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SMARTPHONE ADDICTION AMONG HIGHER SECONDARY LEVEL STUDENTS IN SOUTH 24 PARGANAS DISTRICT, WEST BENGAL

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RESEARCH ARTICLE

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Abstract

Control is prevalent in all sorts of organization and school is not an exception. Pupil Control Ideology has significant implications for the student-teacher interactions as well as the overall climate of the school. The present study endeavoured to investigate the Pupil Control Ideology of secondary school teachers in Purulia district of West Bengal, India, and examined whether it differed according to gender, locale, teaching experience, academic discipline, and highest academic qualification. A multistage random sampling method was used to select 300 Secondary School teachers from 22 co-educational higher secondary schools from 11 blocks of Purulia district. Data were collected using the standardized Pupil Control Ideology Scale (PCIS–KM) developed by Khatoon and Munir (2009). Descriptive statistics, independent-samples *t*-tests, and one-way analysis of variance (ANOVA) were used for data analysis. The findings indicated that 56.3% of the teachers had a humanistic pupil control ideology, 42.7% had a moderate orientation, and 1% exhibited a custodial orientation thus exhibiting that majority of the Secondary School teachers had Humanistic orientation in Pupil Control Ideology. Furthermore, no statistically significant differences in Pupil Control Ideology were found with respect to gender, locale, teaching experience, academic discipline, and highest academic qualification of the Secondary School teachers. The study contributes to the understanding of Pupil Control Ideology of Secondary School teachers in the specific socio-educational context in Purulia district of West Bengal.

Keywords: *Pupil control ideology, secondary school teachers, classroom management, Purulia district*

Introduction

Rapid advances in digital technology have transformed the ways in which students communicate, access information, and participate in learning (Mandal et al., 2021). Technology can support accessibility, personalized learning, and inclusive classroom participation when it is used purposefully (Patra et al., 2023; Mandal et al., 2022). At the same time, the growing availability of internet-enabled devices has created new challenges related to prolonged digital engagement and self-regulation (Mandal et al., 2023). Among various digital devices, the smartphone has become one of the most frequently used technological tools in the everyday lives of adolescents. Its portability, internet connectivity, multifunctionality, and easy access to social networking platforms, entertainment, games, educational resources, and instant communication have made it especially attractive to students. For higher secondary students, smartphones can serve several constructive purposes, including attending online classes, searching for academic materials, communicating with teachers and classmates, accessing educational videos, preparing assignments, and obtaining information beyond the limits of textbooks. Therefore, smartphone use in itself cannot be regarded as undesirable; rather, the manner, purpose, duration, and level of control associated with its use determine whether it remains beneficial or becomes problematic. The expansion of the digital environment has also resulted in substantially greater exposure of students to internet-based activities. Roy et al. (2024), in their study of higher education students in West Bengal, observed that internet addiction was associated with mental stress and highlighted the need to understand excessive digital engagement in relation to students' psychological well-being. Although internet use and smartphone use are conceptually distinct, smartphones have increasingly become the primary medium through which adolescents access online content. Consequently, continuous connectivity may encourage repeated checking, prolonged screen engagement, social-media use, online gaming, video consumption, and other behaviours that can make self-regulation increasingly difficult.

In the research literature, the expression "smartphone addiction" is commonly used to describe excessive, compulsive, or poorly controlled smartphone behaviour accompanied by difficulties in everyday functioning. However, the term should be used with some conceptual caution because smartphone addiction is not currently established as a separate clinical diagnosis in major

psychiatric classification systems. Researchers therefore also frequently employ the term "problematic smartphone use" to describe patterns of use characterized by difficulty in controlling smartphone behaviour and associated negative consequences. Nevertheless, the term smartphone addiction continues to be widely employed in educational and behavioural research, and validated instruments have been developed to assess addiction-like patterns of smartphone use. For example, Kwon et al. (2013) developed and validated the Smartphone Addiction Scale-Short Version (SAS-SV) specifically for adolescents, establishing a useful basis for the empirical assessment of problematic smartphone behaviour. Adolescence represents an important developmental stage during which individuals undergo considerable cognitive, emotional, social, and educational changes. Higher secondary students, generally situated in late adolescence, simultaneously encounter academic demands, examinations, future career decisions, changing peer relationships, and increasing independence in the use of digital media. These conditions can make the regulation of smartphone use particularly important.

