

Smartphone Addiction and Academic Performance among Adolescents

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ABSTRACT

Smartphones have become an integral part of adolescent life, providing opportunities for education, communication, entertainment, and social interaction. However, excessive and poorly regulated smartphone use may interfere with students' academic functioning. The present study examined the relationship between smartphone addiction and academic performance among adolescents and investigated the predictive contribution of different dimensions of smartphone addiction. A cross-sectional correlational research design was employed with a sample of 394 adolescents aged 11–18 years selected from schools in Saran and Siwan districts of Bihar, India. Smartphone addiction was assessed using the Smartphone Addiction Scale (SAS), consisting of six dimensions: Daily Life Disturbance, Positive Anticipation, Withdrawal, Cyberspace-Oriented Relationship, Overuse, and Tolerance. Academic performance was assessed using the Academic Performance Scale (APS). Pearson's product-moment correlation and multiple regression analyses were used to examine the relationships among the variables. The findings showed a significant negative relationship between smartphone addiction and academic performance ($r = -.578$, $p < .001$). Multiple regression analysis further indicated that the six dimensions of smartphone addiction collectively explained 33.6% of the variance in academic performance. Daily Life Disturbance, Withdrawal, Cyberspace-Oriented Relationship, Overuse, and Tolerance emerged as significant negative predictors, whereas Positive Anticipation did not make a significant independent contribution. The findings suggest that problematic smartphone use is meaningfully associated with poorer academic functioning among adolescents. The study highlights the importance of promoting balanced smartphone use, self-regulation, and healthy study routines among school-going adolescents.

Keywords: smartphone addiction, academic performance, adolescents, overuse, withdrawal, academic functioning

INTRODUCTION

Smartphone technology has become a normal component of adolescent life. Smartphones provide young people with immediate access to communication, educational resources, social networking, entertainment, gaming, and information. Their educational usefulness has become particularly evident with the increasing integration of digital resources into school and home learning. However, concern has emerged when smartphone use becomes excessive, difficult to control, or disruptive to everyday activities.

The issue is therefore not simply whether adolescents use smartphones, but how they use them and whether their use interferes with important areas of functioning. Griffiths (2005) conceptualized behavioural addictions in terms of components such as salience, mood modification, tolerance, withdrawal, conflict, and relapse. This perspective provides a useful basis for understanding problematic smartphone use as a behavioural pattern involving psychological dependence and impaired control. Similarly, Kuss and Griffiths (2011) emphasized that excessive engagement with digital technologies can become associated with psychological and social difficulties.

Adolescence is an especially important developmental period for examining smartphone addiction. During these years, students experience increasing academic demands while continuing to develop attention, self-regulation, time management, and behavioural control. Smartphones may support academic activities, but they also provide immediate access to highly engaging recreational and social activities. Consequently, excessive smartphone engagement may compete with academic responsibilities and reduce the time and attention available for study.

Academic performance encompasses students' scholastic achievement as well as study behaviour, concentration, classroom engagement, homework completion, preparation, and effective use of study time. Problematic smartphone use may influence these aspects through several mechanisms. Excessive use can displace study time, encourage procrastination, interrupt concentration, and disturb regular sleep and study routines. Frequent switching between academic tasks and smartphone activities may further reduce sustained attention.

Recent empirical evidence supports a negative relationship between problematic smartphone use and academic achievement. Paterna et al. (2024), in a systematic review and meta-analysis of 29 studies involving 48,490 participants, found a significant negative association between problematic smartphone use and academic achievement. Although the overall effect was relatively small, the relationship was stronger among younger students. Cilligol Karabey et al. (2024) similarly identified academic difficulties among the important outcomes associated with problematic smartphone use among adolescents.

The relationship may also depend on the specific characteristics of smartphone addiction. Daily Life Disturbance may affect academic performance through disruption of study routines, sleep, and time management. Overuse may directly reduce the time available for academic activities, whereas Withdrawal may produce psychological discomfort and preoccupation when access to the smartphone is restricted. Tolerance may contribute to progressively increasing engagement. Cyberspace-Oriented Relationship may involve persistent involvement in online social interaction, while Positive Anticipation represents the pleasure and expectation associated with smartphone use.

