Beyond Screen Time: Mobile Phone Use Behavior Patterns and Health Outcome among School Aged Students in Lalitpur District, Nepal

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ABSTRACT

Introduction: The use and access to mobile phones have been growing rapidly among school-aged students. Constant and repeated use of mobile phones that reinforce habits formation, may result in adverse health outcomes. The objective of the study was to study the behavioral patterns of mobile phone use and related physical and mental health outcomes.

Methods: A descriptive cross-sectional study was conducted from August 2025 to February 2026 at Mahendra Bhrikuti Secondary School, Lalitpur. A total of 199 school students of grades 7-12 were selected using non-probability sampling technique and requested to complete a self-administrated questionnaire consisting of their socio-demographic characteristics, patterns of mobile usage, and mobile phone addiction, which were assessed with a 5-point Likert scale, 11-item Mobile Phone Usage Behavioral Scale and a 6-point Likert scale, 20-item Mobile Phone Addiction Scale, respectively.

Results: Out of 199 participants, 158 (79.40%) used smartphone and 54 (27.14%) had mobile phone addiction. The most commonly reported physical symptoms were digital eye strain (80, 40.20%), followed by neck pain (67, 33.67%), headache (64, 32.16%) and sleep disturbances (59, 29.65%), while tolerance (83, 41.71%) followed by decreased interest in alternative pleasures (76, 38.19%) and withdrawal symptoms (75, 37.69%) were the frequently reported psychological symptom. Mobile phone addiction was seen significantly higher among smartphone user students (p=0.016).

Conclusions: Mobile phone addiction was found in about quarter of the school-aged students. Digital eye strain and tolerance were the commonest physical and psychological symptoms respectively. Mobile phone dependence was higher among smartphone users.

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INTRODUCTION

Mobile phones, despite their variety of functions, can lead to behavioral changes in adolescents when used constantly and excessively, further exacerbating problematic mobile phone use.[1-3] Studies have reported that problematic mobile use may engage dopaminergic reward system through mechanisms similar to those involved in behavioral addictions. Constant and repeated stimuli such as notifications and social media feedbacks may contribute to neuroadaptation that reinforces problematic use.[4,5] Problematic mobile use has been linked with adverse mental and physical health outcomes.[6-11]

In Nepal, the Multiple Indicator Cluster Survey reported a high prevalence of mobile usage among school-aged adolescents.[12] Though several studies have reported that use of mobile are more prevalent and linked to negative health outcomes,[5,7,9,13] most of them were limited to either behavioral or physical health outcomes, resulting in a significant knowledge gap regarding the simultaneous assessment of both behavior and physical outcomes.

Hence, this study aimed to examine mobile usage patterns and assess their association with both behavioral and physical health outcomes among school-aged adolescents.

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METHODS

A school-based cross-sectional descriptive study was conducted from August 2025 to February 2026 among the school-aged adolescents at Mahendra Bhrikuti Secondary School, located in Ekantakuna, Lalitpur, Nepal. The study was approved by Institutional Review Committee of Nepalese Army Institutes of Health Sciences [Ref. no. 1343, July 21, 2025].

The sample size for the study was calculated using the Cochran's formula:

$n = Z^2pq / e^2$

$= (1.96)^2 \times 0.937 \times (1 - 0.937)/ (0.05)^2 = 91$

Where:
Z = 1.96 at 95% confidence interval
p = prevalence of 6.3% by Sahu et al about problematic mobile use among adolescents. [14]
q = 1 − p = 0.937
e = margin of error (0.05)

A 10% non-response rate was added, resulting in a final minimum sample size of 101 participants. However, all eligible students of grades 7-12 were included in the study by utilizing total enumeration sampling technique, rather than recruiting only minimum calculated sample of 101 participants. The final sample size of 199 students represents the total number of eligible and available students from grades 7-12 who participated in the study.

Students who were using mobile phones were included. Students who were not using mobile phones and those with known medical or psychiatric conditions, were excluded.

Written informed consent was obtained from students who were =>18 years of age and from legally authorized representatives for students <18 years. Assent was also obtained from all students aged 11-17 years. Confidentiality of participants information and data was maintained.

