Section: Miscellaneous

Original Research Article

SMARTPHONE DEPENDENCY AMONG YOUNG ADULTS IN HOSUR, TAMIL NADU: A CROSS-SECTIONAL STUDY USING SAS-SV SCALE

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ABSTRACT

Background: Smartphone use is widespread among young adults, raising concerns about dependency and its impact on health and academic performance. This study assessed smartphone dependency and its associated factors among young adults in Hosur, Tamil Nadu, using the Smartphone Addiction Scale–Short Version (SAS-SV). **Materials and Methods:** A cross-sectional study was conducted among 453 undergraduate and postgraduate students aged 18–30 years using convenience sampling. Data were collected using a self-administered questionnaire that included socio-demographic details and the SAS-SV. Statistical analysis was performed using SPSS version 26, including descriptive statistics, Cronbach's alpha for reliability, and exploratory factor analysis for construct validation. **Results:** The prevalence of smartphone addiction was 29.4%, indicating a moderate level of dependency. The SAS-SV showed excellent internal consistency (Cronbach's alpha = 0.891). Factor analysis identified a three-factor structure: psychological dependence, compulsive use and social engagement, and functional impairment, explaining 57.4% of the variance. Significant associations were found between smartphone addiction and male gender, higher daily screen time, and poorer academic performance ($p < 0.05$). Additionally, excessive smartphone use was linked to adverse effects on mental health, sleep quality, and physical activity. **Conclusion:** Smartphone dependency is moderately prevalent among young adults and is associated with negative academic and health outcomes. The SAS-SV is a reliable tool for assessing smartphone addiction. Targeted interventions that promote digital well-being and behavioural change are recommended.

INTRODUCTION

Smartphones have changed the way we communicate, access information, and complete everyday tasks. However, they also come with potential risks that must be managed.[1] This is largely because teenagers often engage excessively in activities like searching for information and using social networks, which can harm their mental health.[2,3] For example, some studies have looked at how these devices affect cognitive and emotional processes. They found links to attention, memory, and academic success, while also noting an increase in issues like mental distress and sleep problems.[4,5] There is debate about whether "addiction" is the right term for excessive phone use. However, many agree it can have serious effects on health and well-being. Research shows that heavy smartphone use is connected to loss of control and withdrawal symptoms.[6] Some experts suggest that compulsive smartphone habits can resemble substance addictions.[7] These behaviors may disrupt daily activities and cause withdrawal symptoms when people cannot access their devices. This perspective supports research into smartphone addiction, identifying behavior patterns using the Diagnostic and Statistical Manual of Mental Disorders (DSM) criteria. It also helps in developing treatment strategies like cognitive behavioral therapy, which has proven effective in addressing smartphone abuse.[8]

According to Statista (2023a), 90% of people worldwide owned at least one smartphone in 2022. Younger people use these devices significantly more than older individuals.[9,10] A study of Chinese

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college students revealed that 29.14% reported issues with smartphone addiction. The breakdown showed 22.8% in Asia, 15.8% in America, 12.4% in Europe, and 9.6% in Africa. Another study examining over 14 countries found a rate of 28.1%. These findings highlight how widespread the issue is globally, but comparisons between countries should be made cautiously since measurement tools and definitions vary.

Several tools are available to measure smartphone addiction. For instance, the Smartphone Addiction Inventory (SPAI) helps adults assess their addiction levels.[11] The Problematic Use of Mobile Phones (PUMP) evaluates harmful phone usage in adults.[12] The Smartphone Addiction Scale (SAS) identifies smartphone addiction in terms like substance abuse.[7] This tool measures how often someone uses their device, how much it affects their daily life, and how they feel when they stop using it. The SAS-SV, the most widely used version with only 10 items, is based on the DSM-IV criteria for addiction disorder.[7] It has also shown sufficient psychometric evidence in various countries, including China13, Brazil,[14] Italy,[15] and the United States 16. While most studies have utilized SAS-SV to identify smartphone addiction, few have examined whether the individual items remain consistent. Some research indicates differences in addiction risk between men and women.[17] Most studies have focused on college student groups.[18-20] Therefore, more equivalence studies are needed to ensure the SAS-SV applies consistently across different cultures, ages, and genders.