Research conducted among Indian adolescents provides evidence that problematic smartphone behaviour is a matter requiring educational and public-health attention. Amudhan et al. (2022), in a district-level study of school-going adolescents in India, reported smartphone addiction as the most common form of technology addiction examined in their study. Similarly, Bhanderi et al. (2021), while studying adolescents aged 16-19 years, reported that smartphone addiction was associated with several factors, including the duration of smartphone ownership and daily hours of use. Daily smartphone-use duration appears to be particularly relevant in understanding problematic patterns. Vaghasiya et al. (2023), in a study of school-going adolescents, found problematic smartphone use to be significantly associated with the duration of smartphone use per day. This finding is especially relevant to the present study because time spent on smartphones may reflect differences in students' patterns of engagement and may consequently be related to their level of smartphone addiction. At the same time, demographic characteristics such as gender have also received considerable research attention. Findings concerning gender are not entirely consistent across studies, indicating that smartphone addiction may vary according to the population, cultural setting, patterns of use, and measurement procedures employed. Such inconsistencies make context-specific study necessary rather than assuming that findings obtained in one geographical or educational setting will apply equally to another. Growing evidence also suggests that problematic smartphone use may be associated with undesirable consequences for young people. Sohn et al. (2019), through a systematic review and meta-analysis involving children and young people, reported associations between problematic smartphone use and depression, anxiety, perceived stress, and poor sleep quality. A systematic review focusing specifically on adolescents further indicated that excessive smartphone involvement may be linked with sleep problems, depressive symptoms, social difficulties, and reduced academic achievement (Karabey et al., 2024). More recently, Paterna et al. (2024), in a systematic review and meta-analysis, found an overall negative relationship between problematic smartphone use and academic achievement. These findings do not imply that every student who frequently uses a smartphone will necessarily experience such difficulties; rather, they highlight the importance of distinguishing normal and purposeful smartphone use from patterns characterized by loss of control and functional interference. Within the Indian educational context, smartphones have become closely integrated with students' academic as well as recreational lives. However, India is socially, economically, culturally, and geographically diverse, and patterns identified in one state or district cannot automatically be generalized to students in another region. South 24 Parganas District of West Bengal includes students from varied social and geographical settings and represents a significant educational context in which higher secondary learners increasingly interact with digital technologies. Despite the growing relevance of smartphone-related behaviour, localized empirical evidence regarding smartphone addiction among higher secondary students in this district remains limited. There is therefore a need to determine the existing status of smartphone addiction among these learners and to examine whether it varies according to selected demographic and usage-related characteristics. Against this background, the present study entitled "Smartphone Addiction among Higher Secondary Level Students in South 24 Parganas District, West Bengal" seeks to assess the status of smartphone addiction among students of Classes XI and XII. It further attempts to examine smartphone addiction with respect to gender, class level, and average daily smartphone usage. Understanding these patterns may provide context-specific evidence regarding the nature of smartphone involvement among higher secondary students and may assist teachers, parents, school authorities, counsellors, and researchers in encouraging balanced, responsible, and educationally productive use of smartphones.

Rationale of the Study

Smartphones have created important opportunities for communication, information access, and learning, yet their growing presence in adolescents' everyday lives has also raised concerns regarding excessive and uncontrolled use. The significance of the issue lies not simply in the amount of time students spend with smartphones, but in whether such engagement begins to interfere with academic responsibilities, sleep, interpersonal interaction, emotional well-being, or normal daily activities. As the higher secondary stage is closely associated with important academic examinations and decisions regarding future education and careers, understanding problematic smartphone behaviour during this period is particularly relevant. Existing empirical evidence demonstrates that smartphone-related problems among adolescents cannot be overlooked. Studies conducted in India have reported measurable levels of smartphone or technology addiction among school-going adolescents (Amudhan et al., 2022; Bhanderi et al., 2021; Vaghasiya et al., 2023). However, prevalence estimates differ considerably across studies because of differences in age groups, geographical settings, instruments, sampling procedures, and definitions of problematic use. Such variation suggests that national or international prevalence figures alone cannot adequately explain the situation of students in a specific district. Contextual studies are therefore required to understand the actual status of smartphone addiction within particular educational populations. The present study is further justified by the developmental characteristics of higher secondary