The students were requested to complete a pretested semi-structural questionnaire which consisted of: 1) Social demographic characteristics, 2) Mobile phone usage patterns, and 3) Mobile phone addiction.

Assessment of mobile phone usage behavior

An 11-item Mobile Phone Usage Behavioral Scale was used to assess the mobile phone usage behavior, which was developed by Munusamy and Ghazali.[15] Each item in the scale was rated on a five-point Likert scale ranging from 1 (never) to 5 (frequently), measuring the frequency of various mobile phone-related activities such as chatting, internet browsing, photography, and other uses. The total score was obtained by calculating the mean of all item responses.

Assessment of mobile phone addiction

Furthermore, mobile phone addiction was assessed using a standardized 20-item Mobile Phone Addiction Scale, developed and validated by Basu et al., which is based on ICD-10 criteria for dependence syndrome.[16] Each item is rated on a six-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). The 20 items covered six domains of dependence which are intense desire (Questions 1–6, 9), impaired control (Q. 1, 3, 4, 7, 9, 10–13, 19), withdrawal (Q. 14, 15), tolerance (Q. 10, 11, 19), decreased interest in alternate pleasures (Q. 8, 19), and harmful use (Q. 12–20). Each domain was diagnosed as positive when 50% or more items had positive responses (four and more on the Likert scale). Mobile phone addiction was labeled when three or more domains were positive in a respondent.

Data analysis procedure:

Data were entered, cleaned, and managed using Microsoft Excel, and statistical analysis was performed using IBM SPSS Statistics for Windows, Version 26. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used to summarize participants' sociodemographic characteristics, prevalence of mobile phone usage patterns, media/platform use, and physical and psychological health outcomes. The association between mobile phone use habits and health hazards was assessed using the chi-square and fisher's exact test. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 199 school- aged adolescents participated in the study, of whom 119 (59.80%) were female and 80 (40.20%) were male. The mean age of participants was 15.39±1.90 (range:11-22years). The overall demographics of school aged children are shown in Table 1.

Table 1. Overall demographics of participants

Characteristics	Number(%)
Gender	
Male	80(40.20)
Female	119(59.82)
Age-year(Mean ± SD)	15.39 ± 1.9
	Minimum: 11years
	Maximum:22 years
Grade of school	
7th grade	32(16.08)
8th grade	62(31.16)
9th grade	38(19.10)
10th grade	15(7.54)
11th grade	34(17.09)
12th grade	18(9.05)`
Types of family:	
Nuclear	83(41.71)
Joint	116(58.29)
Types of mobile phone use	
Smart-phone	158(79.40)
Simple-phone	41(20.60)

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Duration of mobile phone owned	
<1year	114(57.29)
1-5 years	46(23.12)
>5years	39(19.60)
Time spent per day using mobile phone	
<30mins	48(24.12)
30-60mins	51(25.63)
>1 hour	100(50.26)

Mobile phones characteristics:

Table 1 also depicts the prevalence of types, duration, and time spent per day on mobile phones among participants. Out of 199 participants, 158 (79.40%) used smartphone, while 41 (20.60%) used simple mobile phones.

Regarding duration of mobile phones ownership and daily usage, 114 (57.29%) had owned a mobile phone for <1 year and 100 (50.26%) reported using mobile phones for >1 hour per day.

Mobile phone usage behavior:

Table 2 shows, overall, the most frequently used activity was receiving voice calls (2.77±1.09), followed by taking pictures (2.73±0.99) and using social networking sites (2.56±1.12). Moderate uses included taking selfies, playing games, sending SMS, chatting, and internet browsing. Less common uses included health records application, MMS, and navigation.

