# Impact of Compulsive Smartphone Usage on Academic Functioning of Adolescents

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## ABSTRACT

The objective of the present study was to examine the relationship between Compulsive Smartphone Usage (CSU) and Academic Functioning among adolescents, framed within Self Determination Theory. A total of 247 class 12th students were selected via stratified random sampling from CBSE-affiliated schools in Bhopal, Madhya Pradesh. Participants responded to a structured survey comprising demographic information, the Compulsive Smartphone Use Scale (CSUS), and a researcher-designed Academic Functioning Scale (AFS). ANOVA results revealed a significant main effect of academic stream on CSU, with Arts-Commerce students reporting higher compulsive smartphone use than Science students, primarily on technological and psychological dimensions. Gender showed no significant main effect on total CSU. However, it significantly impacted objective performance with female students consistently achieving higher CGPA and have reported greater mental health distress. Stepwise regression analysis identified "Time and Overuse" as the primary predictor of academic functioning. Finally, the Psychological/Social component negatively affected the objective performance of students in terms of 11th-grade students in terms of decline in CGPA scores. The study identifies a critical "Perception-Performance Gap," where Arts-Commerce students credit smartphones for academic management. Implications are discussed regarding the necessity for digital wellbeing interventions that address the digital surrogate role of smartphones for autonomy, competence, and relatedness in high-pressure academic environments.

**Keywords:** Compulsive Smartphone Usage (CSU), Academic Functioning, Self-Determination Theory, Perception-Performance Gap, Digital Wellbeing.

## INTRODUCTION

The digital landscape of the 21st century has undergone a seismic shift, transitioning from desktop computing to the era of omnipresent mobile connectivity (Mandolessi, 2024). For the contemporary adolescent, the smartphone is no longer a luxury but a fundamental "survival tool" for both education and social integration. This transition was accelerated by the global COVID-19 pandemic, which necessitated a sudden shift to online learning, effectively transforming the smartphone into the primary portal for academic engagement (Nawaz et al., 2024). While this technological integration allowed students to bridge the gap during physical school closures, it simultaneously blurred the boundaries between productive utility and compulsive dependency (Yadav, 2024). Compulsive Smartphone Usage (CSU) emerges when the device serves as a "short-term remedy" for fundamental psychological needs such as autonomy, competence, and relatedness as described by Self-Determination Theory. In the high-stakes environment of Class XII, where students navigate rigorous CBSE curricula and entrance exam preparations, the constant pull of digital features like gaming or social validation often clashes with the sustained attention required for academic mastery.

This study explores the "Perception-Performance Gap," where students may credit their devices for aiding academic management despite objective indicators of psychological distress or shifting CGPA trends.

Understanding this paradox is critical for developing interventions that support mental health of students without compromising the educational benefits of mobile technology.

The conceptualization of problematic smartphone use has evolved from general addiction models to specialized scales reflecting cultural and technological nuances. The Compulsive Smartphone Use Scale (CSUS), synthesized from the works of Kwon et al. (2013) and Yildirim and Correia (2015), identifies four distinct components: Time and Overuse, Psychological/Social, Preoccupation, and Technological. Research indicates that for students in developing nations, the smartphone is often the sole tool for accessing a global world of educational resources. However, this utility can lead to a forced dependency, facilitating a transition into CSU that persists even after traditional academic environments are restored.

The psychological toll of high smartphone engagement is often gender-specific. Recent studies highlight that female students frequently report significantly higher levels of social dysfunction, anxiety, and insomnia compared to their male peers. Interestingly, a "Perception-Performance Gap" is observed: despite higher mental health distress, females often demonstrate remarkable academic resilience, maintaining higher objective CGPA scores than males. This aligns with findings by Birrell et al. (2025), who emphasize that while social connectivity is vital for youth well-being, the compulsive nature of such connections can undermine internal stability and cause psychological burnout.

The shift from 9th to 11th grade for the current cohort represented a critical juncture marked by nationwide lockdowns. During this period, smartphone technology became a "critical application" for education. Iyengar et al. (2020) highlighted how digital platforms allowed for the continuation of learning, yet Jain and Dutta (2018) warned that the "gamification" of learning might lead students to prioritize immediate digital rewards over long-term academic goals. The transition saw a performance shift across academic streams; while Arts-Commerce students initially showed higher performance in the 9th grade, Science students often more integrated into structured digital coaching adapted more effectively to the high-stakes 11th-grade online environment.