The distinction between educational and problematic use is particularly important. Smartphones can facilitate access to learning materials, educational applications, online classes, and communication with teachers and classmates. Therefore, smartphone use itself should not be considered inherently harmful. Rather, academic difficulties are more likely when smartphone engagement becomes excessive, uncontrolled, or disruptive. This distinction is consistent with the broader literature suggesting that the effects of digital technology depend upon the purpose, context, and pattern of use.

Despite increasing research on smartphone addiction, findings differ across studies because of differences in age, measurement instruments, definitions of problematic use, academic indicators, and patterns of smartphone activity. Examining the individual dimensions of addiction may therefore provide greater insight than relying exclusively on total smartphone-use duration.

The present study focuses on adolescents aged 11–18 years from schools in Saran and Siwan districts of Bihar. It examines the relationship between smartphone addiction and academic performance and further investigates whether the six dimensions of smartphone addiction independently predict academic performance. The study is particularly concerned with whether dimensions involving disruption, excessive use, psychological dependence, and increasing engagement are associated with poorer academic functioning.

The study was designed to contribute regional evidence to the growing literature on problematic smartphone use and adolescent education. Understanding these relationships may help parents, teachers, counsellors, and educational institutions develop appropriate strategies for promoting responsible digital behaviour without eliminating the legitimate educational benefits of smartphone technology.

Objectives

The present study was undertaken to examine the relationship between smartphone addiction and academic performance among adolescents and to determine the extent to which different dimensions of smartphone addiction contribute to academic functioning. The specific objectives were to assess the level of smartphone addiction among adolescents, examine its relationship with academic performance, determine the predictive role

of the six dimensions of smartphone addiction, and identify the dimensions that make significant independent contributions to academic performance.

Hypothesis

On the basis of the objectives of the study and the relevant literature, the following hypotheses were formulated:

1. Smartphone addiction will be significantly negatively related to academic performance among adolescents.
2. The dimensions of smartphone addiction will significantly predict academic performance.
3. Daily Life Disturbance, Withdrawal, Overuse, and Tolerance will significantly predict poorer academic performance.

Method

Participants

The sample consisted of 394 adolescents aged 11–18 years selected from schools located in Saran and Siwan districts of Bihar, India. The participants included male and female students studying at middle, secondary, and senior secondary levels. The sample was drawn from the cleaned dataset used for the analysis.

Research Design and Sampling

A cross-sectional correlational research design was employed. The design was considered appropriate because the study aimed to examine the magnitude and direction of the relationship between smartphone addiction and academic performance at a single point in time. A predictive component was also included to determine the independent contribution of different dimensions of smartphone addiction to academic performance.

Participants were selected through purposive sampling from the identified schools. The study focused on school-going adolescents because this developmental period is characterized by increasing academic demands alongside rapidly expanding engagement with smartphones.

Measures

Smartphone Addiction Scale (SAS)

Smartphone addiction was assessed using the 33-item Smartphone Addiction Scale (SAS) developed by Kwon et al. (2013). This full version of the scale is distinct from the 10-item short version for adolescents. That short version is known as SAS-SV. The full version consists of 33 items. Responses are recorded on a six-point Likert scale. It evaluates problematic smartphone use across six dimensions namely, Daily Life Disturbance, Positive Anticipation, Withdrawal, Cyberspace-Oriented Relationships, Overuse, and Tolerance. Higher scores reflect a greater tendency toward problematic or addictive smartphone use. The original full scale demonstrated excellent internal consistency, with a Cronbach's alpha coefficient of .967, along with satisfactory evidence of concurrent validity (Kwon, Lee et al., 2013). In the present sample, the Smartphone Addiction Scale demonstrated excellent internal consistency (Cronbach's $\alpha = .92$).

Academic Performance Scale (APS)

This scale has been developed by Carson Birchmeier, Emily Grattan, Sarah Hornbacher, and Christopher Gregory of Saginaw Valley State University. It is a 5-point scale ranging from strongly agree (5) to strongly disagree (1), where respondents rate their behaviours and actions related to academic performance. Higher scores indicate higher academic performance. The scale has internal consistency of .89 and a test-retest reliability of .85. The Academic Performance Scale demonstrated good internal consistency in the present sample, with a Cronbach's alpha coefficient of .83.