Table 2. Purpose of mobile phone usage behavior among participants

Use of mobile phone	Number(%)					
	1 (Never Use)	2 (Almost Never)	3 (Sometimes)	4 (Almost every time)	5 (Frequently use)	Mean ± SD
Chatting(e.g. WhatsApp, Messenger)	75(37.69)	21(10.55)	83(41.71)	17(8.54)	3(1.51)	2.27±1.10
Browsing information in the internet	38(19.10)	38(19.10)	99(49.75)	17(8.54)	7(3.52)	2.27±1.01
Connect with social networking sites	45(22.61)	38(19.10)	86(43.22)	17(8.54)	13(6.53)	2.56±1.12
Taking picture	28(14.07)	33(16.58)	112(56.28)	15(7.54)	11(5.53)	2.73±0.99
Taking selfies	29(14.57)	46(23.12)	83(41.71)	28(14.07)	13(6.53)	2.54±1.01
Receiving phone calls	43(21.61)	33(16.58)	102(51.26)	15(7.54)	6(3.02)	2.77±1.09
Playing game	50(25.13)	25(12.56)	102(51.26)	15(7.54)	7(3.52)	2.52±1.85
Navigation such as Google Map, Waze	101(50.75)	29(14.57)	66(33.17)	3(1.51)	0(0.00)	1.85±0.94
Health records	105(52.76)	19(9.55)	57(28.64)	10(5.03)	8(4.02)	1.98±1.18
Sending SMS (Short message service)	58(29.15)	22(10.55)	109(54.77)	9(4.52)	2(1.01)	2.37±0.99
Sending MMS (Multimedia message service)	97(49.24)	13(6.60)	80(40.61)	5(2.54)	2(1.02)	1.95±1.95

Note: SD= standard deviation and mean score:1.00-2.33 (less usage), 2.34-3.46 (moderate/average usage), >3.68(high usage)[16]

Among the 199 participants, 88 (44.22%) were classified as having normal mobile phone use, 108 (54.27%) as having moderate use, and 3 (1.51%) as having high use of mobile phones.

Mobile phone addiction:

Among 199 participants, 54 (27.14%) were identified as having mobile phone addiction.

Physical health outcomes:

Table 3 shows that the most commonly reported physical problems was digital eye strain (40.20%), followed by neck pain (33.67%) and headache (32.16%) while sleep disturbance (29.65%), and restlessness (26.63%), were also relatively common. Only digital eye pain showed a statistically significant relation with mobile phone use (p=0.004).

Psychological outcomes:

As shown in table 4, tolerance 83 (41.71%) was the most prevalent reported psychological symptom among participants, followed by decreased interest in alternative pleasures in 76 (38.19%) and withdrawal symptoms in 75 (37.69%) participants. Several of these (intense desire, impaired control, withdrawal, tolerance, and harmful use) were statistically significant with mobile phone use (p<0.05).

Mobile phone addiction by type of mobile phone ownership:

Mobile phone addiction was significantly higher among smartphone users compared to those using simple phone as shown in table 5. Similarly, parental smartphone use was associated with higher addiction among school-aged adolescents (30.77%) compared to parental simple phone use (6.67%) (p = 0.006).

DISCUSSION

In the present study, majority of participants used smartphones. The most frequently utilized mobile phone functions among the participants were voice calls, taking photographs, and using social networking applications. Additionally, selfie capture, gaming, SMS messaging, online chatting, and general internet browsing were used at a moderate level. These findings are broadly consistent with those of Toh et al., and Lee H et al., smartphone were highly prevalent and frequently used for voice calling, messaging, online gaming, listening music, surfing social media and for school work and highly prevalent and frequently practiced among users.[17,18] The results suggest that

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smartphones are primarily embedded in adolescents' routines as tools for communication, social interaction, and sharing information, and academic purpose.

Table 3. Physical problems among participants according to mobile phone use behavior