A primary paradox in recent literature is the positive correlation between Time and Overuse and perceived academic competence. Hashemi et al. (2024) found that students often perceive smartphones as performance enhancers due to immediate information access. However, regression analyses suggest that while students credit the phone for "Academic Management," the Technological component (features and apps) actually serves as a predictor for concentration difficulty and academic reduction. As Jeno et al. (2018) noted, technology only supports a student's autonomy when it remains a tool; once it begins to dictate the student's schedule, it undermines true academic functioning.

### Relevance of the study

The rapid technological advancements and high-pressure academic schedules have transformed the smartphone into an essential "survival tool" for the modern student. This dependency was significantly intensified by the COVID-19 pandemic, which necessitated a sudden shift to online learning and blurred the lines between productive utility and compulsive dependency. While the smartphone serves as a primary portal for education, its omnipresence often leads to a "Perception-Performance Gap," where students credit the device for academic management even as it contributes to social dysfunction, anxiety, and insomnia. This study is particularly relevant as it explores how this forced digital dependency thwarts fundamental psychological needs for autonomy, competence, and relatedness—especially among Class XII students navigating the rigorous Indian CBSE system. By examining the interaction between gender, academic stream, and usage patterns, this research provides critical insights into the mental health costs of high-stakes academic resilience in a post-pandemic digital landscape.

### Objectives of the study

- To examine the effects of compulsive Smartphone usage on the academic functioning of male and female students of class XII.

- To examine if the relationship between compulsive smartphone usage and academic functioning differs between male and female students across various academic streams.

# METHODOLOGY

## Participants

The sample was drawn from Class XII students enrolled in schools affiliated with the Central Board of Secondary Education (CBSE) in Bhopal, Madhya Pradesh. From an initial pool of 400 randomly selected students, 247 participants who fulfilled the predetermined inclusion criteria were selected using a stratified random sampling technique.

## Research design

In the present study, the research design was Empirical in nature. Descriptive statistics were utilized to determine the prevailing levels of Compulsive Smartphone Usage (CSU) and the state of academic functioning among the sampled Class XII students in Bhopal. This approach allowed for the calculation of frequencies, percentages, means, and standard deviations to provide a clear profile of participant demographics, such as academic stream and gender distribution, as well as their typical smartphone habits, including ownership duration and daily usage frequency. By organizing the raw data into these summary measures, the researcher was able to describe the fundamental characteristics of the sample before proceeding to inferential testing. Inferential statistics was used to test the hypothesis. A 2x2 factorial design was used to categotize students by Gender (Male and Female) and academic stream of course (Science and Arts-Commerce).

## Instruments

The Compulsive Smartphone Use (CSU) and Academic Functioning Scale (AFS) was used to collect the data. The Compulsive Smartphone Use Scale (CSUS) was developed, adapting elements from the SAS (Kwon et al., 2013) and NMP-Q (Yildirim & Correia, 2015) for the Indian context. Its a 5-point Likert scale ("Never" to "Very often") covering four domains that are Time/Overuse, Psychological/Social, Preoccupation, and Technological. The Scores range from 20 to 100 with higher values indicating greater compulsion.

The Academic Functioning Scale (AFS) is a researcher-developed, 12-item instrument designed to assess student performance through two primary components. The first is a 6-item Smartphone Impact Subscale, which uses a five-point Likert scale with 6–30 range of scores to measure how students perceive smartphone use affecting their studies where higher scores indicate a positive impact, while lower scores reflect perceived distraction. The second component evaluates Objective Performance and Perceived Satisfaction, combining self-reported CGPA/percentages from Class IX and XI with Likert-scale items regarding academic satisfaction and peer comparison. Additionally, four open-ended questions capture qualitative reasons for student satisfaction levels. Collectively, higher total AFS scores signify robust academic functioning.

Reliability: Reliability and validity tests were applied to the CSU consisting of 20 items. The value of Cronbach alpha was 0.86 for all the four dimensions.