students. Students of Classes XI and XII are at a stage where academic pressure increases while personal autonomy and access to digital media also expand. Smartphones may be required for educational searches, communication, online resources, and preparation for examinations; at the same time, the same device provides unrestricted access to social media, gaming, streaming services, and entertainment. The coexistence of academic and recreational functions makes it difficult to define problematic smartphone behaviour merely in terms of ownership or frequency of use. A systematic assessment of addiction-related tendencies is therefore necessary. Average daily smartphone usage has been included as an important variable because previous Indian studies have demonstrated associations between longer duration of smartphone use and problematic or addictive patterns (Bhanderi et al., 2021; Vaghasiya et al., 2023). Examining students according to their average daily smartphone usage may therefore help determine whether addiction scores differ across groups with varying levels of exposure. Such evidence can be particularly useful for developing practical awareness regarding balanced screen use among school students. Gender has also been selected because existing findings regarding gender differences in smartphone addiction are mixed. Some studies have reported differences between male and female adolescents, whereas others have found little or no significant difference. Consequently, gender-based patterns should not be assumed in advance. Examining male and female higher secondary students within the socio-cultural context of South 24 Parganas may provide more locally meaningful evidence and may indicate whether awareness or intervention programmes need to consider gender-specific usage patterns. The inclusion of class level (Classes XI and XII) is also relevant because students at these two stages may differ in academic responsibilities, examination pressure, study schedules, peer engagement, and purposes of smartphone use. Class XII students, for example, usually experience greater pressure associated with board examinations and entry into higher education, whereas Class XI students may be adapting to a new curricular and disciplinary structure. Investigating whether smartphone addiction varies according to class level can therefore contribute to a more differentiated understanding of smartphone behaviour among higher secondary learners. Another important justification arises from the relationship between problematic smartphone use and educational and psychological outcomes. Systematic evidence has linked problematic smartphone use with poorer sleep, anxiety, depression, perceived stress, and diminished academic achievement among children and young people (Sohn et al., 2019; Karabey et al., 2024; Paterna et al., 2024). In the West Bengal context, Roy et al. (2024) also demonstrated a significant relationship between internet addiction and mental stress among higher education students. Although the present study does not directly examine mental health or academic achievement as dependent variables, such findings reinforce the importance of identifying excessive technology-related behaviour before it develops into a more serious educational or psychosocial concern.

Finally, relatively limited research appears to have specifically examined smartphone addiction among higher secondary students of South 24 Parganas District with simultaneous consideration of gender, class level, and average daily smartphone usage. The present study is therefore expected to contribute localized empirical evidence to the existing literature. Its findings may help teachers, parents, school administrators, counsellors, and educational planners understand the extent and distribution of smartphone addiction among students and may provide a foundation for awareness programmes, digital-well-being initiatives, parental guidance, and responsible smartphone-use practices at the school level. Thus, the study is considered both educationally relevant and socially significant.

Delimitations of the Study

The present study was delimited to the following aspects:
i. The study was delimited to only one district of West Bengal, namely South 24 Parganas District.
ii. The study was delimited to students studying in Classes XI and XII.
iii. The study was delimited to a sample of 317 students selected from five higher secondary schools.
iv. The study was delimited to Bengali-medium students only.
v. The study was delimited to students belonging to the Arts and Science streams.
vi. The study was delimited to three independent/demographic variables, namely gender, class level, and average daily smartphone usage.

Objectives of the Study

The present study was undertaken with the following objectives:
i. To assess the present status of smartphone addiction among higher secondary level students in South 24 Parganas District, West Bengal.
ii. To examine the association between smartphone addiction level and gender among higher secondary level students.
iii. To examine the association between smartphone addiction level and class level (Class XI and Class XII) among higher secondary level students.
iv. To examine the association between smartphone addiction level and average daily smartphone usage among higher secondary level students.

Hypotheses of the Study

The following null hypotheses were formulated for the study:
H_{o1}: There is no significant association between smartphone addiction level and gender among higher secondary level students.
H_{o2}: There is no significant association between smartphone addiction level and class level among higher secondary level students.

H_{03}: There is no significant association between smartphone addiction level and average daily smartphone usage among higher secondary level students.

Methodology

The methodology of the present study was aligned with the descriptive and associational nature of the research objectives. A quantitative descriptive research method was adopted because the study aimed to assess the existing status of smartphone addiction among higher secondary level students and to examine its association with selected demographic indicators. A cross-sectional survey research design was employed, and data were collected from the selected students at a single point in time. The target population comprised all higher secondary level students studying in Classes XI and XII in Bengali-medium higher secondary schools of South 24 Parganas District, West Bengal, particularly those belonging to the Arts and Science streams. A total of 317 students constituted the sample and were selected from five higher secondary schools in the district. Within the participating schools, student-level selection was carried out through simple random sampling, whereby eligible students included in the sampling frame were provided an equal opportunity of being selected. The dependent variable of the study was smartphone addiction among higher secondary level students, while the independent variables were gender, class level, and average daily smartphone usage.

Tool Used for Data Collection

The Smartphone Addiction Scale (SAS-VAM) developed by Vijayshri and Masaud Ansari (2020) was used to assess smartphone addiction among the participants. The standardized self-report scale is intended for individuals approximately 14-24 years of age and consists of 23 items distributed across six dimensions: Compulsion, Forgetfulness, Lack of Attention, Depression and Anxiety, Disturbed Hunger/Sleep, and Social Withdrawal. Responses are recorded on a five-point Likert-type scale ranging from Strongly Agree to Strongly Disagree. The total score represents the extent of smartphone addiction, with higher scores indicating higher levels of addiction. According to the prescribed norms, total scores are classified into seven levels: Very Low, Low, Below Average, Average, Above Average, High, and Very High. The scale has reported internal consistency of approximately $\alpha = .85$, supporting its suitability for the present study.