Physical symptoms		Mobile phone use behavior				
		Normal use n(%)	Moderate (at-risk) use n(%)	Severe (addictive) use n(%)	Total n(%)	Fisher's exact p
Digital eye stain	Yes	24(27.27)	54(50.00)	2(66.67)	80(40.20)	0.004*
	No	64(72.73)	54(50.00)	1(33.33)	119(59.80)	
Neck pain	Yes	32(36.36)	33(30.56)	2(66.67)	67(33.67)	0.330
	No	56(63.64)	75(69.44)	1(33.33)	132(66.33)	
Back pain	Yes	17(19.32)	29(26.85)	0(0.00)	46(23.12)	0.208
	No	71(80.68)	79(73.15)	3(100.00)	153(76.88)	
Weight Gain	Yes	8(9.09)	13(12.04)	0(0.00)	21(10.55)	0.669
	No	80(90.91)	95(87.96)	3(100.00)	178(89.45)	
Headache	Yes	25(28.41)	37(34.26)	2(66.67)	64(32.16)	0.298
	No	63(71.59)	71(65.74)	1(33.33)	135(67.84)	
Earache	Yes	6(6.82)	15(13.89)	0(0.00)	21(10.55)	0.231
	No	82(93.18)	93(86.11)	3(100.00)	178(89.45)	
Tinnitus	Yes	10(11.36)	9(8.33)	0(0.00)	19(9.55)	0.659
	No	78(88.64)	99(91.67)	3(100.00)	180(90.45)	
Restlessness	Yes	19(21.59)	34(31.48)	0(0.00)	53(26.63)	0.171
	No	69(78.41)	74(68.52)	3(100.00)	146(73.37)	
Morning Tiredness	Yes	18(20.45)	25(23.15)	1(33.33)	44(22.11)	0.808
	No	70(79.55)	83(76.85)	2(66.67)	155(77.89)	
Fatigue	Yes	11(12.50)	10(9.26)	0(0.00)	21(10.55)	0.658
	No	77(87.50)	98(90.74)	3(100.00)	178(89.45)	
Sleep Disturbances	Yes	22(25.00)	37(34.26)	0(0.00)	59(29.65)	0.194
	No	66(75.00)	71(65.74)	3(100.00)	140(70.35)	

Note: Values are presented as n (%). Percentages are calculated within each mobile phone use category. p values were obtained using Fisher's exact test. *p < 0.05 indicates statistical significance.

Table 4. Psychological problems among participants according to mobile phone use behavior

Characteristics / Psychological symptoms		Mobile phone use behavior			Total N(%)	Fisher's exact test p
		Normal use N(%)	Moderate use (At-risk) N(%)	Severe use (Addictive) N(%)		
Intense Desire	Present	11(12.50)	38(35.19)	2(66.67)	51(25.63)	0.000*
	Absent	77(87.50)	70(64.81)	1(33.33)	148(74.37)	
Impaired control	Present	13(14.77)	39(36.11)	2(66.67)	54(27.14)	0.001*
	Absent	75(85.23)	69(63.89)	1(33.33)	145(72.86)	
withdraw	Present	23(26.14)	50(46.30)	2(66.67)	75(37.69)	0.009*
	Absent	65(73.86)	58(53.70)	1(33.33)	124(62.31)	
Tolerance	Present	27(30.68)	53(49.07)	3(100.00)	83(41.71)	0.004*
	Absent	61(69.32)	55(50.93)	0(0.00)	116(58.29)	
Decreased interest in alternative pleasure	Present	30(34.09)	44(40.74)	2(66.67)	76(38.19)	0.376
	Absent	58(65.91)	64(59.26)	1(33.33)	123(61.81)	
Harmful use	Present	21(23.86)	42(38.89)	2(66.67)	65(32.66)	0.037
	Absent	67(76.14)	66(61.11)	1(33.33)	134(67.34)	

Note: Values are presented as n (%). Percentages within the normal, moderate (at-risk), and severe (addictive) categories are column percentages. p values were obtained using Fisher's exact test. * p <0.05 indicates statistical significance.

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Table 5. Mobile phone dependence by types of mobile phones owned by participants and parents

Types of mobile phone	Mobile phone addiction		P value
	Present n (%)	Absent n (%)	
Types of mobile phone owned by participant			
Smart-phone	49(31.01)	109(69.99)	0.016
Simple-phone	5(12.20)	36(87.80)	
Types of mobile phones owned by parents			
Smart-phone	52(30.77)	117.(69.23)	0.006
Simple-phone	2(6.67)	28(93.33)	

Regarding daily mobile usage , the criteria used to define frequent or excessive use based on the amount of time spent on mobile phones each day vary across different studies. Study done by Nikhita et al., who found a 31.3% prevalence of mobile phone dependence among secondary-school adolescents, showed a significant relationship between higher usage duration and dependence; and individuals spending more than two hours daily were considered as frequent users.[19] The study by Seregely et al. reported that individuals spending ≥4 hours/day daily using mobiles were increased the risk of problematic smartphone use.[20] Studies from worldwide have found that adolescents who spend more time using mobile each day are more likely to develop mobile phone dependence.[21-25] In this study, majority of participants were found to be mild to moderate mobile users and more than half of them had reported daily use of mobile of more than one hour.

