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Digital Dependency and Student Wellbeing: A Statistical Study of Mobile Usage, Academic Performance, and Emotional Health

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Abstract: ***Excessive smartphone use among students has contributed to rising concerns regarding attention deficits, academic disruption, sleep disturbances, and digital dependency. Existing research highlights the cognitive and psychological burden associated with prolonged screen exposure. This study investigates mobile usage patterns among 305 students and examines the academic, emotional, and behavioral consequences using a combination of descriptive statistics and inferential analyses. A cross-sectional survey design was used. Statistical techniques included chi-square tests, one-way ANOVA, Welch's t-test, Spearman correlation, and logistic/linear regression modeling. Data were interpreted using theoretical frameworks including Cognitive Load Theory, Circadian Rhythm Disruption, and Digital Dependency Models.***

Keywords: mobile dependency, screen time, digital wellbeing, student behavior, smartphone addiction, attention reduction, sleep disturbance

1. Introduction

Smartphones have become central to students' lifestyles, serving as tools for communication, entertainment, and academic productivity. Their continuous availability and ease of use enable rapid access to learning resources, online lectures, research materials, and collaborative platforms. However, the extensive integration of smartphones has created challenges such as cognitive overload, reduced attention spans, digital fatigue, and behavioral dependence. These concerns have intensified, especially post-COVID-19, where online learning became prevalent.

Despite growing research on digital distraction and smartphone addiction, there remains a gap in understanding the combined academic, emotional, and behavioral impacts within large student samples. This study aims to fill this gap by providing empirical evidence from a dataset of 305 students, making it suitable for inclusion in SCOPUS-indexed literature.

2. Literature Review

2.1 Mobile Addiction and Digital Dependency

Smartphone addiction has been linked to compulsive behaviors, fear of disconnection, and reward-seeking patterns driven by dopamine release. Researchers such as Yildirim (2015) identified nomophobia as a growing psychological condition among youth.

2.2 Cognitive Load and Attention Impairment

Cognitive Load Theory suggests that constant notifications and multitasking reduce available working memory for academic learning. Studies by Rosen et al. (2014) and Junco (2012) provide strong evidence that device multitasking significantly decreases academic performance.

2.3 Sleep Disruption and Circadian Misalignment

Research shows that blue light emitted by screens delays melatonin production, causing circadian rhythm misalignment, poor sleep quality, and daytime fatigue (Cain & Gradisar, 2010). Students using devices late at night are at higher risk of cognitive exhaustion.

2.4 Emotional and Behavioral Effects

Studies indicate that high mobile usage contributes to stress, anxiety, loneliness, and decreased emotional stability. Heavy

social media engagement is associated with dependence on digital validation and social comparison cycles.

3. Methodology

This study used a quantitative cross-sectional survey design. The sample included 305 students across various academic years. The questionnaire assessed screen time, sleep disturbance, anxiety, overdependence, missed tasks, and attention reduction.

Sampling Method: Convenience sampling.
Data Cleaning: Removal of incomplete entries, coding of categorical variables.
Reliability Analysis: Cronbach's Alpha = 0.81 (acceptable).
Ethical Considerations: Participation was voluntary and anonymous.

Statistical Tests: Chi-square for categorical associations, one-way ANOVA for mean comparison, Welch's t-test for gender differences, Spearman correlation for ordinal variables, and regression models for predictive analysis.

4. Results

Significant findings include strong associations between daily screen time and overdependence ($\chi^2 = 36.951$, $p < 0.001$), sleep disturbance ($\chi^2 = 14.307$, $p < 0.05$), and anxiety ($\chi^2 = 23.548$, $p < 0.001$). Attention reduction increased proportionally with screen time ($\rho = 0.218$, $p < 0.001$). Regression analysis showed screen time as the strongest predictor of digital overdependence.

