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Paediatrics Section

Smartphone Addiction and Depressive Symptoms among Urban Adolescents in India: A Cross-sectional Study

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ABSTRACT

Introduction: Smartphone use has increased rapidly among adolescents, raising concerns about excessive use and its association with mental health problems, particularly depression. This is particularly concerning during adolescence, a critical developmental period characterised by emotional, cognitive, and social changes that increase vulnerability to behavioural addictions. Excessive smartphone use may disrupt sleep, academic performance, and social interactions, potentially contributing to depressive symptoms.

Aim: To determine the prevalence of smartphone addiction among adolescent and examine its relationship with depressive symptoms.

Materials and Methods: A cross-sectional study was conducted among 1,120 adolescents aged 15-18 years between March and December 2018, in the Department of Paediatrics, CSI Holdsworth Memorial Hospital, Mysore, Karnataka, India. Smartphone addiction was assessed using the Smartphone Addiction Scale (SAS), and depressive symptoms were measured using the Patient Health Questionnaire-9 (PHQ-9). Descriptive statistics were computed for SAS and PHQ-9 scores. Associations between smartphone addiction and demographic variables were analysed using Chi-square test. Non normal PHQ-9 distributions across age groups were examined using the Kruskal-Wallis test. A p-value <0.05 was considered statistically significant.

Results: A high prevalence of smartphone addiction was observed among the adolescents (86.7%), with males showing higher addiction levels than females. Participants in the high smartphone addiction group had significantly higher PHQ-9 scores and a greater proportion of moderate to severe depression compared with the low-use group (p-value <0.001).

Conclusion: Smartphone addiction was common in this adolescent population and showed a strong association with depressive symptoms. These findings highlight the need for increased awareness, early identification, and targeted interventions to address problematic smartphone use among adolescents. Further longitudinal research is required to explore causal relationships and broader mental health implications.

Keywords: Addictive, Adolescent behaviour, Behaviour, Mental wellbeing, Mobile phone use

INTRODUCTION

The rapid growth of Information Technology (IT) has transformed modern life but has also raised concerns about its excessive use, with IT addiction emerging as a significant behavioural health issue. Among these, smartphone addiction is particularly prominent, especially among adolescents, defined by the World Health Organisation (WHO) as the period between 10 and 19 years of age [1], who are frequent and early adopters of digital technologies. With advanced computing capabilities, touchscreen interfaces, internet access, and multifunctional operating systems have become essential tools for communication, entertainment, education, and social engagement. Their portability and constant availability facilitates continuous access to digital content, making them central to the social and academic lives of young people [2].

As smartphone ownership and dependence increase globally, they have surpassed traditional computers as the primary means of internet access. Although smartphones support valuable functions, from social connection to information seeking, their pervasive use has raised concerns about physical, emotional, and psychological wellbeing [3]. Excessive or uncontrolled smartphone use has been associated with a range of adverse outcomes, including sleep disturbances, attention deficits, impaired social interactions, anxiety, loneliness, and depressive symptoms [4]. In developing countries such as India, where affordable smartphones and widespread connectivity have accelerated digital adoption, excessive smartphone use has become a particular concern among adolescents [5]. Smartphone addiction in this demographic may manifest through symptoms such as salience, tolerance, withdrawal, craving, loss of control, and mood modification, often occurring during academic tasks, social gatherings, leisure activities, and even while driving or sleeping [2]. Despite these risks, problematic smartphone use is often overlooked, and many adolescents remain unaware of the potential behavioural and mental health consequences.

Adolescents constitute one-fifth of the global population, with India alone accounting for approximately 243 million young people, highlighting the relevance of this issue in the Indian context [6]. This age group is especially vulnerable to emotional and behavioural disturbances, including depression, which may present as persistent sadness, hopelessness, irritability, anhedonia, impaired concentration, fatigue, appetite or sleep disturbances, and somatic complaints [7]. The rapid rise in smartphone ownership and use among Indian adolescents over the past decade for communication, entertainment, and academic engagement has heightened the concerns about the potential link between problematic smartphone use and depressive symptoms [8].

Although, international studies report a strong association between smartphone addiction and depression [2,9,10], evidence among Indian adolescents remains limited, despite growing behavioural addictions and mental health concerns. With rapidly increasing smartphone use in this population, the present study aimed to assess the prevalence of smartphone addiction among urban adolescents aged 15-18 years using the SAS and to evaluate the prevalence of depressive symptoms. The findings of this study add to existing evidence on the association between problematic smartphone use and depressive symptoms, while providing context-specific data from an Indian adolescent population, thereby strengthening the

overall evidence base. Furthermore, the study compared depressive symptoms between adolescents with and without smartphone addiction, thereby providing insights into the potential mental health consequences associated with excessive smartphone use in this vulnerable age group.