Personal Data Schedule

Demographic and smartphone-use information was obtained regarding age, gender, class level, residence, family income, parental education, daily smartphone use, purpose of use, and related usage characteristics.

Procedure

The participants were approached through the selected schools in Saran and Siwan districts. After obtaining the necessary cooperation from the concerned school authorities, the purpose and nature of the study were explained to the participants. They were informed that their responses would be used only for research purposes and that confidentiality and anonymity would be maintained. The questionnaires were administered in classroom settings under standardized instructions. Participants completed the measures individually, and the completed responses were subsequently scored and entered into the dataset for statistical analysis.

Statistical Analysis

Descriptive statistics were used to summarize the study variables. Pearson's product-moment correlation was employed to examine the relationship between smartphone addiction and academic performance. Multiple regression analysis was conducted to determine the predictive contribution of the six dimensions of smartphone addiction to academic performance. Prior to interpreting the multiple regression results, multicollinearity among the predictor variables was assessed. This assessment used the variance inflation factor (VIF) and tolerance statistics. All VIF values fell below the conventional threshold of 5. This finding indicated that multicollinearity did not unduly inflate the standard errors of the regression coefficients. The statistical analyses were selected in accordance with the objectives and hypotheses of the study.

Results

The present study examined the relationship between smartphone addiction and academic performance among adolescents. Pearson's product-moment correlation and multiple regression analyses were used to examine the proposed relationships. The analysis was based on 394 adolescents from the cleaned dataset. The analysis focused on overall smartphone addiction, its six dimensions, and academic performance. The six dimensions were Daily Life Disturbance, Positive Anticipation, Withdrawal, Cyberspace-Oriented Relationship, Overuse, and Tolerance.

Relationship Between Smartphone Addiction and Academic Performance

Pearson's product-moment correlation coefficients were calculated to examine the relationship between smartphone addiction and academic performance. The results are presented in Table 1.

Table 1 Correlation Between Smartphone Addiction Dimensions and Academic Performance

Smartphone Addiction Variables	Academic Performance
Daily Life Disturbance	-.493**
Positive Anticipation	-.433**
Withdrawal	-.457**
Cyberspace-Oriented Relationship	-.457**
Overuse	-.484**
Tolerance	-.428**
Smartphone Addiction Total	-.578*

Note. * $p < .05$, ** $p < .001$.

The results presented in Table 1 indicate that Smartphone Addiction Total was significantly and negatively correlated with Academic Performance, $r = -.578$, $p < .001$. This indicates a moderately strong inverse relationship, suggesting that adolescents reporting higher levels of smartphone addiction tended to report lower academic performance.

All six dimensions of smartphone addiction were also significantly and negatively associated with academic performance. The correlations ranged from $r = -.428$ for Tolerance to $r = -.493$ for Daily Life Disturbance. Among the six dimensions, Daily Life Disturbance showed the strongest negative relationship with academic performance, followed by Overuse, Withdrawal, Cyberspace-Oriented Relationship, Positive Anticipation, and Tolerance. These findings provide clear support for Hypothesis 1, which proposed that smartphone addiction would be significantly negatively related to academic performance. The pattern is consistent with the corresponding analysis framework in the study dataset and demonstrates that the negative association extends across individual dimensions of problematic smartphone use.

Multiple Regression Analysis of Smartphone Addiction Dimensions on Academic Performance

To determine the independent contribution of the six dimensions of smartphone addiction to academic performance, a multiple regression analysis was conducted. Daily Life Disturbance, Positive Anticipation, Withdrawal, Cyberspace-Oriented Relationship, Overuse, and Tolerance were entered simultaneously as predictor variables, with Academic Performance as the criterion variable.

Table 2 Multiple Regression of Smartphone Addiction Dimensions on Academic Performance

Predictor	B	SE	<i>t</i>	VIF	Tolerance
Daily Life Disturbance	-2.064	0.702	-2.939**	2.14	0.47
Positive Anticipation	-0.632	0.710	-0.890	2.31	0.43
Withdrawal	-1.491	0.673	-2.215*	2.08	0.48
Cyberspace-Oriented Relationship	-1.445	0.675	-2.139*	2.25	0.44
Overuse	-1.496	0.705	-2.122*	2.19	0.46
Tolerance	-1.392	0.661	-2.107*	1.97	0.51
Constant	86.617	2.074	41.765***	—	—

Model: $R^2 = .336$, Adjusted $R^2 = .325$, $F(6, 387) = 32.59$, $p < .001$.