## Data analysis

SPSS (version 28) was used for data analysis. In explorative analysis measures of central tendency such as means, mode, standard deviation was carried out to study the nature and distribution of scores on various variables. To establish the relationship between compulsive smartphone usage, academic functioning correlation analysis was applied. A Two-Way ANOVA was applied to examine the significance of differences and interaction effects between the two independent variables: Gender (Male and Female) and Academic Stream (Science and Arts-Commerce). This statistical test was used to determine how these factors, both individually and in combination, influenced the total scores of Compulsive Smartphone Usage (CSU) and the various domains of Academic Functioning. Specifically, the ANOVA helped identify that while gender alone often did not significantly impact total compulsive usage, the academic stream played a highly significant role, and the interaction between gender

and stream significantly influenced outcomes like 11th-grade CGPA and overall academic functioning. A stepwise regression analysis was conducted to identify which components of compulsive smartphone usage (CSU) most significantly predict academic functioning.

## RESULTS

The demographic profile of the participants reveals a varied distribution across academic streams, students from the Arts-Commerce category formed the majority of the sample at 58.3%, while Science stream students accounted for 41.7%. Within the gender distribution, females (62.1%) were more prevalent in the Arts-Commerce stream compared to males (54.5%). In the category of smartphone ownership, an overwhelming majority of 96% of the total respondents owned a device, with nearly identical rates between males (95.9%) and females (96.8%). When examining ownership duration, the largest group (43.9%) had owned their phones for less than 2 years, followed closely by 42.3% in the 2–5 years category, while only 13.3% had owned devices for more than 5 years. In terms of daily usage frequency, the 20–40 times category was highest at 40.9%, followed by those using their phones less than 20 times (37.2%). Students using their devices more than 40 times daily represented 21.9% of the total, with females (26.6%) reporting higher frequent use than males (17.1%). Analyzing monthly recharge expenses, most students (57.9%) spent less than ₹500, followed by 35.6% spending between ₹500–₹2000, and a small minority of 6.5% spending more than ₹2000. In the smartphone cost category, devices priced between ₹10,000–₹20,000 were most common (45%), followed by those costing more than ₹20,000 (43.3%), while only 11.7% of students used devices costing less than ₹10,000. Finally, in the coaching status category, a significant majority of 83.8% of the total students were attending coaching classes, while 16.2% were not.

**Table 1: Intercorrelations between compulsive smartphone usage and academic functioning**

| **Components of compulsive smartphone usage** | **Components of Academic Functioning** | | | | | |
|---|---|---|---|---|---|---|
| | **Efficient Studying** | **Concentration Difficulty** | **Ease of Completion** | **Decline in marks** | **Academic Management** | **Homework Delays** |
| **Time & Overuse** | -.09 | .38** | -.03 | .36** | -.01 | .35** |
| **Psychological/Social** | -.16** | .31** | -.19** | .33** | -.19** | .28** |
| **Preoccupation** | -.16* | .26** | -.15* | .29** | -.22** | .32** |
| **Technological** | -.19** | .07 | -.18** | -.19** | .25** | -.17** |
| **CSU Total Score** | -.17** | .36** | -.15* | .38** | - .17** | .37** |

Note: * ($p < .05$), ** ($p < .01$)

The data of correlational analysis as depicted in Table 1 reveals a significant positive correlation between the overall CSU score and the Academic Functioning Scale (AFS). This suggests that as compulsive usage intensifies, students report higher levels of perceived academic impairment. Notably, the Time and Overuse dimension showed the strongest positive link to AFS scores, identifying it as the primary behavioral aspect tied to students' perceived academic struggles. While the overall CSU score showed a weak, non-significant negative trend with Class 9 and Class 11 grades as can be seen in Table 2, a specific significant negative correlation was found between the Psychological/Social component and Class 11 CGPA. This indicates that students utilizing smartphones as a coping mechanism for social validation or emotional escape tend to achieve lower objective academic results. Other CSU components did not show a statistically confirmed linear relationship with objective

grades. Compulsive usage was largely unrelated to personal satisfaction or peer comparison, with one exception: the Technological component was significantly and negatively correlated with Class 11 peer comparison. This suggests that students focused on the utility and features of their devices are less likely to engage in social academic comparisons.

