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Do Smartphones Affect Academic Performance? Evidence from a Gender-Based Quantitative Study in India

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A B S T R A C T

Background: The ubiquity of smartphones has transformed the learning landscape in higher education. While smartphones offer enhanced connectivity and learning opportunities, excessive and non-academic use has raised concerns about possible detrimental effects on students' academic performance. This study examines the relationship between smartphone usage and academic performance, with particular attention to gender-based differences among undergraduate students in the Indian context. Using a cross-sectional quantitative design, data were collected from 153 undergraduate students (87 male, 66 female) in Cuttack, Odisha. Participants completed the Smartphone Addiction Scale–Short Version (SAS-SV), and self-reported their most recent cumulative grade point average (CGPA). Statistical analysis conducted in R involved Spearman correlation and independent samples t-tests. Findings revealed a strong, negative correlation between smartphone addiction and academic performance, indicating that higher smartphone use is associated with lower academic achievement. No significant gender difference in smartphone usage was found. The results underscore the importance of understanding digital behavior in academic contexts and suggest targeted interventions that account for usage patterns rather than gender alone.

Keywords: smartphone addiction, academic performance, gender differences, undergraduate students, India, SAS-SV, quantitative research.

1. Introduction

The digital age has ushered in unprecedented connectivity, with smartphones becoming an indispensable tool among youth worldwide. In India, the proliferation of smartphones among university students has coincided with shifts in both learning modalities and lifestyle behaviors (Kumar & Singh, 2022). While these devices offer access to educational content, collaborative platforms, and productivity tools, they also serve as gateways to distractions including social media, gaming, and non-academic content. Consequently, questions have emerged regarding the net impact of smartphone usage on academic outcomes. Globally, the literature presents a complex picture: while some studies suggest that smartphones may enhance academic engagement (Kim et al., 2021), a growing body of evidence points toward a negative association between problematic smartphone use and academic performance (Samaha & Hawi, 2016). In the Indian context, where the digital divide is rapidly narrowing and mobile internet access is widespread, such relationships warrant systematic investigation. Despite increasing research attention, limited studies have examined the direct relationship between quantified smartphone usage and self-reported academic performance among Indian undergraduate populations. Even fewer studies have accounted for gender-based behavioral differences, which are known to influence digital engagement patterns and academic outcomes differently (Lopez-Fernandez et al., 2017). Furthermore, existing studies often rely on self-developed, non-standardized instruments or lack statistical rigor, thus reducing generalizability and comparability. This study addresses these gaps by employing a validated instrument—the Smartphone Addiction Scale–Short Version (SAS-SV)—and applying rigorous statistical analyses. By focusing on a gender-based examination within a specific regional context, this research contributes novel insights to both Indian and global psychological literature.

1.1. Objectives and Hypotheses

This study is guided by the following objectives:

i. To examine the relationship between smartphone usage and self-reported academic performance (CGPA).

ii. To explore gender differences in smartphone usage and academic outcomes.

Based on existing literature and empirical trends, the following hypotheses were formulated:

H1: There is a significant negative correlation between smartphone addiction scores and CGPA among undergraduate students.

H2: There is a significant difference in smartphone addiction scores between male and female students.

2. Literature Review

The advent of smartphones has transformed how students access, consume, and interact with information. As digital multitasking and mobile connectivity become normative behaviors among university students, researchers have increasingly explored the cognitive and behavioral implications of these trends (Lepp et al., 2014). A critical domain of inquiry within this literature concerns the impact of smartphone usage on academic performance. A growing body of empirical research indicates that high levels of smartphone use—particularly for non-academic purposes—are negatively correlated with academic outcomes. Studies conducted in various cultural contexts have documented associations between excessive smartphone usage and lower grade point averages (GPA), reduced concentration, and poor time management skills (Samaha & Hawi, 2016; Junco, 2015). These effects are often attributed to cognitive overload and attention fragmentation, whereby frequent device-checking behavior impairs deep learning and retention (Rosen et al., 2013).