MATERIALS AND METHODS

This was a questionnaire-based cross-sectional study conducted between 1st March 2018, and 31st December 2018, in the Department of Paediatrics, CSI Holdsworth Memorial Hospital, Mysore, Karnataka, India. The study received approval from the Institutional Human Ethics Committee. Written informed consent was obtained from all eligible participants and their parents after being informed of the method and purpose of the study. Participant confidentiality and data anonymity were strictly maintained in accordance with the principles of the Declaration of Helsinki [11].

Inclusion criteria: Participants aged between 15 and 18 years who used a smartphone and were willing to provide signed informed consent were included.

Exclusion criteria: Participants with known psychiatric disorders were excluded from the study.

Sample size: The sample size was calculated as 1104.46, rounded off to 1105 participants, assuming a 20% prevalence of depression among adolescents, which is consistent with previously reported adolescent depression prevalence ranges in clinical and school-based populations [12].

Study Procedure

A predesigned questionnaire was used to collect socio-demographic information, including age (years), sex (male/female), duration of smartphone use (in years), and daily time spent using the smartphone (h/day). Smartphone addiction was assessed using the SAS, a validated self-report instrument developed by Kwon M et al., to measure problematic smartphone use among adolescents and adults [13]. The scale consists of 33 items rated on a six-point Likert scale ranging from 1 ("strongly disagree") to 6 ("strongly agree"), with higher scores indicating greater levels of smartphone addiction. The SAS evaluates six domains of addictive smartphone use: daily-life disturbance, positive anticipation, withdrawal, cyberspace-oriented relationship, overuse, and tolerance. The scale has demonstrated excellent internal consistency, with a Cronbach's alpha of 0.967 in its original validation study. Total scores range from 33 to 198, reflecting increasing severity of addiction. Participants were classified into two groups based on the median SAS score *viz.* smartphone addiction (>72) and no smartphone addiction (≤72), following previously used methodological cut-offs [14].

Depressive symptoms were assessed using the PHQ-9, a widely validated screening tool for identifying depressive symptoms in adolescents and adults [15,16]. The PHQ-9 comprises nine items reflecting DSM-IV depressive symptom criteria, each scored from 0 ("not at all") to 3 ("nearly every day"), yielding a total score ranging from 0 to 27. Established cut-offs of 5, 10, 15, and 20 denote mild, moderate, moderately severe, and severe depressive symptoms, respectively [15]. The prevalence reported in this study reflects screen-positive depressive symptoms rather than clinically diagnosed depression. In line with ethical practice, participants who screened positive for moderate or severe depressive symptoms were referred to a psychiatrist after discussion with their parents and the school principal.

Data collection: Data was collected using self-administered questionnaires. The principal investigator provided an overview of the study to the participants, comprising students from the 10th, 11th, and 12th grades, about the study objectives and procedures. Post obtaining written consent, the participants completed the questionnaires in the classroom under the supervision of the investigator, and queries, if any, were clarified by the investigator. Completed forms were collected immediately and prepared for analysis. Smartphone addiction, assessed using the SAS, was defined as the primary outcome variable, while depressive symptoms measured by the PHQ-9 constituted the secondary outcome variable. Age, gender, duration of smartphone use, and usage were treated as explanatory variables.

STATISTICAL ANALYSIS

Descriptive analyses were used to study the characteristics of the data collected. Categorical measures were reported as frequency and percentages while continuous variables were reported as mean±standard deviation. Non normally distributed continuous variables were summarised using medians and interquartile ranges. Associations between demographic variables (age and gender) and smartphone use categories were examined using cross-tabulation and Chi-square tests. The prevalence and severity of depressive symptoms were compared between high and low smartphone use groups using Chi-square test. Mean PHQ-9 scores between smartphone use groups were compared using the unpaired t-test. As PHQ-9 scores were not normally distributed across age categories, comparisons within age subgroups were performed using the non-parametric Kruskal-Wallis test. A two-sided p-value <0.05 was considered statistically significant. All statistical analyses were performed using IBM Statistical Package for the Social Sciences (SPSS) Statistics for Windows, Version 22.0 (IBM Corp., Armonk, NY, USA).