**Table 2: Intercorrelations between compulsive smartphone usage and academic functioning**

| Components of compulsive smartphone use | Components of Academic Functioning | | | | | | |
|---|---|---|---|---|---|---|---|
| | Class 9th CGPA | Personal Satisfaction (9th) | Peer Comparison (9th) | Class 11th CGPA | Personal Satisfaction (11th) | Peer Comparison (11th) | Academic functioning Scale (AFS) |
| Time & Overuse | -.12 | .08 | -.01 | -.07 | -.00 | -.01 | .27** |
| Psychological/ Social | -.11 | .05 | .04 | -.13* | .04 | .01 | .12 |
| Preoccupation | -.04 | -.01 | .01 | -.06 | .00 | .01 | .11 |
| Technological | -.04 | -.05 | -.09 | -.12 | .01 | -.18** | -.03 |
| CSU Total Score | -.10 | .04 | .01 | -.11 | .02 | -.01 | .19** |

Note: * ($p < .05$), ** ($p < .01$)

**Table 3: ANOVA result depicting Mean differences on Academic functioning as a function of academic stream and gender**

| Components of Academic functioning (Smartphone Impact Scale) | Academic stream | | | | F (1,239) | Gender | | | | F (1,246) | Interaction | F (3,239) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Science | | Arts-Commerce | | | Male | | Female | | | | |
| | M | SD | M | SD | | M | SD | M | SD | | | |
| Efficient Studying | 2.63 | 1.19 | 2.65 | 1.13 | 1.92 | 2.80 | 1.22 | 2.78 | 1.05 | 0.24 | 1.05 | 0.13 |
| Concentration Difficulty | 3.29 | 1.14 | 3.40 | 1.29 | 0.45 | 3.14 | 1.15 | 3.33 | 1.15 | 0.52 | 1.18 | 0.88 |
| Ease of Completion | 2.38 | 1.07 | 2.43 | 1.16 | 0.87 | 2.72 | 1.24 | 3.02 | 1.24 | 0.85 | 1.63 | 1.49 |
| Decline in marks | 2.86 | 1.15 | 2.77 | 1.22 | 1.99 | 2.93 | 1.18 | 3.08 | 1.21 | 2.53 | 1.71 | 1.23 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Academic Management** | 2.98 | 1.19 | 3.05 | 1.06 | 4.74** | 2.48 | 1.08 | 2.88 | 1.04 | 0 .25 | 0 .99 | 0 .82 |
| **Homework Delays** | 2.84 | (1.37) | 2.81 | (1.37) | 1.03 | 2.55 | (1.26) | 2.81 | (1.35) | 0.01 | 2.52 | 1.49 |

Note: * (p < .05), ** (p < .01)

The Analysis of Variance (ANOVA) as can be seen in Table 3 revealed a significant main effect of Academic Stream on compulsive smartphone usage (CSU), while Gender showed no statistically significant impact on total scores or individual components. Students in the Arts-Commerce stream reported significantly higher overall CSU scores compared to their peers in Science. This disparity was primarily driven by the Technological and Psychological/Social dimensions, with the technological component exhibiting the most pronounced effect. These findings suggest that academic discipline, rather than gender, is a key differentiator in how students engage with and experience smartphone compulsion.

