factors associated with fatigue among youth.

MATERIALS AND METHODS:

A cross-sectional study was conducted among 400 youth aged 18–24 years studying in four randomly selected colleges in Rajahmundry, Andhra Pradesh, over a period of six months. The required sample size was estimated to be 400 participants based on an assumed fatigue prevalence of 50%, absolute precision of 5%, and 95% confidence level. The colleges were selected using simple random sampling from the list of eligible colleges in Rajahmundry. Within each selected college, students were recruited proportionately using a simple random sampling technique. Students with smart phone, who were willing to participate and provided informed consent were included in the study, while those with known psychiatric illnesses and chronic medical conditions associated with fatigue were excluded.

Data were collected using a pretested semi-structured questionnaire consisting of sociodemographic characteristics, smartphone usage patterns, and lifestyle-related factors. Daily smartphone screen time was assessed using the average screen time recorded in the Digital Wellbeing or Screen Time feature available on participants' smartphones. Information regarding duration of smartphone ownership, purpose of smartphone use, sleep duration, and physical activity was also obtained. Fatigue was assessed using the Fatigue Assessment Scale (FAS), a validated 10-item instrument that measures both physical and mental fatigue. Based on the total FAS score, participants were categorized according to the severity of fatigue.

The collected data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 25.0. Descriptive statistics such as mean, standard deviation, frequencies, and percentages were used to summarize the study variables. The association between smartphone screen time and fatigue was assessed using Chi-square test, independent t-test, and analysis of variance wherever appropriate. Multivariable logistic regression analysis was performed to identify independent predictors of fatigue among the study participants. A p-value of less than 0.05 was considered statistically significant.

Ethical approval for the study was obtained from the Institutional Ethics Committee prior to data collection. Written informed consent was obtained from all participants after explaining the purpose and procedures of the study, and confidentiality of the information collected was ensured throughout the study.

RESULTS:

A total of 400 youth participated in the study. The mean age of the participants was 20.38 ± 1.79 years, with females constituting 52.00% of the study population. The mean daily smartphone screen time was 5.63 ± 2.14 hours, and 79.25% reported using smartphones before sleep. Social media was the most common purpose of smartphone use (82.75%), followed by academic activities (71.50%).

The mean Fatigue Assessment Scale score was 21.46 ± 5.92 . Overall, 188 participants (47.00%) had fatigue, including 154 (38.50%) with substantial fatigue and 34 (8.50%) with extreme fatigue.

A statistically significant association was observed between daily smartphone screen time and fatigue ($\chi^2 = 32.68$, $p < 0.001$). The prevalence of fatigue increased from 20.59% among participants with screen time less than 2 hours/day to 62.71% among those with screen time exceeding 8 hours/day. Fatigue was significantly associated with female gender ($p = 0.031$), smartphone use before sleep ($p < 0.001$), inadequate physical activity ($p < 0.001$), and sleep duration of less than 7 hours/day ($p < 0.001$). Age group was not significantly associated with fatigue ($p = 0.057$).

Table 1: Smartphone Usage Characteristics Among Study Participants

Variable	Frequency (n)	Percentage (%)
Daily Screen Time		
<2 hours	34	8.5
2–4 hours	87	21.75
4–6 hours	124	31
6–8 hours	96	24
>8 hour	59	14.75
Primary Purpose of Smartphone Use*[multiple options]		
Academic Activities	286	71.5
Social media	331	82.75
Entertainment	261	65.25
Gaming	94	23.5
Others	76	19
Smartphone Use Before Sleep		
Yes	317	79.25
No	83	20.75

Table 2. Distribution of Fatigue Assessment Scale (FAS) Scores

Fatigue Category	Frequency (n)	Percentage (%)
No Fatigue (<22)	212	53
Substantial Fatigue (22–34)	154	38.5
Extreme Fatigue (≥ 35)	34	8.5
Total	400	100

Table 3. Association Between Daily Smartphone Screen Time and Fatigue

Daily Screen Time	Fatigue Present n (%)	Fatigue Absent n (%)
<2 hours (n=34)	7 (20.59)	27 (79.41)
2–4 hours (n=87)	26 (29.89)	61 (70.11)
4–6 hours (n=124)	57 (45.97)	67 (54.03)
6–8 hours (n=96)	61 (63.54)	35 (36.46)
>8 hours (n=59)	37 (62.71)	22 (37.29)
Total (N=400)	188 (47.00)	212 (53.00)
Chi-square = 32.68, p-value <0.001 (Significant)		