Statistical Analysis: Frequency and percentage were used to describe the distribution of students across the seven normative smartphone-addiction levels. Pearson's chi-square test of independence was used to examine the association of smartphone addiction level with gender, class level, and average daily smartphone usage. For inferential analysis, the seven normative levels were consolidated into three ordered analytic groups to maintain a consistent classification across the hypothesis tests and to satisfy expected-frequency requirements: the Lower Addiction Group comprised Very Low, Low, and Below Average; the Average Addiction Group comprised Average; and the Higher Addiction Group comprised Above Average, High, and Very High. Cramer's V was reported as an effect-size measure for each chi-square test. All null hypotheses were tested at the 0.05 level of significance.

Results and Interpretation

The data were analyzed according to the objectives and hypotheses of the study. Descriptive results are presented using the original seven normative levels of the SAS-VAM, whereas the chi-square analyses use the three ordered analytic groups defined in the Methodology section.

Table 1

Distribution of Students According to Smartphone Addiction Level

Smartphone Addiction Level	n	%
Very Low	12	3.8
Low	49	15.5
Below Average	76	24.0
Average	87	27.4
Above Average	58	18.3
High	15	4.7
Very High	20	6.3
Total	**317**	**100.0**

Note. Percentages are based on 317 valid cases.

Interpretation

The largest proportion of students, 87 (27.4%), was classified at the Average level of smartphone addiction, followed by Below Average (24.0%) and Above Average (18.3%). When the Above Average, High, and Very High categories were considered together, 93 students (29.3%) demonstrated comparatively elevated smartphone-addiction scores.

Table 2

Distribution of Smartphone Addiction Analytic Groups According to Gender

Gender	Lower Addiction Group, n (%)	Average Addiction Group, n (%)	Higher Addiction Group, n (%)	Total, n
Male	35 (30.2)	32 (27.6)	49 (42.2)	116
Female	102 (50.7)	55 (27.4)	44 (21.9)	201
Total	**137 (43.2)**	**87 (27.4)**	**93 (29.3)**	**317**

Note. Percentages are calculated within gender categories.

Interpretation

Male students were more frequently represented in the Higher Addiction Group (42.2%) than female students (21.9%), whereas female students were more frequently represented in the Lower Addiction Group (50.7%) than male students (30.2%). The proportions in the Average Addiction Group were almost identical for males (27.6%) and females (27.4%).

Table 3

Chi-Square Test of Association Between Gender and Smartphone Addiction Analytic Group

Variables	χ^2	df	p	Cramer's V	Decision
Gender and Smartphone Addiction Group	17.59	2	< 0.001	0.24	H_{01} rejected

Note. $N = 317$. The minimum expected cell frequency was 31.84; therefore, the expected-frequency assumption was satisfied.

Pearson's chi-square test indicated a statistically significant association between gender and smartphone addiction group, $\chi^2(2, N = 317) = 17.59$, $p < 0.001$, Cramer's $V = 0.24$. Therefore, H_{01} was rejected.

Table 4

Distribution of Smartphone Addiction Analytic Groups According to Class Level

Class Level	Lower Addiction Group, n (%)	Average Addiction Group, n (%)	Higher Addiction Group, n (%)	Total, n
Class XI	47 (34.1)	37 (26.8)	54 (39.1)	138
Class XII	90 (50.3)	50 (27.9)	39 (21.8)	179
Total	**137 (43.2)**	**87 (27.4)**	**93 (29.3)**	**317**

Note. Percentages are calculated within class-level categories.

Interpretation

Class XI students were more frequently represented in the Higher Addiction Group (39.1%) than Class XII students (21.8%), whereas Class XII students were more frequently represented in the Lower Addiction Group (50.3%) than Class XI students (34.1%).

Table 5

Chi-Square Test of Association Between Class Level and Smartphone Addiction Analytic Group

Variables	χ^2	df	p	Cramer's V	Decision
Class Level and Smartphone Addiction Group	12.77	2	0.002	0.20	H_{02} rejected

Note. $N = 317$. The minimum expected cell frequency was 37.87; therefore, the expected-frequency assumption was satisfied.

Pearson's chi-square test indicated a statistically significant association between class level and smartphone addiction group, $\chi^2(2, N = 317) = 12.77$, $p = .002$, Cramer's $V = .20$. Therefore, H_{02} was rejected.