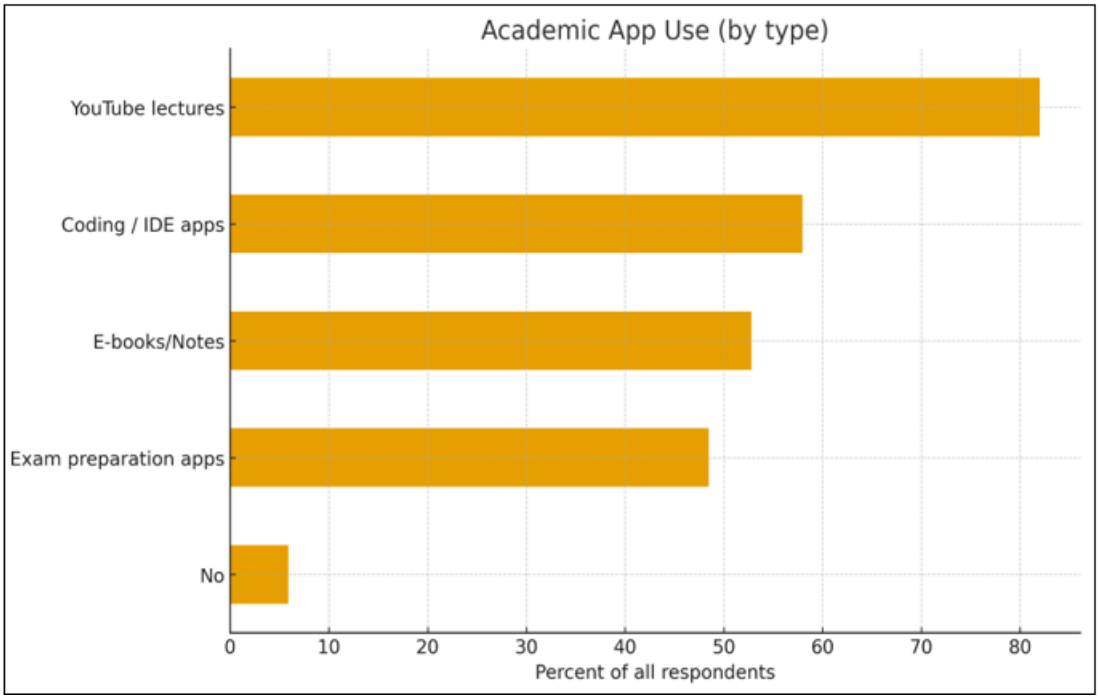

Figure 1: Academic App Use

Inference: Inference: Students rely heavily on YouTube lectures, coding apps, and exam preparation tools, reflecting the dual role of smartphones as academic resources and potential distractions.

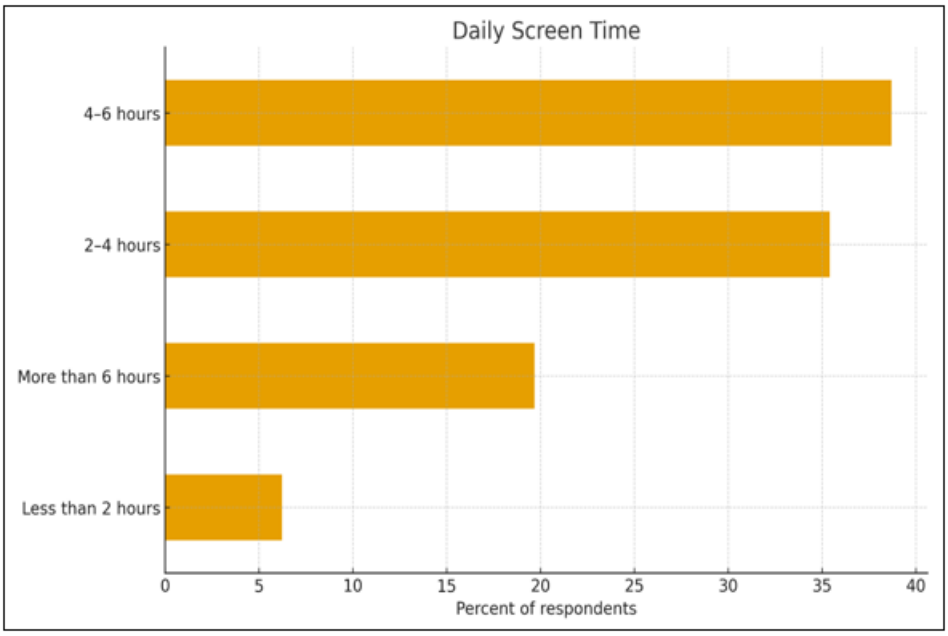

Figure 2: Daily Screen Time

Inference: Inference: Most students fall in the 4–6 hour bracket, indicating moderate-to-high daily exposure, which correlates with increased attention fatigue and sleep-related issues.