**Table 4: ANOVA result depicting Mean differences on Academic functioning as a function of academic stream and gender**

| Components of Academic functioning (Objective Performance and Perceived Satisfaction with marks obtained) | Academic stream | | | | $F$ $(3,239)$ | Gender | | | | $F$ $(1,246)$ | Interaction | $F$ $(3,239)$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Science | | Arts-Commerce | | | Male | | Female | | | | |
| | **M** | **SD** | **M** | **SD** | | **M** | **SD** | **M** | **SD** | | | |
| **Class 9th CGPA** | 74.29 | 13.69 | 76.54 | 10.99 | 7.05** | 77.10 | 12.32 | 80.06 | 10.75 | 3.69* | 184.68 | 1.48 |
| **Personal Satisfaction (9th)** | 2.96 | 1.14 | 3.06 | 1.10 | 0.11 | 2.98 | 1.10 | 3.02 | 1.16 | 0.03 | 0.95 | 0.74 |
| **Peer Comparison (9th)** | 2.76 | 1.36 | 2.70 | 1.04 | 0.05 | 2.69 | 1.06 | 2.73 | 1.13 | 1.80 | 3.28 | 2.75* |
| **Class 11th CGPA** | 75.48 | 13.04 | 73.12 | 13.38 | 3.12* | 73.12 | 13.38 | 78.13 | 11.84 | 4.44* | 690.95 | 4.21** |
| **Personal Satisfaction (11th)** | 2.80 | 1.15 | 3.08 | 1.10 | 0.80 | 2.89 | 1.13 | 3.10 | 1.17 | 5.37* | 2.25 | 1.71 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Peer Comparison (11th)** | 2.64 | 1.11 | 2.69 | 1.08 | 0.74 | 2.72 | 1.07 | 2.78 | 1.14 | 1.77 | 3.13 | 2.61* |
| **Academic Functioning Scale (AFS)** | 16.83 | 4.30 | 16.73 | 4.40 | 0.05 | 16.51 | 4.39 | 17.03 | 4.31 | 0.39 | 67.88 | 3.61* |

Note: * ($p < .05$), ** ($p < .01$)

The ANOVA results (Table 3 and 4) shows that academic functioning is shaped by a complex interplay between gender and academic discipline. Arts-Commerce students demonstrated superior Academic Management and higher 9th-grade CGPA, whereas Science students outperformed them in 11th-grade CGPA. Gender remained a consistent predictor of performance, with female students achieving significantly higher grades in both 9th and 11th grade and reporting greater personal satisfaction by the 11th grade. While the main effects for Overall Academic Functioning Scale (AFS) were not standalone significant, the study found critical interaction effects for 11th-grade CGPA, peer comparison, and overall AFS scores. These interactions suggest that academic outcomes and social comparisons are not determined by gender or stream in isolation, but rather by how these two factors combined influence a student's educational experience. No significant differences were observed in study efficiency, concentration, or homework delays across the groups.

**Table 5: Step-wise regression of CSU predicting Academic Functioning**

| **Components of CSU** | **Class 11th CGPA** | | | | **Peer Comparison (11th Class)** | | | | **Overall Academic Functioning** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | $R^2$ | β | F | R | $R^2$ | β | F | R | $R^2$ | β | F |
| **Time and overuse** | - | - | - | - | - | - | - | - | .27 | .07 | .22 | 19.43** |
| **Psychological/Social** | .13 | .02 | -.35 | 4.42* | - | - | - | - | - | - | - | - |
| **Preoccupation** | - | - | - | - | - | - | - | - | - | - | - | - |
| **Technology** | - | - | - | - | .17 | .03 | -.17 | 8.01** | .30 | .09 | -.60 | 5.53* |

Note: * ($p < .05$), ** ($p < .01$)

A stepwise regression analysis was conducted to identify which components of compulsive smartphone usage (CSU) most significantly predict academic functioning. The results as depicted in Table 5 indicate that Time and Overuse is the primary predictor, accounting for 7% of the variance, while the Technology component

contributes an additional 2%, resulting in a combined variance of 9%. Interestingly, the positive Beta coefficient for Time and Overuse suggests that increased time spent on devices is associated with perceived academic gains. Conversely, the negative Beta coefficient for the Technology factor indicates that engagement with advanced smartphone features may actually hinder academic functioning.

The stepwise regression results in Table 8 indicate that among the four components of compulsive smartphone usage (CSU), the technology component was the most significant predictor of Academic Functioning, and it accounted for 3% of the variance for Satisfaction with Academic Functioning compared to friends. The negative Beta shows that students more compulsively attached to the device's technical features report lower satisfaction with their academic functioning when compared to their friends.

# DISCUSSION

The findings of this study reveal a complex relationship between academic functioning and smartphone use, where objective performance (CGPA) and subjective perceptions of utility show a significant "Perception Performance Gap." While female students consistently achieved higher CGPA scores in both 9th and 11th grade, this academic resilience came at a substantial mental health cost, as they reported significantly higher levels of social dysfunction and distress.