RESULTS

A total of 1,120 participants were included in this study and the demographic characteristics of the participants are summarised in [Table/Fig-1]. The mean age of the study population was 16.55±0.99 years (95% CI: 16.49-16.60), with females constituting a higher proportion of participants than males. The mean duration of smartphone use among participants was 2.34±0.99 years (95% CI: 2.28-2.40), average smartphone use time was approximately 12.3±6.37 hours per week [Table/Fig-1].

Parameters	Mean±SD or n (%)	95% CI
Age, years	16.55±0.99	16.49 - 16.60
Age-wise distribution (years)		
15	207 (18.5)	
16	305 (27.2)	
17	398 (35.5)	
18	210 (18.7)	
Sex		
Male	497 (44.4)	
Female	623 (55.6)	
Duration of smartphone use (years)	2.34±0.99	2.28-2.40
Time spent on smartphone		
Weekday (hours/day)	1.65±0.94	1.60-1.71
Weekend (hours/day)	2.52±1.71	2.42-2.62
Total time (hours/week)	12.3±6.37	11.92-12.67

[Table/Fig-1]: Demographic characteristics of study participants.
Abbreviations: CI: Confidence interval; SD: Standard deviation

The descriptive analysis of SAS scores and subscale domains among the study population has been given in [Table/Fig-2]. The mean SAS score was 99.41±24 (95% CI: 98.00–100.82). The majority of participants were classified as high smartphone users (86.7%), while only 13.3% belonged to the low-use category. Subdomains such as withdrawal, overuse, and tolerance demonstrated moderate levels, indicating that multiple behavioural components of smartphone addiction were prevalent in this adolescent cohort.

Parameters	Mean±SD or n (%)	95% CI
Mean SAS score	99.41±24	98.00-100.82
Distribution based on smartphone addition		
High smartphone users (SAS score >72)	971 (86.7)	
Low Smartphone users (SAS score ≤72)	149 (13.3)	
Mean SAS subscale scores		
Daily life disturbance	16.45±5.35	16.13-16.76
Positive anticipation	26.63±7.58	26.18-27.07
Withdrawal	14.29±5.64	13.96-14.62
Cyberspace oriented relationship	17.95±6.66	17.56-18.34
Overuse	12.95±4.26	12.70-13.02
Tolerance	11.16±3.89	10.93-11.38

[Table/Fig-2]: Descriptive analysis of SAS scores, SAS domains, and use categories in urban adolescents (N=1120).
Abbreviations: CI: Confidence interval; SAS: Smartphone addiction scale; SD: Standard deviation

[Table/Fig-3] summarises the distribution of depressive symptoms as measured by the PHQ-9. The mean PHQ-9 score in the study population was 5.55±4.29 (95% CI: 5.30-5.80). More than half of the adolescents reported no depressive symptoms (55.89%) suggesting that despite high smartphone use, a substantial proportion of adolescents did not exhibit relevant depressive symptoms.

Parameter	Mean±SD or n (%)	95% CI
Mean PHQ-9 score	5.55±4.29	5.30-5.80
PHQ-9 category		
No depression	626 (55.89)	
Mild	359 (32.05)	
Moderate	108 (9.64)	
Moderately severe	19 (1.70)	
Severe depression	8 (0.71)	

[Table/Fig-3]: Descriptive analysis of PHQ-9 scores and PHQ-9 domains in urban adolescents (N = 1120).
CI: Confidence interval; PHQ-9: Patient health questionnaire-9; SD: Standard deviation

As shown in [Table/Fig-4], the prevalence of high smartphone use (SAS>72) varied significantly across age groups in the overall sample (χ^2=24.082, p-value <0.001). The highest proportion of high-use participants was observed among 18-year-old (96.7%). A significant association was observed between smartphone addiction and sex, with higher prevalence among males. Age-stratified analyses showed that smartphone addiction increased with age in both sexes, with a more pronounced age-related rise among females. Depressive symptoms varied across age and smartphone usage groups. Among females, PHQ-9 scores increased with age and differed significantly across age groups (p-value=0.007), whereas scores among males remained relatively stable (p-value=0.896) [Table/Fig-5]. Adolescents with high smartphone use had significantly higher PHQ-9 scores than those with low smartphone use (p-value <0.001), indicating a clear association between higher smartphone use and increased depressive symptoms [Table/Fig-6].