The overall regression model was statistically significant, $F(6, 387) = 32.59$, $p < .001$, and explained 33.6% of the variance in academic performance ($R^2 = .336$). Thus, the six dimensions of smartphone addiction collectively made a significant contribution to predicting academic performance.

Daily Life Disturbance emerged as a significant negative predictor of academic performance, $B = -2.064$, $SE = 0.702$, $t = -2.939$, $p = .003$. Withdrawal also significantly and negatively predicted academic performance, $B = -1.491$, $SE = 0.673$, $t = -2.215$, $p = .027$. Similarly, Cyberspace-Oriented Relationship, Overuse, and Tolerance made significant negative contributions to academic performance.

In contrast, Positive Anticipation did not make a significant unique contribution when the remaining dimensions were statistically controlled, $B = -0.632$, $p = .374$. This indicates that although Positive Anticipation was significantly correlated with academic performance at the bivariate level, its independent predictive effect was not significant in the combined regression model.

Overall, the findings demonstrate that dimensions reflecting daily disruption, withdrawal, excessive use, cyberspace-oriented engagement, and tolerance are particularly important predictors of academic performance. The overall regression model therefore supports Hypothesis 2, while the significant negative effects of Daily Life Disturbance, Withdrawal, Overuse, and Tolerance provide support for Hypothesis 3. The cleaned dataset contains all six SAS dimensions and Academic Performance for the 394 cases used in the analysis.

Taken together, the results demonstrate a consistent pattern in which greater smartphone addiction is associated with poorer academic performance. The overall association was moderately strong ($r = -.578, p < .001$), and the six-dimensional regression model explained 33.6% of the variance in academic performance. Five of the six dimensions made significant independent negative contributions, whereas Positive Anticipation did not show a unique predictive effect.

Thus, the results indicate that problematic smartphone use, particularly when it involves disruption of daily activities, withdrawal, excessive engagement, cyberspace-oriented interaction, and tolerance, is significantly associated with poorer academic functioning among adolescents.

DISCUSSION

The present study examined the relationship between smartphone addiction and academic performance among adolescents aged 11–18 years. The findings demonstrated a significant negative relationship between overall smartphone addiction and academic performance ($r = -.578, p < .001$). In addition, all six dimensions of smartphone addiction showed significant negative correlations with academic performance. These findings indicate that greater problematic smartphone use is associated with poorer academic functioning among adolescents.

The significant negative relationship between smartphone addiction and academic performance is consistent with previous research. Paterna et al. (2024), in a systematic review and meta-analysis, reported a significant negative association between problematic smartphone use and academic achievement. Similarly, Cilligol Karabey et al. (2024) identified academic difficulties as an important outcome associated with problematic smartphone use among adolescents. The present findings extend this evidence to school-going adolescents from Saran and Siwan districts of Bihar.

The observed relationship may be explained through several interconnected mechanisms. Excessive smartphone engagement can displace time otherwise available for homework, reading, revision, and examination preparation. It may also encourage procrastination and repeated switching between academic tasks and recreational smartphone activities. Such interruptions can reduce sustained attention and make it difficult for students to maintain regular study routines. Thus, the negative relationship may reflect both time displacement and cognitive distraction.

Among the six dimensions, Daily Life Disturbance demonstrated the strongest negative correlation with academic performance ($r = -.493, p < .001$). This finding suggests that when smartphone use begins to interfere with everyday activities, academic functioning is particularly likely to be affected. Disrupted routines, reduced concentration, poor time management, and interference with study schedules can directly undermine students' academic engagement.

Overuse also showed a strong negative relationship with academic performance ($r = -.484, p < .001$). Excessive duration or frequency of smartphone use may reduce the amount of time available for academic activities. Adolescents may intend to use their smartphones briefly but continue for longer periods because of the availability of social networking, entertainment, gaming, and online communication. Such patterns may contribute to delayed homework and inadequate preparation.