The transition from 9th to 11th grade for this cohort was defined by the COVID-19 pandemic, which transformed the smartphone from a supplementary tool into a vital "survival device" for education. This forced shift necessitated hours of daily screen time for classes and peer communication, blurring the lines between productive learning and compulsive habits. When viewed through Self-Determination Theory (SDT), the lockdown severely restricted traditional avenues for autonomy and relatedness. In this physical isolation, the smartphone became a "short-term remedy" to satisfy these thwarted needs, providing a sense of independence and essential social connectivity. However, because the device was officially sanctioned for schoolwork, the usual guardrails against excessive use were weakened, allowing compulsive behaviors to take root.

The data shows a notable shift in performance as Arts-Commerce students led in the 9th grade, but Science students took the lead by the 11th grade. This likely reflects how Science students, who often engage with structured digital coaching, adapted more effectively to high-stakes online environments. Despite this, the constant pull of smartphone features like gaming or social validation which offer immediate psychological rewards often undermined the competence students sought through their studies (Hanham et al., 2021). This created a paradox where the "on-demand" information access offered by the phone provided a temporary sense of mastery, even as the constant distraction threatened objective academic progress.

A fascinating finding was the positive correlation between "Time and Overuse" and perceived academic benefit. Students spending the most time on their phones were also the most likely to credit the device for aiding their studies. From an SDT perspective, this suggests that students use the device to feel a sense of competence through quick digital rewards, even if their objective performance is trending downward. This reliance is particularly visible in Arts-Commerce students, who reported higher scores in academic management and CSU, suggesting they use the device to satisfy a need for autonomy in navigating their specific curriculum which is more research heavy and less lab-bound, Because their coursework is more research-heavy, students in these streams naturally rely on their smartphones as primary tools for information gathering and academic management. However, this increased reliance for research purposes creates a "slippery slope" toward compulsion, as the device is always "officially" open for work, weakening the guardrails against non-academic use.

Interaction effects revealed that the perceived impact of technology is deeply tied to gender and academic environment (Bain & Rice, 2006). For example, males in Science reported higher positive impacts, while females in Arts-Commerce did the same, likely using the device for different needs competence versus relatedness. Qualitatively, reasons for dissatisfaction highlighted the role of external pressure. "Parental Disapproval" was a dominant stressor, especially for males, which often drove students to the non-judgmental digital world as an escape to satisfy their need for relatedness (Javed et al., 2025). Conversely, 11th-grade females showed high self-awareness, identifying "smartphone distraction" as a source of dissatisfaction. This internal conflict knowing the

phone is a hindrance but feeling a compulsive need to use it represents a fundamental struggle for autonomy and is a primary driver of the recorded anxiety and mental health distress (Rudolf & Kim, 2024).

# CONCLUSION

This study confirms that the smartphone has evolved from a supplementary tool into a non-negotiable "survival tool" for education and social connectivity, a transition fundamentally accelerated by the COVID-19 pandemic. However, this forced dependency has facilitated a significant "Perception-Performance Gap" (Timotheou et al., 2022). While students particularly those in the Arts-Commerce stream increasingly credit their devices for aiding academic management, objective data reveals that compulsive usage is a primary predictor of mental health distress, including anxiety, insomnia, and social dysfunction.

When viewed through the lens of Self-Determination Theory (SDT), the smartphone emerges as a digital surrogate for psychological needs that are often thwarted in a high-pressure academic environment (West et al., 2024). Regarding competence, students frequently turn to their devices for "on-demand" academic validation and quick information, but this reliance on instant gratification can undermine the sustained attention and deep focus necessary for genuine academic mastery (Marvi et al., 2025). Similarly, the device creates a paradox for autonomy; while it provides an initial sense of digital freedom and navigation, its constant presence often results in the technology dictating the student's daily schedule rather than the student maintaining control over the tool (Talaifar & Lowery, 2022). Finally, the smartphone serves the need for relatedness by offering a vital, yet potentially addictive, connection to social validation (Liu et al., 2025). This often becomes a primary escape mechanism for students when their real-world academic performance results in external disapproval from parents or peers, creating a cycle of digital dependency.

Gender emerged as a critical variable, with female students demonstrating a remarkable "resilience-at-a-cost" pattern (Montolio & Taberner, 2018). Despite consistently outperforming their male peers in objective CGPA scores, females reported significantly higher levels of mental health distress and a greater awareness of the smartphone as a psychological distraction. Furthermore, the interaction effects between gender and academic stream highlight that academic functioning is not influenced by technology in isolation, but by how digital tools intersect with specific curriculum demands and gendered socialization (Sharma et al., 2024).