Table 6

Distribution of Smartphone Addiction Analytic Groups According to Average Daily Smartphone Usage

Average Daily Smartphone Usage	Lower Addiction Group, n (%)	Average Addiction Group, n (%)	Higher Addiction Group, n (%)	Total, n
Less than 1 hour	29 (69.0)	9 (21.4)	4 (9.5)	42
1-2 hours	42 (55.3)	24 (31.6)	10 (13.2)	76
2-4 hours	33 (47.1)	18 (25.7)	19 (27.1)	70
4-6 hours	24 (36.9)	17 (26.2)	24 (36.9)	65
More than 6 hours	9 (14.1)	19 (29.7)	36 (56.3)	64
Total	**137 (43.2)**	**87 (27.4)**	**93 (29.3)**	**317**

Note. Percentages are calculated within average daily smartphone-usage categories.

Interpretation

A clear graded pattern was observed across daily smartphone-usage categories. The proportion of students in the Higher Addiction Group increased from 9.5% among those using smartphones for less than one hour per day to 56.3% among those using smartphones for more than six hours per day. Conversely, representation in the Lower Addiction Group decreased from 69.0% to 14.1% across the same usage categories.

Table 7

Chi-Square Test of Association Between Average Daily Smartphone Usage and Smartphone Addiction Analytic Group

Variables	χ^2	df	p	Cramer's V	Decision
Average Daily Smartphone Usage and Smartphone Addiction Group	53.32	8	< 0.001	0.29	H_{03} rejected

Note. $N = 317$. No expected cell frequency was below 5; the minimum expected count was 11.53. Therefore, the expected-frequency assumption was satisfied.

Pearson's chi-square test indicated a statistically significant association between average daily smartphone usage and smartphone addiction group, $\chi^2(8, N = 317) = 53.32$, $p < 0.001$, Cramer's $V = 0.29$. Therefore, H_{03} was rejected.

Major Findings of the Study

Smartphone addiction was distributed across all seven normative levels. The largest proportion of students (27.4%) was classified at the Average level, followed by Below Average (24.0%) and Above Average (18.3%). In total, 29.3% of students fell within the combined higher-level group consisting of Above Average, High, and Very High categories.

Smartphone addiction group was significantly associated with gender, $\chi^2(2, N = 317) = 17.59$, $p < 0.001$. Male students were more frequently represented in the Higher Addiction Group than female students.

A statistically significant association was also observed between class level and smartphone addiction group, $\chi^2(2, N = 317) = 12.77$, $p = 0.002$. Class XI students were more frequently represented in the Higher Addiction Group than Class XII students.

Average daily smartphone usage was significantly associated with smartphone addiction group, $\chi^2(8, N = 317) = 53.32$, $p < 0.001$. The proportion of students in the Higher Addiction Group increased progressively as daily smartphone-use duration increased.

On the basis of the statistical analysis, all three null hypotheses were rejected.

Discussion

In the contemporary era, countries have become increasingly connected through developments in trade, communication, and technology. This growing global interdependence, commonly referred to as globalization, has promoted cross-border mobility and strengthened economic integration through the expansion of international trade and commercial activities (Mandal et al., 2025; Adak et al., 2024; Mandal et al., 2023).

The present study examined the status of smartphone addiction among higher secondary level students in South 24 Parganas District, West Bengal, and explored its association with gender, class level, and average daily smartphone usage. The findings indicate that smartphone-related addictive tendencies are distributed across different levels among the students rather than being confined to a small extreme group. Although the largest proportion of students belonged to the Average category (27.4%), nearly three out of ten students (29.3%) were classified within the combined Above Average, High, and Very High categories. This finding suggests that problematic smartphone involvement deserves attention within the higher secondary school context, particularly because adolescence is a developmental period characterized by increasing autonomy, peer influence, academic demands, and greater access to digital media. The observed level of smartphone addiction is broadly consistent with earlier studies showing that problematic or addictive smartphone behaviour is not uncommon among adolescents, although direct numerical comparisons should be made cautiously because different studies have employed different instruments, cut-off scores, age groups, and operational definitions. Bhanderi et al. (2021), for example, reported smartphone addiction among 37% of Indian adolescents aged 16-19 years, while Gangadharan et al. (2022) found mobile phone addiction among approximately 33% of adolescents in urban Delhi. Nikhita et al. (2015) similarly reported mobile phone dependence among 31.33% of secondary school adolescents. In contrast, Vaghasiya et al. (2023) reported problematic smartphone use among 12.5% of school-going adolescents, and Amudhan et al. (2022) found phone addiction among 8.91% of adolescent phone users in a district-level Indian survey. At the international level, Sohn et al. (2019), in a systematic review and meta-analysis involving 41,871 children and young people, reported a median prevalence of problematic smartphone use of 23.3%. These variations reinforce the view that smartphone addiction estimates are sensitive to the population studied, age range, social environment, assessment instrument, and criteria used for classification. Therefore, the 29.3% identified in the present study as belonging to the combined higher-level group should be interpreted as an indicator of comparatively elevated smartphone-addiction scores within the normative framework of the instrument rather than as a directly comparable clinical prevalence estimate. The importance of this finding extends beyond the mere frequency of smartphone use. Systematic evidence indicates that problematic smartphone use among children and adolescents is associated with a range of adverse outcomes. Sohn et al. (2019) found that problematic smartphone use was associated with increased odds of depression, anxiety, perceived stress, and poor sleep quality. Karabey et al. (2024), after systematically reviewing 188 studies on adolescent smartphone addiction, similarly identified associations with depressive symptoms, sleep problems, and reduced academic achievement. Moreover, Paterna et al. (2024), in a meta-analysis of 29 studies involving 48,490 participants, found a statistically significant negative relationship between problematic smartphone use and academic achievement. Although the magnitude of this relationship was small, the finding is educationally relevant because even a modest association may become important when smartphone use is widespread among students. Thus, the presence of a substantial group with elevated smartphone-addiction scores in the present study should be viewed not simply as a technological habit but as a potential issue related to students' broader educational and psychosocial functioning. A second major finding of