According to the Peruvian National Institute of Statistics and Informatics (INEI), 94.1% of Peruvian households had at least one smartphone user in the last quarter of 2022.[21] In fact, Peruvian teens use smartphones differently based on their background due to cultural, economic, and technological factors. For example, teens in northern Peru have better access to the internet and smartphones, allowing them to use them more for entertainment like social networks and online games. In contrast, teens in rural areas mainly use their phones for basic communication, gathering information, and local entertainment. This is partly because they spend most of their time working on the farm and handling household chores.[22] In the Peruvian jungle, where geographical challenges limit internet access, people primarily use their phones for essential communication and useful apps related to health or environmental education.[23]

Some researchers have explored smartphone addiction among Peruvians.[24] However, these studies have uncertain findings about the effectiveness of measurement tools, as they lack proof of their psychometric properties, which could lead to unclear and inaccurate results.[25] Additionally, one study examined the psychometric properties of the Smartphone Dependence and Addiction Scale (EDAS) in adults from a rural city in Peru. However, it was based on a small sample with limited analyses, giving restricted representativeness and psychometric evidence.[26,27] There is a need for tools that provide psychometric validation and are easy to implement with diverse groups.

The goal of this study was to explore how dependent young adults are on smartphones by using the SAS-SV for college students. Specifically, it aimed to achieve the following goals: (a) Identify socio-demographic factors that predict higher dependency scores, (b) Confirm the scale's structure, (c) Test its measurement consistency by examining subgroups based on age, gender, and city, and (d) Investigate how SAS-SV scores relate to academic performance.

MATERIALS AND METHODS

Objectives

Primary Objective: To evaluate the level of smartphone dependency among young adults using SAS-SV.

Secondary Objectives

a. To identify socio-demographic predictors of higher dependency scores.
b. To determine the relationship between SAS-SV scores and academic performance.

Materials and Methods:

This study employed a cross-sectional design using convenience sampling among undergraduate and postgraduate students aged 18–30 years. The sample size was calculated using the formula for a single population proportion ($N = Z^2 \times p \times (1 - p) / d^2$), where Z = 1.96 at a 95% confidence level, p = 0.252 based on a previous Indian study,[28] and d = 0.05 as the margin of error. The initial calculated sample size was 302. Considering a 20% non-response rate due to the use of a self-administered Google Forms questionnaire, the sample size was adjusted to 378 and further rounded to 400 participants to ensure adequacy. Smartphone dependence was assessed using the SAS-SV questionnaire consisting of 10 items with a score range of 10–60. Data analysis was performed using SPSS version 26, applying descriptive statistics, Cronbach's alpha to assess internal consistency, and scree plot analysis for construct validation.

Participants

Subject matter experts and sample participants for SAS-SV validation were the two groups involved in this study. Participating Experts and Validation of Participants: Hernández et al.'s,[29] changes to the International Testing Committee checklist and criteria were used to modify the scale. Participants had to be between 18 and 30 years old, current college students living in or near Hosur, smartphone owners, daily users, and willing to give their informed consent. Exclusion criteria included having behavioral or co-morbid psychiatric neurological disorders, providing incomplete or inconsistent questionnaire responses, lacking smartphones or only using shared devices, and refusal or inability to give informed consent.

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The subject matter experts evaluated each item's linguistic and content validity for SAS-SV. A content validity index helped interpret responses, gathered on a 6-point scale. The specialists recommended suitable wording. Students were informed about the study, and those who consented were recruited. A total of 453 participants took part in the research.

A self-reported demographic questionnaire collected details on age, gender, education, marital status, family situation, socioeconomic status, employment status, mobile phone ownership, and daily screen time.

Smartphone Addiction Scale – Short Version (SAS-SV)[7]

SAS-SV is a 10-item self-report questionnaire that assesses problematic smartphone use (PSU). It uses a 6-point Likert scale, where "1" means "strongly disagree" and "6" means "strongly agree." Based on previously validated cut-off scores, participants with scores ≥31 for males and ≥33 for females were classified as having smartphone addiction. In the initial development and validation study, Kwon and colleagues,[7] included 453 participants. The scale showed strong internal consistency (Cronbach's alpha = 0.891) and a strong correlation with SAS. SAS-SV has a unidimensional factor structure.[7] After the expert validation was completed, the current study used SAS-SV with Cronbach's alpha of 0.891. An example item following expert revision states, "I keep thinking of my smartphone even when I am not using it."