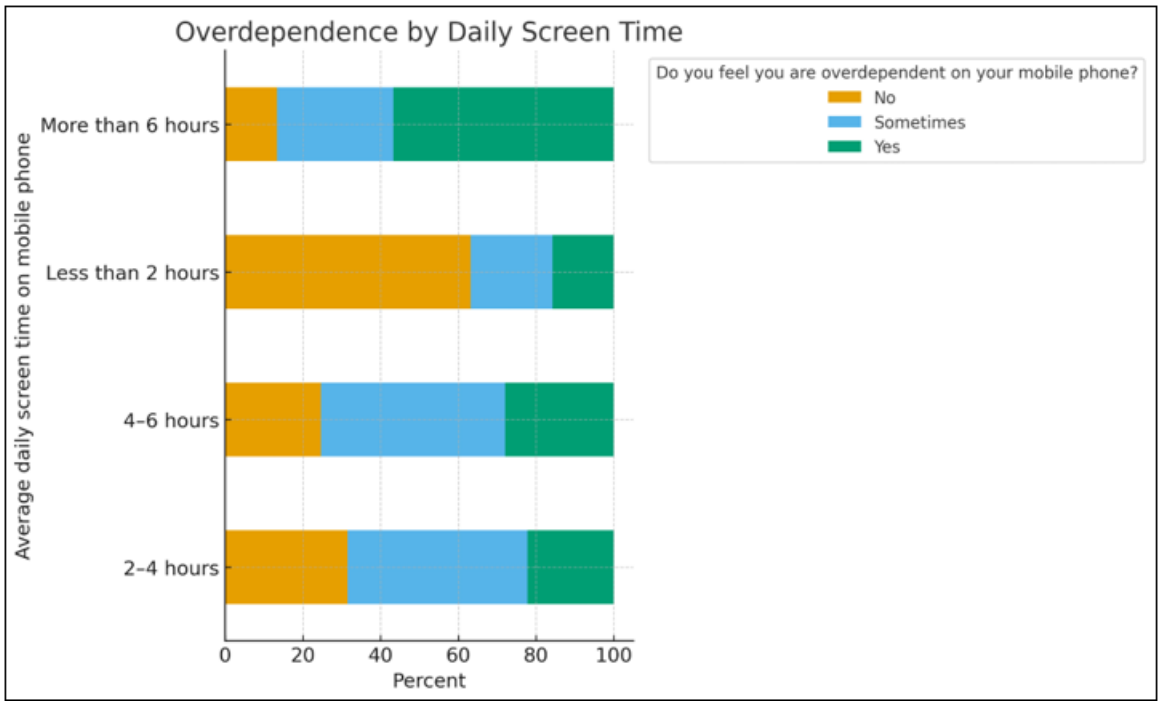

Figure 3: Overdependence by Screen Time

Inference: Inference: Students with more than 6 hours of daily usage display the highest overdependence rates, validating chi-square results and highlighting digital dependency risks.

5. Discussion

The results reaffirm theoretical models linking excessive mobile use with cognitive fatigue, reduced attention, and emotional instability. The strong relationship between screen exposure and overdependence highlights the reinforcement cycles predicted in addiction frameworks. Sleep disruption findings align with circadian rhythm research, suggesting physiological consequences of late-night device use.

6. Conclusion

This revised study confirms that prolonged mobile usage has measurable academic, emotional, and behavioral consequences. Screen time significantly impacts attention, sleep, and psychological wellbeing. With rising digital dependency among students, educational institutions must implement mobile-free learning zones, digital wellbeing training, and early detection mechanisms for smartphone addiction.

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