the present study was the statistically significant association between gender and smartphone addiction level. Male students were proportionately more represented in the Higher Addiction Group than female students. This finding receives some support from Indian evidence suggesting that technology-related addictive behaviours may be more pronounced among boys in certain contexts. Amudhan et al. (2022), in their district-level investigation of Indian school-going adolescents, observed that overall technology addiction was more prevalent among boys than girls. Other Indian research on technology addiction among school students has also identified male gender as a risk factor. Such findings suggest that, in some social and educational settings, boys may be more vulnerable to certain forms of technology-related overuse. However, the gender finding of the present study is not universally supported by the existing literature. Gangadharan et al. (2022) found only a small difference between boys and girls in mobile phone addiction-33.6% among boys and 32.4% among girls, and the difference was statistically non-significant. Vaghasiya et al. (2023) also found no significant association between gender and problematic smartphone use among school students. More importantly, broader reviews have sometimes suggested the opposite pattern. Fischer-Grote et al. (2019), in their review of risk factors for problematic smartphone use among children and adolescents, noted that several studies reported female gender as a risk factor, while other studies reported higher scores among boys or no gender effect at all. Similarly, the systematic review by Karabey et al. (2024) concluded that females were more frequently identified as being vulnerable to smartphone addiction across the studies they reviewed. Thus, the existing evidence on gender is clearly heterogeneous rather than uniform. This inconsistency is important for interpreting the present result. Gender itself may not act as a simple or universal cause of smartphone addiction; rather, gender may interact with differences in the purposes, patterns, and social contexts of smartphone use. Fischer-Grote et al. (2019) observed that boys and girls may differ in the activities for which smartphones are used, with some studies indicating greater involvement of girls in social communication and greater involvement of boys in gaming or other media-related activities. Therefore, the higher proportion of males in the Higher Addiction Group in the present study may reflect locally specific patterns of smartphone engagement rather than an inherent gender-based vulnerability. Since the present study did not examine specific smartphone activities such as gaming, social networking, streaming, messaging, or educational use, these explanations should be treated as plausible interpretations rather than established causal mechanisms. The present finding therefore highlights the need for gender-sensitive study without assuming that one gender is universally more susceptible than the other. The study also revealed a significant association between class level and smartphone addiction, with Class XI students showing a greater representation in the Higher Addiction Group than Class XII students. This is an interesting finding because the existing literature does not provide a consistent expectation that addiction should necessarily increase with advancement in school grade. Bhanderi et al. (2021) reported that smartphone addiction among adolescents was associated with age and place of education, suggesting that educational and developmental stage may have relevance to smartphone behaviour. Gangadharan et al. (2022) also observed descriptively that mobile phone addiction was higher among adolescents at the higher-secondary-and-above level than among those at lower educational levels; however, the overall association with educational level was not statistically significant. Therefore, while some evidence suggests that educational stage may be related to patterns of mobile-phone dependence, the precise direction of that relationship remains uncertain. The class-level result differs more clearly from the findings of Vaghasiya et al. (2023), who examined students in Classes VIII, IX, and X and found no significant association between class in school and problematic smartphone use. In their sample, problematic use was distributed relatively similarly across grades. This difference may arise because the present study focuses specifically on Classes XI and XII, which represent a distinct stage of schooling characterized by different academic structures, examination pressures, autonomy, and patterns of digital engagement. The transition into Class XI may involve new subjects, new peer groups, increased independence, and altered study routines, whereas Class XII students may experience more structured preparation for board examinations and competitive entrance examinations. Such contextual differences could potentially contribute to the lower proportion of Class XII students in the higher addiction category found in the present study. Nevertheless, because academic pressure, parental monitoring, study routines, examination preparation, and purposes of smartphone use were not measured directly, these explanations remain hypotheses for future research rather than conclusions of the present study. The class-level finding is nevertheless educationally important. It indicates that problematic smartphone involvement may not simply increase linearly with age or educational progression. Instead, different stages of schooling may present different patterns of risk and protection. A student entering Class XI may experience considerable changes in educational structure and freedom of smartphone use, whereas a Class XII student may have stronger external regulation arising from examination preparation, coaching schedules, parental expectations, or academic responsibilities. The significant association observed in the present study therefore supports the need for class-specific digital well-being strategies rather than assuming that all higher secondary students experience smartphone use in the same manner. The strongest and most consistent pattern in the present study emerged in relation to average daily smartphone usage. Smartphone addiction level was significantly associated with the amount of time students spent using their smartphones each day. The descriptive pattern was particularly clear: only 9.5% of students using smartphones for less than one hour per day belonged to the Higher Addiction Group, whereas this proportion progressively increased across the usage categories and reached 56.3% among students who used smartphones for more than six hours per day. At the same time, the proportion classified in the Lower Addiction Group decreased substantially as daily smartphone usage increased. This graded pattern strengthens the practical importance of daily smartphone-use duration as an indicator associated with elevated addiction tendencies. This finding is strongly supported by previous Indian research. Bhanderi et al. (2021) reported that smartphone addiction among adolescents aged 16-19 years was significantly associated with daily hours of smartphone use as well as the overall duration for which smartphones had been used. Vaghasiya et al. (2023) similarly found that problematic smartphone use was associated with the duration of smartphone use per day; in multivariable analysis, using smartphones for more than four hours per day remained