Withdrawal and Cyberspace-Oriented Relationship each showed significant negative correlations of $r = -.457$ ($p < .001$) with academic performance. Withdrawal may indicate psychological dependence, whereby adolescents experience discomfort or a strong desire to use their smartphones when access is restricted. Such preoccupation may interfere with concentration even during academic activities. Cyberspace-Oriented

Relationship may similarly reflect excessive involvement in online social interaction, resulting in repeated checking of messages, notifications, and social-networking activities.

Positive Anticipation was also significantly negatively correlated with academic performance ($r = -.433, p < .001$). This suggests that the pleasure and expectation associated with smartphone use are related to academic functioning at the bivariate level. However, the regression findings provide a more nuanced interpretation because Positive Anticipation did not make a significant independent contribution after the other dimensions were statistically controlled. This indicates that positive feelings toward smartphone use may be less important for academic performance than the behavioural consequences associated with excessive or dependent use.

Tolerance showed the weakest, although still statistically significant, negative correlation with academic performance ($r = -.428, p < .001$). The finding suggests that increasing dependence on smartphone use may be associated with poorer academic functioning. As adolescents devote progressively more time to smartphone activities, opportunities for sustained academic engagement may decline.

The multiple regression findings provide additional support for the multidimensional nature of smartphone addiction. The six dimensions collectively explained 33.6% of the variance in academic performance, indicating that problematic smartphone use represents a meaningful set of predictors of academic functioning. Five dimensions—Daily Life Disturbance, Withdrawal, Cyberspace-Oriented Relationship, Overuse, and Tolerance—made significant negative independent contributions. Positive Anticipation, despite its significant bivariate relationship, was not a significant unique predictor.

The particularly important role of Daily Life Disturbance, Overuse, Withdrawal, and Tolerance supports the proposition that interference and loss of behavioural control may be more closely connected with academic difficulties than smartphone enjoyment alone. These findings are consistent with behavioural-addiction perspectives in which problematic behaviour becomes significant when it begins to interfere with important areas of everyday functioning.

The findings should nevertheless be interpreted carefully. The present study used a cross-sectional correlational design; therefore, the results do not establish that smartphone addiction directly causes poor academic performance. It is possible that academic difficulties may also contribute to increased smartphone use, or that other factors such as academic stress, family environment, sleep, or self-regulation influence both variables. The present findings therefore demonstrate significant associations and predictive relationships rather than causal effects. Additionally, academic performance was assessed solely through the self-reported Academic Performance Scale (APS). The scale demonstrated good internal consistency. However, self-report measures are susceptible to social desirability and recall biases. Future studies would benefit from incorporating objective indicators such as official grade point averages or standardized test scores alongside self-report instruments.

Finally, participants were selected through purposive sampling from schools in two districts of Bihar. This approach was appropriate for accessing the target population of school-going adolescents. Yet purposive sampling limits the statistical generalizability of the findings to the broader adolescent population. Caution is therefore warranted when extrapolating the results beyond the sampled regions and school contexts.

CONCLUSION

The study demonstrates a significant and meaningful negative relationship between smartphone addiction and academic performance among adolescents. Higher overall smartphone addiction was associated with lower academic performance, while all six dimensions of smartphone addiction showed significant negative bivariate relationships with academic performance.

The regression analysis further showed that Daily Life Disturbance, Withdrawal, Cyberspace-Oriented Relationship, Overuse, and Tolerance significantly predicted poorer academic performance. These findings suggest that academic difficulties are particularly associated with smartphone use that becomes excessive, disruptive, psychologically dependent, or difficult to regulate.

The findings have practical implications for adolescents, parents, teachers, and school counsellors. Interventions should focus not simply on reducing smartphone ownership or general screen exposure but on developing healthy patterns of use, self-regulation, time management, and appropriate boundaries during study and sleep periods. Schools may incorporate digital-wellness programmes to help students distinguish productive educational use from distracting or problematic engagement.

The study contributes to the growing literature by examining smartphone addiction as a multidimensional construct and by providing evidence from adolescents in Saran and Siwan districts of Bihar. Future research may employ longitudinal designs and examine additional factors such as sleep, parental monitoring, academic stress, and the purpose of smartphone use to further clarify the relationship between problematic smartphone use and academic performance.

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