In the Indian context, Sharma and Pal (2020) reported that students who engaged in high-frequency smartphone usage for entertainment and social networking showed significantly lower academic scores compared to their peers who used smartphones for academic tasks. However, their study lacked a standardized instrument to quantify smartphone addiction, and it did not examine the influence of gender—highlighting a critical gap in regional literature. Smartphone addiction has been conceptualized as a behavioral dependency characterized by compulsive usage, withdrawal symptoms, and functional impairment (Kwon et al., 2013). To empirically capture this construct, Kwon et al. developed the Smartphone Addiction Scale–Short Version (SAS-SV), a widely used and psychometrically validated instrument. For example, in a study by Chen et al. (2017), higher SAS-SV scores were associated with lower academic self-efficacy and reduced academic performance. However, such validated tools are underutilized in Indian studies, where locally adapted or informal tools remain prevalent.

Gender-based behavioral patterns often moderate the psychological and academic impact of technology usage. Several studies report that female students tend to use smartphones more for social interaction, while male students are more likely to engage with gaming and media consumption apps (Lopez-Fernandez et al., 2017; Montag et al., 2015). These behavioral distinctions may yield differential cognitive loads and consequences for academic performance. Nevertheless, findings on gender differences in smartphone addiction are mixed. While some studies report higher addiction scores among females (Van Deursen et al., 2015), others indicate either no significant differences or higher usage among males depending on context and demographic variables (Sahin et al., 2013). Few studies, however, integrate gender as a moderator in the relationship between smartphone use and academic performance—a gap this study directly addresses.

3. Methods

3.1. Design and Participants

This study employed a cross-sectional, quantitative design to examine the relationship between smartphone addiction and academic performance, and to explore gender-based differences among undergraduate students. This design was chosen for its suitability in identifying associations and group differences in a defined population at a single point in time. The target population comprised undergraduate students from various colleges in Cuttack district, Odisha, India. Using purposive sampling, data were collected in early 2025 using a structured Google Form designed to include the SAS-SV items, CGPA entry field, and demographic questions (gender, age, academic year, and urban/rural background). These forms-based questionnaire was distributed through academic WhatsApp groups specifically targeting students across a mix of urban and rural colleges. A total of 171 responses were initially received. After removing 18 incomplete or invalid entries, the final sample included 153 participants, with 87 male and 66 female students. Participants were aged approximately between 17 and 20 years and represented diverse academic disciplines. A post hoc power analysis was conducted using G*Power tool assuming an alpha level (α) of .05, two-tailed tests, and a medium effect size ($r = .30$; $d = .50$). The achieved statistical power for primary analyses was $1 - \beta = .86$, indicating adequate sensitivity to detect medium-sized effects. This power level supports the reliability of correlation and t-test outcomes used in the study.

3.2. Measures

Smartphone addiction was measured using the Smartphone Addiction Scale – Short Version (SAS-SV) developed by Kwon et al. (2013). The scale comprises 10 items rated on a 6-point Likert scale (1 = strongly disagree to 6 = strongly agree). The English version was used with no item-wise analysis; only total scores were considered. The SAS-SV has been applied in diverse populations and shows strong internal consistency (Cronbach's $\alpha > .80$), construct validity, and cross-cultural adaptability (Ching et al., 2015). Participants self-reported their CGPA (Cumulative Grade Point Average) from their most recent semester, recorded on a 10-point scale, accurate to one decimal place.

3.3. Ethical Considerations

Ethical clearance was obtained from the host institution. All participants gave informed consent through an integrated declaration embedded within the Google Form. The form clearly stated and included a detailed participant consent declaration, informing respondents about the voluntary nature of participation, data confidentiality, and use of data for academic research purposes only. No identifiable personal data were collected.

3.4. Statistical Analysis

Data were analyzed using R software. Descriptive statistics were computed for CGPA and SAS-SV scores. A Spearman correlation assessed the relationship between smartphone addiction and CGPA while an independent samples t-test compared addiction scores across gender.

4. Results

A Spearman rank-order correlation revealed a strong, negative correlation between SAS-SV scores and CGPA, $\rho = –0.754$, $p < .001$, 95% CI [–0.815, –0.676], indicating that higher levels of smartphone addiction were significantly associated with lower academic performance (Refer Table 2). An independent samples t-test showed no significant difference in SAS-SV scores between male (M = 34.98, SD = 5.85) and female students (M = 34.32, SD = 5.75); $t(151) = 0.695$, $p = .488$, Cohen's $d = 0.11$, suggesting a very small effect size (Refer Table 3).