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 26.0 (IBM Corp., Armonk, NY, USA). Socio-demographic characteristics and study variables were summarized using descriptive statistics such as mean ± SD, frequencies and percentages. The internal consistency of the Smartphone Addiction Scale–Short Version (SAS-SV) was assessed using Cronbach's alpha coefficient, where a value of ≥0.70 was considered acceptable. Item analysis was performed using corrected item–total correlations and "Cronbach's alpha if item deleted" to evaluate the contribution of individual items to overall scale reliability. Construct validity of the SAS-SV was examined using exploratory factor analysis (EFA). Associations between smartphone addiction and socio-demographic variables were assessed using the Chi-square (χ^2) test of independence. A p-value <0.05 was considered statistically significant for all analyses.

Ethical consideration

The study received approval from the Institutional Ethics Committee (SPMCH/IEC/AP/70/2026-27), and Kim Kwon, the author, permitted the use of SAS-SV for Indian validation. The expert validation and participant validation stages were linked through Google Forms. The ten selected experts received an informed consent form and information about the tool via email. After getting approval, a Google Form with options to adjust the wording for Indian language relevance and a relevance rating was sent to them.

Their Google Forms began with an informed consent form, followed by a section for sociodemographic information. The third section included the expert-reviewed questionnaire (SAS-SV). Students completed the survey, and the results were gathered.

RESULTS

Table 1: Socio-demographic characteristics of the participants (N = 453)

Characteristics	Frequency (n)	Percentage (%)
Age		
18 to 24 years	437	96.5
25 to 30 years	11	2.4
> 30 years	5	1.1
Gender		
Female	312	68.9
Male	139	30.7
Prefer not to say	2	0.4
Residence		
Rural	159	35.1
Urban	294	64.9
Marital status		
Married	10	2.2
Separated	5	1.1
Unmarried	438	96.7
Level of education		
12th class or below	31	6.8
Postgraduate	18	4.0
Undergraduate	404	89.2
Socio-economic status		
Lower Class	9	2.0
Lower Middle Class	43	9.5
Middle Class	274	60.5
Upper Class	25	5.5
Upper Middle Class	102	22.5

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Employment status		
Employed	12	2.6
Student	416	91.8
Unemployed	25	5.5
Years of Mobile phone ownership		
Less than 1 year	199	43.9%
1 - 3 years of Ownership	69	15.2%
3 - 5 years of Ownership	132	29.1%
More than 5 years of Ownership	53	11.7%
Mobile Usage by Time of Day		
Morning (6 AM – 12 PM)	16	3.5
Afternoon (12 PM – 4 PM)	13	2.9
Evening (4 PM – 8 PM)	124	27.4
Night (8 PM – 12 AM)	244	53.9
Late Night (12 AM – 5 AM)	52	11.5
Irregular / non-specific	4	0.9

Table 1 shows the socio-demographic characteristics of the participants. The study population was predominantly young where 96.5% of them were aged 18–24 years, female constitutes 68.9% of the participants, and majority residing in urban, 64.9%. Most participants were unmarried (96.7%), undergraduate students (89.2%), and belonged to the middle or upper-middle socio-economic class (60.5%, 22.5% respectively). A large majority of the participants were students (91.8%), with minimal representation of employed individuals. Regarding mobile phone ownership, 43.9% had used a phone for less than one year. Mobile phone usage was highest during the night (53.9%), followed by evening hours (27.4%), indicating a higher preference for usage during later parts of the day.

Table 2: Influence of Smartphone Use on Mental Health, Sleep, Lifestyle, Academic Performance, and Social Behavior (n = 453)

Domain	Variable	Categories	Frequency (n)	Percentage (%)
Mental Health	Feeling anxious/irritable/low	Yes	167	36.9
		No	286	63.1
	Sought help for mental health	Yes	135	29.8
		No	318	70.2
Sleep Pattern	Smartphone use before sleep	Always	191	42.2
		Often	131	28.9
		Rarely	120	26.5
		Never	11	2.4
	Feeling rested in morning	Yes	206	45.5
		Occasionally	110	24.3
		No	137	30.2
Dietary Pattern	Number of meals/ days	1 meal	50	11.0
		2 meals	95	21.0
		3 meals	292	64.5
		>3 meals	16	3.5
	Skipping meals due to phone use	Yes	30	6.6
		Sometimes	34	7.5
		No	389	85.9
Physical Activity	Exercise frequency	Daily	124	27.4
		Weekly	79	17.4
		Occasionally	109	24.1
		Rarely	140	30.9
		No	1	0.2
	Phone affects activity level	Yes	263	58.1
		No	190	41.9
Academic Impact	Phone use during study/class	Frequently	69	15.2
		Occasionally	140	30.9
		Rarely	158	34.9
		Never	86	19.0
	Academic focus	Excellent	20	4.4
		Good	196	43.3
		Fair	165	36.4
		Poor	72	15.9
Social Behavior	Preference for online interaction	Yes	115	25.4
		Sometimes	105	23.2
		No	233	51.4
	Time spent with friends	Daily	252	55.6
		Weekly	88	19.4
		Rarely	89	19.6
		Monthly	24	5.3