significantly related to problematic smartphone use. Gangadharan et al. (2022) reported that adolescents with mobile phone addiction spent significantly more time using mobile phones than those without addiction. Likewise, Nikhita et al. (2015) found a significant association between mobile phone dependence and average daily time spent using the device. The consistency between these previous findings and the present result provides comparatively strong evidence that greater daily exposure is closely linked with more problematic smartphone behaviour among adolescents. The relationship between usage duration and addiction level can be interpreted in several ways. Greater time spent on a smartphone provides more opportunities for repetitive checking, entertainment, gaming, social networking, video consumption, and other forms of habitual engagement. Repeated smartphone interaction may gradually become incorporated into everyday routines and make self-regulation increasingly difficult. However, the relationship may also operate in the reverse direction: students who already experience greater difficulty controlling smartphone use may consequently spend more time on their devices. Because the present study employed a cross-sectional design, it cannot establish whether longer daily use causes greater smartphone addiction or whether stronger addictive tendencies produce longer usage duration. The finding should therefore be interpreted as a strong association rather than evidence of causation. This distinction is particularly important in an educational context because time spent using a smartphone is not necessarily equivalent to harmful use. Higher secondary students may legitimately use smartphones for searching educational information, accessing digital learning materials, watching instructional videos, communicating about schoolwork, preparing assignments, or participating in online educational activities. Therefore, intervention efforts should not be based solely on reducing screen time indiscriminately. Instead, schools and families should focus on the quality, purpose, timing, and self-regulation of smartphone use, alongside duration. The review by Fischer-Grote et al. (2019) similarly emphasized that specific patterns of use, including gaming and social networking, may represent relevant risk factors. Thus, daily duration is a useful warning indicator, but it should be interpreted together with the behavioural context in which the smartphone is being used.

The findings have particular significance for school-based educational practice. Students classified at elevated levels of smartphone addiction may benefit from structured awareness programmes focusing on digital self-regulation, sleep-friendly smartphone habits, notification management, purposeful educational use, and appropriate boundaries between study time and recreational smartphone engagement. The need for school-level intervention is also supported by Vaghasiya et al. (2023), whose adolescent participants responded positively to educational sessions on responsible smartphone use, with a substantial majority indicating that such sessions should be conducted in schools. These findings suggest that preventive digital well-being education can be incorporated into school guidance and counselling activities without treating all smartphone use as inherently negative. The significance of such interventions becomes greater when the broader consequences of problematic smartphone use are considered. Sohn et al. (2019) demonstrated associations between problematic smartphone use and depression, anxiety, perceived stress, and poor sleep among young people, while Paterna et al. (2024) reported a small but statistically significant negative association with academic achievement. Karabey et al. (2024) likewise concluded that adolescent smartphone addiction is linked with psychological, social, sleep-related, and academic difficulties. Accordingly, identifying problematic smartphone tendencies at the higher secondary stage may offer an opportunity for early preventive action before such behaviours become more deeply established or begin to interfere substantially with students' educational and psychosocial functioning. Taken together, the present findings both support and extend the existing literature. The significant association between daily smartphone usage and addiction level is strongly consistent with previous Indian studies, whereas the gender and class-level findings demonstrate the context-dependent nature of demographic differences in problematic smartphone behaviour. The higher representation of males and Class XI students in the Higher Addiction Group should therefore be interpreted as characteristics of the present sample and setting rather than universal patterns applicable to all adolescents. In contrast, the progressive increase in elevated addiction levels with longer daily smartphone usage represents a particularly robust practical finding and identifies duration of use as an important factor for further investigation and preventive attention.