Table 4. Sociodemographic and Behavioral Factors Associated with Fatigue Among Youth

Variable	Fatigue		χ^2	p-value
	Present n (%)	Absent n (%)		
Gender				
Male (n=192)	83 (43.23)	109 (56.77)	4.64	0.031
Female (n=208)	105 (50.48)	103 (49.52)		
Age Group				
18–19 years (n=118)	48 (40.68)	70 (59.32)	5.72	0.057
20–21 years (n=176)	86 (48.86)	90 (51.14)		
22–24 years (n=106)	54 (50.94)	52 (49.06)		
Smartphone Use Before Sleep				
Yes (n=317)	164 (51.74)	153 (48.26)	15.38	<0.001
No (n=83)	24 (28.92)	59 (71.08)		
Physical Activity				
Adequate (n=183)	69 (37.70)	114 (62.30)	16.92	<0.001
Inadequate (n=217)	119 (54.84)	98 (45.16)		
Sleep Duration				
≥ 7 hours/day (n=229)	80 (34.93)	149 (65.07)	31.24	<0.001
<7 hours/day (n=171)	108 (63.16)	63 (36.84)		

DISCUSSION:

The mean daily smartphone screen time among participants was 5.63 ± 2.14 hours/day, and the overall prevalence of fatigue was 47%. The findings indicate that prolonged smartphone use is common among youth. The increasing dependence on smartphones for academic activities, social networking, entertainment, and communication may contribute to prolonged screen exposure and its associated health effects.

In the present study, 47.0% of participants experienced fatigue. This finding is comparable to previous studies that have reported a positive relationship between excessive screen exposure and fatigue [4,8,9]. Wahid et al. [10] reported a significant association between screen-time addiction and fatigue across different age groups during the COVID-19 lockdown, suggesting that prolonged exposure to digital devices may contribute to physical and mental exhaustion. Similarly, the report "Screen Time & Screen Fatigue: Let's Get Serious!" highlighted that increasing screen exposure is associated with eye strain, mental exhaustion, reduced productivity, and fatigue among young individuals [11].

A significant association was observed between smartphone screen time and fatigue in the present study. The prevalence of fatigue increased progressively from 20.59% among participants with screen time less than 2 hours/day to 62.71% among those reporting more than 8 hours/day. These findings are consistent with the study by Mohamed Yaakoubi et al., [12] who reported a problematic smartphone use prevalence of 15.7% among adolescents. Adolescents with problematic smartphone use had significantly greater screen time (435 vs. 155 minutes/day, $p < 0.001$), lower levels of vigorous physical activity, higher obesity prevalence, and substantially higher fatigue levels (50.3% vs. 5.8%, $p < 0.001$). Their findings support the hypothesis that excessive smartphone use may contribute to fatigue through sedentary behavior, reduced physical activity, and impaired health behaviours. Similar findings have been reported by Sharma et al., [13] who observed that bedtime smartphone use adversely affected sleep quality and daytime functioning among medical students. Recent international studies have further demonstrated that nighttime screen use is associated with poor sleep quality, increased sleep latency, and higher levels of smartphone addiction symptoms. Since inadequate sleep is an important contributor to daytime fatigue, the observed association may be partially mediated through sleep disturbances resulting from excessive smartphone use.

Female participants showed a higher prevalence of fatigue than males in the present study. Although the difference was modest, it was statistically significant. Previous studies have similarly reported gender differences in smartphone-related health outcomes. However, Yaakoubi et al. [12] observed that participation in sports exerted a stronger protective effect against problematic smartphone use among females than males, suggesting that lifestyle interventions may be particularly beneficial in reducing adverse effects of excessive smartphone use among young women. The findings of the present study have important implications for public health and student well-being. As smartphone ownership and screen exposure continue to increase among youth, educational institutions should promote digital well-being programs, healthy sleep practices, and regular physical activity.

CONCLUSION:

The present study found that nearly half of the youth experienced fatigue, with a significant association between increased smartphone screen time and fatigue levels. Higher screen time, smartphone use before sleep, inadequate physical activity, and shorter sleep duration were identified as important factors associated with fatigue. These findings highlight the growing impact of excessive smartphone use on the health and well-being of young adults and underscore the need for promoting healthy digital habits.

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