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Smartphone use showed multidimensional impacts among participants, with over one-third reporting negative mental health symptoms and nearly 60% perceiving reduced physical activity. High usage before sleep was common, potentially affecting rest, although about half felt adequately rested. Most maintained regular meals, but a small proportion reported skipping meals due to phone use. Academically, a considerable number used phones during study time, with most reporting only fair to good focus. Socially, while over half preferred face-to-face interaction, a notable proportion leaned toward or occasionally preferred online communication. [Table 2]

Table 3: Item analysis and internal consistency of the SAS-SV (n = 453)

Original Statement	Mean	SD	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q1. Missing important work due to smartphone use	2.77	1.60	0.555	0.885
Q2. Having a hard time concentrating in class, while doing assignments, or while working due to smartphone use	2.95	1.65	0.575	0.884
Q3. Feeling pain in the wrists or at the back of the neck while using a smartphone	2.70	1.68	0.550	0.886
Q4. Not able to stand without a smartphone	2.32	1.61	0.637	0.880
Q5. Feeling impatient and irritation when I am not holding my smartphone	2.26	1.52	0.648	0.879
Q6. Thinking about smartphone even when not using it	2.27	1.54	0.689	0.877
Q7. Never letting go of smartphone despite negative impact on daily life	2.59	1.63	0.731	0.873
Q8. Constantly checking smartphone to avoid missing social interactions	2.76	1.64	0.677	0.877
Q9. Using smartphone longer than intended	3.25	1.70	0.632	0.880
Q10. People around me say I use smartphone too much	2.75	1.66	0.616	0.881

The results of the item analysis of the SAS- SV are presented in Table 3. The SAS-SV demonstrated good internal consistency in this study. All items showed good, corrected item–total correlations (>0.5), indicating good homogeneity and consistency of items within the scale. The Cronbach's alpha if item deleted ranged from 0.873 to 0.886 all of which were lower than the overall alpha (0.891), indicating that each item contributes positively to the internal consistency of the scale and none require removal, suggesting that removal of any individual item does not significantly improve the reliability of the scale, and that all items contribute meaningfully to the construct of smartphone addiction. The overall Cronbach's alpha of 0.891 further confirms excellent reliability, indicating that the SAS-SV is a robust and reliable tool for assessing smartphone addiction in the study population. The overall mean score of the scale was 2.66 ± 1.15, reflecting a moderate level of smartphone addiction-related behaviors among participants.

The prevalence of smartphone addiction in the study population was 29.4% as illustrated in Figure 1.

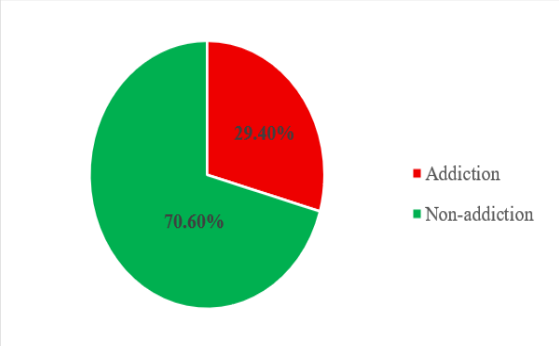

Figure 1: Prevalence of smart phone addiction (N = 453)

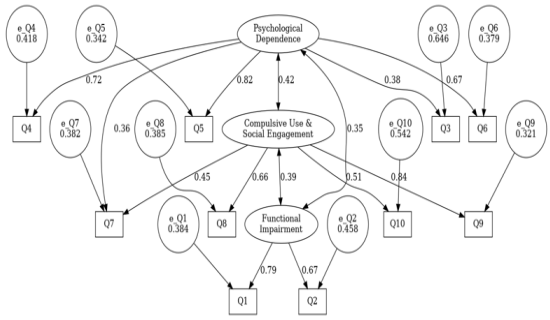

Figure 2: Structural equation model of the three-factor structure of the Smartphone Addiction Scale–Short Version (SAS-SV)

Latent variables (ellipses) represent Psychological Dependence, Compulsive Use & Social Engagement, and Functional Impairment, with observed items (rectangles) and standardized factor loadings shown. Error terms indicate item uniqueness, and bidirectional arrows represent correlations among factors.