Characteristics and category	High smartphone use (SAS >72), n (%)	Low smartphone use (SAS ≤72), n (%)	Chi-square	p-value
Age (overall population; N=1120)				
15 years (N=207)	176 (85)	31 (15)	24.082	<0.001
16 years (N=305)	251 (82.3)	54 (17.7)		
17 years (N=398)	341 (85.7)	57 (14.3)		
18 years (N=210)	203 (96.7)	7 (3.3)		
Sex (N=1120)				
Male (n=497)	442 (88.9)	55 (11.1)	3.877	0.049
Female (n=623)	529 (84.9)	94 (15.1)		
Age (female population; N=623)				
15 years (n=111)	87 (78.4)	24 (21.6)	25.17	<0.001
16 years (n=173)	136 (78.6)	37 (21.4)		
17 years (n=225)	194 (86.2)	31 (13.8)		
18 years (n=114)	112 (98.2)	2 (1.8)		
Age (male population; N=497)				
15 years (n=96)	89 (92.7)	7 (7.3)	7.938	0.047
16 years (n=132)	115 (87.1)	17 (12.9)		
17 years (n=173)	147 (85)	26 (15)		
18 years (n=96)	91 (94.8)	5 (5.2)		

[Table/Fig-4]: Comparison of smartphone addiction across participants characteristics.
n/N, number of participants; SAS: Smartphone addiction scale

Age category	PHQ-9 scores (Median, IQR Q1-Q3)	p-value*
Age (female population; N=623)		
15 years (n=111)	4 (1,8)	0.007
16 years (n=173)	4 (1,7)	
17 years (n=225)	5 (2, 8)	
18 years (n=114)	5 (3.75, 8)	
Age (male population; N=497)		
15 years (n=96)	5 (3,9)	0.896
16 years (n=132)	5 (2,9)	
17 years (n=173)	5 (2.50, 9)	
18 years (n=96)	5.50 (4, 8)	

[Table/Fig-5]: Comparison of depression as evaluated from PHQ-9 scores across participants' age groups.
n/N, number of participants; PHQ-9: Patient health questionnaire-9; IQR: Interquartile range

Smartphone addiction	PHQ-9 Total score Mean±SD	Mean difference	95% CI		p-value
			Lower	Upper	
High smartphone use group (SAS score >72)	6.01±4.14	3.45	2.74	4.16	<0.001
Low smartphone use group (SAS score <72)	2.56±4.01				

[Table/Fig-6]: Comparison of the mean PHQ-9 total score between Smartphone addiction groups (N=1120).
n/N, number of participants; PHQ-9: Patient health questionnaire-9; SAS: Smartphone addiction scale; CI: Confidence interval; SD: Standard deviation

Based on PHQ-9 severity categories, depressive symptoms were significantly more common among adolescents with high smartphone addiction compared with those in the low-use group (p-value <0.001). Nearly half of the high-use group reported some degree of depression (49.2%), whereas majority of low-use participants reported no depression (89.3%). Moderate to severe depressive symptoms were predominantly observed in the high-use group. When PHQ-9 scores were dichotomised (depression vs. no depression), a similar pattern emerged. Nearly half of the high smartphone use group met criteria for depression (49.22%) compared with only 10.73% in the low-use group (p-value <0.001) [Table/Fig-7].

PHQ-9 categories	High smartphone use (SAS >72), n (%)	Low smartphone use (SAS ≤72), n (%)	p-value*
No depression	493 (50.77)	133 (89.26)	<0.001
Mild	348 (35.83)	11 (7.38)	
Moderate	107 (11.01)	1 (0.67)	
Moderately severe	17 (1.75)	2 (1.34)	
Severe depression	6 (0.62)	2 (1.34)	
Any depression	478 (49.2)	16 (10.73)	<0.001
No depression	493 (50.77)	133 (89.3)	

[Table/Fig-7]: Association between smartphone addiction and depressive symptoms (N=1120).
*Estimated using Abbreviations: n/N, number of participants; PHQ-9: Patient health questionnaire-9; SAS: Smartphone addiction scale; CI: Confidence interval; SD: Standard deviation

DISCUSSION

The present study found a high prevalence of smartphone addiction (86.7%) among adolescents, with higher addiction levels observed in males compared to females. Adolescents in the high smartphone addiction group had significantly higher PHQ-9 scores and a greater proportion of moderate to severe depressive symptoms than those in the low-use group (p-value <0.05). Additionally, significant variations in SAS and PHQ-9 scores across age groups were observed, indicating age-related variations in smartphone use patterns and related depressive symptoms.