Table 1 - Means and Standard Deviations of SAS_SV Scores of Participants

Group	n	CGPA Mean (SD)	SAS_SV Mean (SD)
Male	87	7.18 (1.29)	34.98 (5.85)
Female	66	7.43 (1.44)	34.32 (5.75)
Total	**153**	**7.29 (1.36)**	**34.69 (5.80)**

Table 2 - Spearman Rank-Order Correlation Between SAS-SV Scores and CGPA

Variable Pair	ρ	95% CI	p-value
SAS-SV Score-CGPA	-.754	[–.815, –.676]	< .001

Table 3 - Independent Samples t-Test Comparing SAS-SV Scores by Gender

Gender Comparison	n	Mean	SD	t	df	p-value	95% CI of Mean Difference	Cohen's d
Male	87	34.98	5.85	0.695	151	.488	[–1.17, 2.43]	0.11
Female	66	34.32	5.75					

5. Discussion

This study examined the relationship between smartphone addiction and academic performance among undergraduate students in Cuttack, Odisha, with an added focus on gender-based differences. The results provide compelling evidence of a strong, negative correlation between smartphone addiction scores (as measured by the SAS-SV) and academic performance (CGPA), supporting the first hypothesis. Students reporting higher levels of smartphone addiction demonstrated significantly lower academic performance, consistent with existing global literature (Samaha & Hawi, 2016; Lepp et al., 2014). From a cognitive-behavioral perspective, this finding can be understood through the lens of limited capacity theory, which posits that attention is a finite resource (Lang, 2000). Excessive smartphone engagement, particularly for non-academic purposes, may deplete attentional capacity and cognitive bandwidth necessary for academic tasks, leading to suboptimal performance. The second hypothesis, which proposed a gender difference in smartphone addiction scores, was not supported. Although males showed slightly higher mean addiction scores than females, the difference was statistically non-significant and reflected a negligible effect size. This aligns with findings from Sahin et al. (2013) and contrasts with studies reporting higher smartphone dependence in females (Van Deursen et al., 2015). The lack of significant gender difference in the present study suggests that usage patterns—rather than gender identity alone—may be a more meaningful variable to explore in future research.

5.1. Implications

The study contributes novel evidence to the Indian academic landscape, particularly in regional undergraduate settings. The strong inverse relationship between smartphone addiction and CGPA reinforces the need for institutional interventions targeting digital hygiene and time management. From a theoretical standpoint, the findings support behavioral addiction models which conceptualize problematic smartphone use as a compulsive behavior associated with functional impairment (Kuss & Griffiths, 2015). In an academic setting, this impairment manifests in diminished concentration, procrastination, and disrupted study routines, potentially explaining the academic decrement observed in high-use students. For educators and policymakers, these results underscore the importance of digital literacy and structured smartphone usage awareness programs. Educational campaigns could integrate self-regulatory training, including goal setting, usage tracking, and non-digital time reinforcement strategies, tailored to academic contexts.

5.2. Limitations and Directions for Future Research

Several limitations must be acknowledged. First, the study relied on self-reported data, which may be susceptible to social desirability bias or inaccuracies in CGPA recall. Second, the cross-sectional design precludes causal inference. Although a strong association was identified, the directionality between smartphone use and academic performance cannot be definitively established. Third, the sample was limited to one district in Odisha, which may limit generalizability to other regions or educational systems. Lastly, the study did not examine the content or purpose of smartphone usage (e.g., academic vs. recreational), which is an important moderator in understanding its academic consequences.

Future studies should consider employing longitudinal or experimental designs to better capture causal relationships between smartphone usage patterns and academic outcomes. Incorporating objective usage metrics (e.g., screen-time logs or app usage trackers) could enhance accuracy and minimize self-report bias. Research could also stratify usage by purpose (academic, social, entertainment) to better understand functional vs. dysfunctional smartphone behavior. Gender remains an important variable, not as a binary category but in terms of underlying behavioral tendencies and media habits. Mixed-methods studies combining quantitative measures with qualitative interviews may help contextualize smartphone use within students' daily academic routines. Finally, future investigations should explore intervention efficacy—particularly in Indian educational settings—by testing whether structured smartphone use reduction programs or digital mindfulness interventions lead to measurable academic improvement.

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