Ultimately, this study underscores that while the sheer duration of use leads students to perceive the smartphone as an academic boon, the compulsive attraction to its technological features serves as a tipping point where the device becomes a hindrance (Wang et al., 2022). To support the well-being of the Gen Z adolescent, it is imperative to move beyond the "on-demand" digital fix and foster environments that reintegrate real-world avenues for autonomy, competence, and relatedness, thereby breaking the cycle of compulsive dependency (Ganz & Mitchell-Bennett, 2025).

# RECOMMENDATIONS

Based on the findings regarding the "Perception-Performance Gap" and the psychological paradox of smartphone dependency, several recommendations are proposed to support the well-being and academic success of adolescents (Zhang & Zeng, 2024). First, educational institutions should implement comprehensive digital literacy programs that go beyond technical skills to address the psychological mechanisms of Compulsive Smartphone Usage (Gui et al., 2022). These programs should help students recognize the difference between using a device as a functional tool for "Academic Management" and falling into a cycle of "Time and Overuse" driven by the need for instant digital rewards. By fostering self-awareness, especially among female students who already show a high level of awareness regarding smartphone distractions, schools can empower students to regain their autonomy from the seductive pull of technological features. Future studies should conduct a moderation analysis to see if academic success masks any underlying digital anxiety since female students reported higher CGPA but greater mental health distress, It would move beyond simple correlations to show that objective success does not equate to internal stability. It helps explain why students might feel they are "managing" well digitally while their internal mental health is deteriorating. It would help identify a specific at risk cohort: the "high-achieving compulsive user". If academic success "masks" anxiety, these students might be

overlooked by teachers and parents because their grades remain high, even as they experience somatic symptoms and social dysfunction.

Furthermore, the transition to digitally integrated learning environments must be balanced with the restoration of real-world avenues for satisfying fundamental psychological needs (Hsieh, 2025). Since the research indicates that smartphones often serve as a surrogate for autonomy, competence, and relatedness, educators and parents should collaborate to create non-digital spaces where students can experience "Diligent Effort" and "High Achievement" without the constant pressure of social media validation or parental disapproval (Troche et al., 2025). Reducing the reliance on smartphones as the primary escape mechanism requires a shift in the Indian educational context away from rigid curricula and individual competition toward more holistic forms of peer collaboration and social-academic connectivity (George, 2024).

Future research should continue to explore these interaction effects across different cultural and socioeconomic backgrounds in India to refine these support systems and ensure that technology remains a boon rather than a hindrance to adolescent development.

**Limitations Of the Study**

While this research provides valuable insights into the "Perception-Performance Gap" among Indian adolescents, several limitations must be acknowledged. First, the study's sample was restricted to 12th grade students from CBSE-affiliated schools in a single urban location, Bhopal, Madhya Pradesh, which may limit the generalizability of the findings to students in rural areas or those enrolled in different educational boards. Second, the data collection relied on self-reported measures for academic functioning and compulsive usage; such instruments are susceptible to social desirability bias, where students might underreport compulsive behaviors or overstate their academic satisfaction. Additionally, while the 12-item Academic Functioning Scale (AFS) was designed to capture multiple facets of student life, the subjective nature of "perceived impact" means that students' internal benchmarks for success can vary significantly.

The cross-sectional nature of the study also prevents the establishment of definitive causal relationships between smartphone use and academic outcomes. Although regression analysis identified "Time and Overuse" as a significant predictor of perceived academic functioning, it is impossible to determine whether compulsive usage causes academic shifts or if existing academic stress drives students toward the device as a coping mechanism. Furthermore, the study's focus on the COVID-19 pandemic as a primary contextual factor introduces a unique historical variable that may not be present in future cohorts, potentially making some findings specific to this transitional period. Finally, while the research utilized a 2x2 factorial design to examine gender and stream, other influential variables such as parental digital literacy, household income, and specific types of smartphone content (e.g., gaming vs. social media) were not deeply explored and could be subjects for future longitudinal investigation.

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