Finally, the findings should be interpreted within the methodological boundaries of the study. Because the study was cross-sectional, no causal relationship can be established between gender, present class, daily smartphone use, and smartphone addiction. Smartphone addiction was assessed through self-reported responses, and the study did not separately examine the purposes of smartphone use, types of applications used, parental monitoring, academic pressure, sleep behaviour, mental health, or academic achievement. Future research may therefore employ longitudinal designs and include behavioural and psychosocial variables to clarify why certain groups of higher secondary students demonstrate greater vulnerability. Nevertheless, the present findings provide useful district-specific evidence showing that smartphone addiction among higher secondary students is associated not only with the duration of daily smartphone use but also with selected demographic and educational characteristics. These findings support the need for balanced, context-sensitive, and educationally informed approaches to promoting responsible smartphone use among adolescents.

Educational Implications

The findings of the present study have important implications for higher secondary education, particularly in relation to students' digital habits and self-regulation. Since a considerable proportion of students was found in the Above Average and higher levels of smartphone addiction, schools need to recognize excessive smartphone use as an educational concern rather than merely a personal habit. Teachers, school counsellors, and administrators may introduce structured digital-well-being programmes that help students understand healthy screen habits, purposeful use of smartphones, time management, notification control, and the distinction between academic and recreational use. Such initiatives may be incorporated into guidance and counselling activities, life-skills education, or awareness sessions so that students can learn to use smartphones in a balanced and responsible manner

without compromising their academic responsibilities and daily routines. The significant associations of smartphone addiction with gender, class level, and average daily smartphone usage also suggest that a uniform approach may not be equally effective for all students. Schools may therefore consider more context sensitive strategies, especially for groups showing comparatively higher levels of smartphone addiction. Particular attention may be given to students with prolonged daily smartphone use, as the present study showed that higher usage duration was associated with greater representation in the Higher Addiction Group. Parents may also be involved through awareness programmes so that home-based monitoring, communication, and reasonable digital boundaries can complement school-based efforts. At the same time, educational institutions should avoid presenting smartphones only as harmful devices, because they also support learning, communication, and access to educational resources. The more appropriate goal is to promote disciplined, purposeful, and self-regulated smartphone use.

Recommendations

On the basis of the findings, it is recommended that higher secondary schools organize regular awareness and counselling programmes on responsible smartphone use, digital self-control, sleep-friendly device habits, and effective management of daily screen time. Teachers and parents should work collaboratively to identify students who show signs of excessive or uncontrolled smartphone use and provide supportive guidance rather than relying only on restriction or punishment. Students should be encouraged to maintain a balanced daily routine that includes academic work, physical activity, face-to-face social interaction, adequate sleep, and limited recreational smartphone use. Schools may also develop age-appropriate digital well-being guidelines and encourage students to use smartphones primarily for meaningful educational and communication purposes. Future studies may include larger and more diverse samples and examine additional factors such as academic achievement, sleep patterns, parental monitoring, social media use, gaming behaviour, mental well-being, and the specific purposes for which smartphones are used.

Conclusion

The present study examined smartphone addiction among higher secondary level students in South 24 Parganas District, West Bengal, with particular reference to gender, class level, and average daily smartphone usage. The findings demonstrated that smartphone addiction was distributed across different levels among the students, with a notable proportion showing comparatively elevated addiction levels. Significant associations were found between smartphone addiction level and all three selected variables. Male students and Class XI students showed comparatively greater representation in the Higher Addiction Group, while the clearest pattern emerged in relation to average daily smartphone usage, where longer duration of use was associated with higher levels of smartphone addiction. These findings highlight the need to approach smartphone use among adolescents from a balanced educational perspective. Smartphones have become an integral part of contemporary learning and communication, and their benefits cannot be ignored; however, excessive and poorly regulated use may create difficulties for students' academic routines, self-discipline, sleep, and overall well-being. Therefore, the emphasis should not be placed solely on reducing access to smartphones but on developing responsible, purposeful, and controlled patterns of use. The study contributes district-specific evidence to the growing literature on smartphone addiction among adolescents and underlines the importance of coordinated efforts by students, teachers, parents, counsellors, and school authorities to promote healthier digital behaviour among higher secondary learners.

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