Depression is among the most commonly reported mental health conditions globally, affecting more than 300 million individuals, approximately 4.4% of the world's population [17]. The Mental Health Foundation (United Kingdom) defines depression as a disorder characterised by persistent low mood, diminished interest in activities, sleep and appetite disturbances, feelings of guilt or low self-worth, and concentration difficulties [18]. Several studies report that adolescents with depressive symptoms may be more likely to rely on their smartphones as a coping mechanism, while others suggest that overuse itself may exacerbate depressive tendencies through social isolation, sleep disturbance, or reduced physical activity [19,20].

In this context, the present study examined smartphone addiction and depressive symptoms among urban adolescents aged 15-18 years. The age distribution in this sample aligns with the adolescent developmental period defined as 10-19 years. Most participants were 17-year-old (35.5%), followed by those aged 16 (27.2%), 18 (18.7%) and 15 years (18.5%). These demographics are comparable to previous Indian studies, although some focused on slightly different age ranges. Soni R et al., assessed adolescents aged 14-18 years [21], whereas Srivastava A et al., included 17-18-year-old students in Uttar Pradesh in their study [22].

This study contributes to the limited but growing body of literature exploring the intersection between smartphone addiction and depression among adolescents in India [Table/Fig-8] [21,23-32]. The majority of participants were female (55.6%). Median PHQ-9 scores differed significantly across age groups among females (p-value=0.007), suggesting possible developmental or psychosocial influences on mental health in adolescent girls. Hwang KH et al., reported a higher prevalence among female students in Korea [33], while other studies suggest that females may be more vulnerable due to greater engagement in social communication and relational connectivity [23,34]. However, a previous study from India by Soni R et al., reported a higher proportion of males among adolescent smartphone users (57%) [21]. These variations highlight the cultural and behavioural diversity underlying smartphone use patterns, emphasising the need for population-specific research. The mean SAS score was 99.41±24 which was higher than the median score of 85.66 reported by Soni R et al., possibly reflecting the increasing affordability, accessibility, and integration of smartphones into adolescents' daily lives in recent years [21]. A notable 86.70% of participants in this study were classified as high smartphone users (SAS score >72), suggesting widespread problematic usage patterns.

S. No.	Author's name and year	Place of study	Sample size	Objective	Parameters assessed (Conclusion)
1	Sharma D et al., 2023 [25]	Chandigarh, India	400	To assess the prevalence of smartphone addiction and its relation with depression among school-going adolescents	Prevalence of smartphone addiction 23%, depression 45%; higher depression among addicted adolescents (77.2% vs 35.4%), significant association between addiction and depressive symptoms.
2	Jamir L et al., 2025 [26]	Northern India (Urban and Rural)	578	To compare psychosocial characteristics of smartphone use behaviours among urban and rural school students	Prevalence of problematic smartphone use 38.9%; demographic and contextual predictors varied between urban and rural groups; highlights different risk patterns by setting.
3	Kandipudi KLP et al., 2023 [27]	Visakhapatnam, India	380	To determine prevalence of smartphone addiction and its association with depression	Prevalence of smartphone addiction ~40.9% and depressive symptoms ~76%; moderate positive correlation between addiction and depression; students with addiction had ~5× odds of depressive symptoms.
4	Solankure K et al., 2025 [28]	Belagavi, India	140	To assess prevalence of smartphone addiction and how it affects school-age children's sleep in both urban and rural areas	Found 62.9% smartphone addiction and 89.3% students had poor quality sleep; significant correlation between smartphone addition and quality of sleep.
5	Kliesener T et al., 2022 [29]	Germany	1,200	To examine associations between problematic smartphone use and behavioural difficulties, quality of life, and school performance	Problematic smartphone use was associated with higher behavioural difficulties, lower quality of life, and poorer school performance among children and adolescents.
6	Yoon JY et al., 2021 [30]	South Korea	1,500	To study the effects of smartphone addiction on sleep duration and the moderating effects of gender and age	Smartphone addiction negatively impacted sleep duration, with stronger effects in older adolescents; gender and age moderated the association.
7	Lee H et al., 2017 [31]	South Korea	796	To identify risk factors for smartphone addiction in adolescents based on usage patterns	Frequent use, social applications, and longer duration of smartphone use were significant risk factors for addiction; highlighted patterns for early identification.
8	Gao Y et al., 2016 [32]	China	1,121	To examine correlation between smartphone usage, social anxiety, and loneliness	Higher smartphone use was associated with greater social anxiety and loneliness among adolescents; problematic use linked to poorer social functioning.
9	Yang SY et al, 2018 [23]	Taiwan	1,045	To investigate gender differences in smartphone use, vitality, and mental health	Excessive smartphone use negatively affected vitality and mental health; effects varied by gender, with females showing stronger associations with lower wellbeing.
10	Alhassan AA et al., 2018 [24]	Saudi Arabia	1,200	To examine the relationship between smartphone addiction and depression among adults	Smartphone addiction was positively associated with depressive symptoms; adults with higher smartphone dependence had higher odds of depression, indicating similar patterns across age groups.
11	Soni R et al., 2017 [21]	India	100	To assess the prevalence of smartphone addiction, sleep quality, and associated behavioural problems among adolescents	Smartphone addiction prevalence was high and significantly associated with poor sleep quality and behavioural problems, indicating adverse psychosocial effects of excessive smartphone use in adolescents.
12	Present study, 2026	India	1,120	To determine the prevalence of smartphone addiction among adolescents and examine its relationship with depressive symptoms	A high prevalence of smartphone addiction was observed among the adolescents (86.7%), with males showing higher addiction levels than females. Participants in the high smartphone addiction group had significantly higher PHQ-9 scores and a greater proportion of moderate to severe depression compared with the low-use group (p-value <0.05). Significant variations in SAS and PHQ-9 scores were also noted across age groups.