In present study, more than one-fourth of the study participants were classified as having mobile phone addiction. This proportion is comparable to the finding of Sohn et al., who reported a 24.8% rate of smartphone dependence.[6] Several studies have reported that the prevalence of smartphone addiction among adolescents varied across countries including 10% in United Kingdom [26], 16.9% in Switzerland [23], 33.3% in India[27], 35.6% in south korea[28], and 37.1% in Malaysia.[29] Studies have found that problematic mobile use among adolescents likely leads to mobile phone dependence resulting in psychological and physical health consequences.[23-29]

In the context of physical health outcomes, the most commonly reported complaints in the present study included digital eye strain (40.20%), neck pain (33.67%), headache (32.16%), sleep disturbance (29.65%), restlessness (26.63%), back pain (23.12%), morning tiredness (22.11%), and earache (10.55%). The study conducted by Parra-Ferendaz Dm et al on 5-11th grade Colombia school-aged students also reported that musculoskeletal pain was associated with mobile phone dependence.[30] The study conducted by Chu et al., among Hong Kong Chinese school aged children reported high prevalence of digital eye strain.[31] The review evidence by Fatima et al reported that problematic mobile use can be associated with impaired sleep quality and day-time fatigue.[32] Studies have found that problematic mobile use among school-aged adolescents may likely develop physical problems such as eye discomfort, headaches, musculoskeletal pain, and poor sleep quality.[33-37]

With regard to psychological outcomes, in this study, mild and moderate mobile phones users showed psychological symptoms such as withdrawal-like experience when not using it, reduced self-control, increased tolerance, diminished preference for alternative sources of pleasure, and intense desire to use mobile phones, restlessness, tiredness, impaired sleep. Similar observations were reported in studies conducted by Zhu et al., and Kim, which found that uncontrolled and repeated mobile use led to psychological symptoms such as tolerance, loss of self-control, withdrawal-like experience, restlessness, fatigue and reduced sleep quality; and were associated with problematic mobile use among school aged students.[4, 38]

This study has a few limitations. First, this was a single-site study with a small sample size, thus limiting the generalization of its findings across wider adolescent demography. Second, students with known medical or psychiatric conditions were excluded from the study, which may have led to an underestimation of the prevalence of physical and psychological symptoms and may have attenuated the observed association between mobile phone dependence and these symptoms. Therefore, the finding may not fully generalizable to school aged students with pre-existing medical or psychiatric conditions. Third, the assumption that frequent use is harmful, may not necessarily be accurate. Moreover, expanding the investigative scope to includes parents' knowledge, attitudes, and practices regarding mobile phone use, as well as socioeconomic factors, duration of use, and severity of mobile use among school-aged adolescents, will be essential to deeply understand these associations.

Despite these limitations, with the increasing use of mobile phones among school-aged students, this study provides valuable local evidence in a population where limited data is available. Since school age is a critical period for physical, mental, and behavioral development, the findings facilitate early identification of problematic mobile phone use and its potential consequences. The results may also support policymakers, educators, and parents in developing appropriate preventive and intervention strategies.

CONCLUSIONS:

Mobile phone addiction was detected in about a quarter of the school-aged students. Digital eye strain, followed by neck pain, headache and sleep disturbances were the commonest physical symptoms; while tolerance followed by decreased interest

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in alternative pleasures and withdrawal symptoms were the frequently reported psychological symptom by mobile phone users.. Mobile phone addiction was higher among smartphone users. Findings indicated that even moderate levels of mobile phone use may contribute to adverse physical and psycho-behavioral outcomes among school-aged students.

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