Exploratory factor analysis (EFA) of the Smartphone Addiction Scale–Short Version (SAS-SV) was conducted using the minimum residual extraction method with oblimin rotation. The suitability of the data for factor analysis was confirmed by a significant Bartlett's test of sphericity ($\chi^2 = 2070$, df = 45, $p < 0.001$). Based on eigenvalues, scree plot inspection, and parallel analysis, a three-factor solution was retained, explaining 57.4% of the total variance. Factor 1 accounted for 23.4% of the variance and comprised items reflecting psychological dependence, including emotional reliance and difficulty remaining without a smartphone. Factor 2 explained 19.8% of the variance and included items related to compulsive

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use and social engagement, such as excessive use and frequent checking behaviors. Factor 3 contributed 14.2% of the variance and consisted of items indicating functional impairment, including reduced concentration and interference with daily activities. Most items demonstrated satisfactory factor loadings (> 0.30). One item (Q7) showed cross-loading on two factors, suggesting some conceptual overlap between psychological dependence and compulsive use. Overall, the findings support a multidimensional structure of the SAS-SV in the present study population.

As illustrated in Figure 2, the structural model depicts the relationships between latent constructs and observed variables, with standardized factor loadings indicating the strength of associations. The correlations among factors further support the interrelated yet distinct nature of the three dimensions.

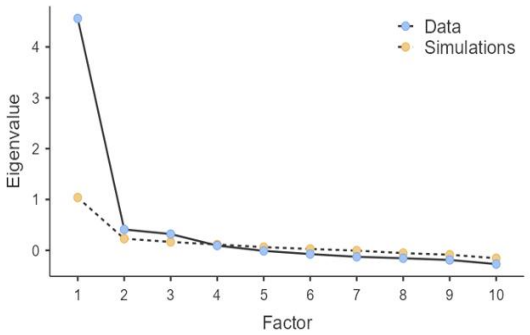

Figure 3: Scree plot with parallel analysis for factor extraction of the Smartphone Addiction Scale–Short Version (SAS-SV)

Figure 3 illustrates the scree plot with parallel analysis which demonstrated that the first three factors had eigenvalues exceeding those obtained from simulated data. This indicates that these factors should be retained. Beyond the third factor, the observed eigenvalues fell below the simulated values, suggesting that additional factors did not contribute meaningful variance. This supports a three-factor structure for the SAS-SV in the present study population.

Table 4: Association between socio-demographic factors and smartphone addiction (N = 453)

Characteristic	Category	Addicted, n (%)	Non-addicted, n (%)	χ^2 (df)	p-value
Gender	Female	78 (25.0)	234 (75.0)	10.7 (2)	**0.005**
	Male	55 (39.6)	84 (60.4)		
	Prefer not to say	0 (0.0)	2 (100.0)		
Age	18–24 years	125 (28.6)	312 (71.4)	3.76 (2)	0.153
	25–30 years	5 (45.5)	6 (54.5)		
	>30 years	3 (60.0)	2 (40.0)		
Education	≤12th class	7 (22.6)	24 (77.4)	4.42 (2)	0.110
	Undergraduate	117 (29.0)	287 (71.0)		
	Postgraduate	9 (50.0)	9 (50.0)		
Residence	Rural	42 (26.4)	117 (73.6)	1.02 (1)	0.311
	Urban	91 (31.0)	203 (69.0)		
Socioeconomic Status	Lower	5 (55.6)	4 (44.4)	6.47 (4)	0.166
	Lower middle	14 (32.6)	29 (67.4)		
	Middle	75 (27.4)	199 (72.6)		
	Upper middle	28 (27.5)	74 (72.5)		
	Upper	11 (44.0)	14 (56.0)		
Screen time	<2 hours/day	21 (23.1)	70 (76.9)	8.70 (3)	**0.034**
	2–4 hours/day	53 (25.7)	153 (74.3)		
	4–6 hours/day	36 (36.4)	63 (63.6)		
	>6 hours/day	23 (40.4)	34 (59.6)		
Academic performance	Good	49 (22.7)	167 (77.3)	8.87 (1)	**0.003**
	Poor	84 (35.4)	153 (64.6)		