[Table/Fig-8]: Summary of relevant literature on smartphone addiction and depression [21,23-32].

Depressive symptoms were also assessed in relation to smartphone addiction. The mean PHQ-9 score was significantly higher among high smartphone users (6.01±4.14) compared to low users (2.56±4.01), indicating a strong significant association between excessive smartphone use and depressive symptoms (p-value <0.001). In this study, nearly half (49.22%) of adolescents with smartphone addiction had depression, compared to just 10.73% of those without addiction. This finding was consistent with findings of previous studies [Table/Fig-8], where a strong correlation between high SAS scores and increased depressive, anxiety, and stress symptoms using the DASS-21 scale was observed [21]. Similarly, findings of college-based research indicate that students with excessive smartphone use show markedly elevated levels of anxiety and depression compared with their non overusing peers [33]. Some studies report that individuals with social anxiety engage differently with smartphone functions compared to others [24,35].

The relationship between smartphone addiction and depression is likely bidirectional. One potential pathway involves stress-induced increases in smartphone use, which subsequently impairs self-control, contributes to cognitive overload, and disrupts daily functioning [36]. Conversely, excessive smartphone use may lead to unhealthy lifestyle behaviours, such as poor diet, weight gain, and sleep disturbances, which are known risk factors for depression [24]. Given these multidirectional links, it remains unclear whether smartphone addiction precedes depressive symptoms or vice versa. On the other hand, it has been reported that moderate smartphone use may provide psychological benefits, including enhanced communication and stress relief [37]. The stimulation-habituation hypothesis provides a theoretical explanation: smartphones offer highly stimulating, engaging content that fosters habitual, prolonged use, which may eventually lead to dependence and associated psychological difficulties [38].

There is the need to develop culturally tailored interventions aimed at promoting digital wellbeing, including awareness programmes at schools, digital literacy training, and early screening strategies for high-risk adolescents. Integrating mental health education into school curricula, and encouraging physical activities, creative hobbies, reading, and mindfulness-based practices like yoga may help reduce reliance on digital devices and mitigate their psychological impact on adolescents.

Limitation(s)

The cross-sectional design precludes causal inference and limit understanding of the temporal relationship between smartphone addiction and depressive symptoms. Reliance on self-reported measures may have introduced recall and social desirability bias, and the single-region school-based sample may limit generalisability. Additionally, the SAS cut-off is not universally standardised, potential confounders were not assessed, and depression was measured using a screening tool (PHQ-9); future longitudinal studies using diagnostic instruments are warranted.

CONCLUSION(S)

Smartphone addiction was highly prevalent among urban adolescents in this study and was associated with male gender, and depressive symptoms. Adolescents with smartphone addiction were significantly more likely to exhibit depressive symptoms than those without addiction. These findings underscore the need for greater awareness among parents, teachers, and policymakers regarding the emotional and behavioural risks of excessive smartphone use. Future research should explore the interplay between smartphone addiction and factors such as anxiety, stress, loneliness, self-esteem, and overall wellbeing to better understand its long-term mental health impact.

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