Table 4 shows the socio-demographic characteristics associated with smart phone addiction. A statistically significant association was observed between gender and smartphone addiction (χ^2 = 10.7, df = 2, p = 0.005), with a higher prevalence among males (39.6%) compared to females (25.0%), indicating that male participants were more likely to exhibit smartphone addiction-related behaviors (Table 7). Similarly, screen time showed a significant association with smartphone addiction (χ^2 = 8.70, df = 3, p = 0.034), with an increasing pattern in addiction prevalence with an increase in daily usage. Participants using smartphones for more than 6 hours per day had the highest prevalence (40.4%) as compared to those using for lesser hours. Moreover, a significant association was observed between academic performance of the participants and smartphone addiction (χ^2 = 8.87, df = 1, p = 0.003). The prevalence of addiction was higher among students with poor academic performance (35.4%) compared to those with good academic performance (22.7%). These findings suggest that male gender, prolonged screen exposure, and poorer academic performance are significant factors associated with smartphone addiction, which highlights a potential

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negative impact of excessive smartphone use on academic outcomes.

DISCUSSION

The current study shows a prevalence of 29.4%. This finding provides important insights into teenage smartphone dependence and indicates a moderate yet concerning level of addiction-related behaviors among this group. This result aligns with earlier research on college students, which found prevalence rates between 20% and 40%, varying by population and assessment techniques.[7,30] The large number of participants in this study, many of whom are aged 18 to 24, may explain this trend. Young people often use their phones excessively due to their need for socializing, education, and leisure.

The study highlights the complex effects of smartphone use, particularly on exercise, sleep, and mental health. Other research shows a strong link between excessive smartphone use and mental health issues.[31] More than one-third of survey participants reported experiencing symptoms such as anxiety, irritability, or depression. Additional evidence suggests that using screens at night disrupts circadian rhythms and sleep quality.[32] Over 70% of respondents indicated they frequently or always use their phones before bed. Many reported having trouble sleeping or poor sleep quality, which could signal a chronic health issue. Almost half of them, however, reported feeling rested.

Regarding lifestyle, most respondents continued to eat meals as usual. However, some said they missed meals due to smartphone use, which may point to a change in their behavior. More significantly, 58.1% of respondents said using a smartphone reduced their physical activity. This finding supports research showing that sedentary screen time raises the risk of obesity and other health issues by replacing physical activity.[33] These behaviors are common among smartphone addicts, suggesting that addiction has a greater impact on their lives.

The data shows a direct link between poor grades and phone addiction. Individuals who depended more on their phones used them more often and found it harder to concentrate on their studies. This backs earlier research indicating that excessive smartphone use disrupts learning and critical thinking34. The connection between increased screen time and higher addiction rates supports the dose-response relationship found in prior studies.

The psychometric evaluation of the SAS-SV in this study shows good reliability in the current population (Cronbach's alpha = 0.891). Exploratory factor analysis identified three factors: functional impairment, compulsive use, and psychological dependence. These findings primarily support earlier scale validations.[7] The idea that smartphone addiction is a complex behavior rather than a simple issue is reinforced by this intricate structure.

The sociodemographic analysis shows that men are significantly more likely than women to become addicted to smartphones. While this finding contradicts some research, it supports others that demonstrate how men and women use devices differently and for various reasons.[17] Furthermore, there is a direct link between addiction, increased screen use, and poorer academic performance. This indicates the need to consider both functional and behavioral factors alongside demographic ones.

The research indicates that youth smartphone addiction is becoming a significant public health issue. The connection between excessive use, mental health problems, lifestyle changes, and academic performance stresses the importance of targeted interventions, such as awareness campaigns, digital well-being strategies, and behavioral modifications. Future studies should use longitudinal designs to understand causal relationships and evaluate the effectiveness of these interventions.

CONCLUSION

Authors' contributions:
Conception and design of the study: Akshay Gali & Joash Jayaraj
Acquisition and interpretation of data: Sabari Anandh J V & Laishram Sanjana
Drafting the article: Akshay Gali & Sabari Anandh J V
Revising it critically: Akshay Gali, Joash Jayaraj & Sabari Anandh J V
Final approval of the manuscript version to be submitted: Akshay Gali, Joash Jayaraj, Laishram Sanjana & Sabari Anandh J V
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