



# Effect of Smartphone Usage Duration on Academic Performance and Spectacle Use Among Adolescents

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## Abstract

This study investigates the impact of smartphone usage duration on academic performance and spectacle use among adolescents. A cross-sectional research design was employed, involving 140 adolescents aged 12–18 years, recruited from schools and coaching institutes. The study used stratified random sampling to ensure representation across different socio-economic backgrounds, genders, and urban/rural settings. Participants who owned and used smartphones daily for academic or non-academic purposes were included, while those with pre-existing vision problems unrelated to smartphone use or diagnosed learning disabilities were excluded. The results indicated a modest negative correlation between smartphone usage duration and academic performance, suggesting that prolonged smartphone use may slightly impair academic outcomes. However, no significant correlation was found between smartphone usage and spectacle use. These findings highlight the need for further research into the potential effects of smartphone use on adolescent development, particularly in relation to academic achievement and eye health.

**Keywords:** Smartphone Usage; Academic Performance; Spectacle Use; Adolescents; Academic Achievement; Screen Time; Adolescent Development

## Introduction

In the digital age, smartphones have transitioned from luxury items to essential tools for communication, education, and entertainment. Their ubiquity among adolescents has been fueled by the demands of academic pursuits, social networking, and recreational activities [1]. While smartphones provide several benefits, such as instant access to educational resources and enhanced social connectivity, excessive use has raised concerns regarding its implications for physical health, mental well-being, and academic

outcomes [2].

Academic performance is a cornerstone of adolescent development, shaping future opportunities in education and employment. Adolescents require consistent focus, effective time management, and sufficient sleep to excel academically. Prolonged smartphone usage, however, is increasingly seen as a significant disruptor. Studies have shown that excessive screen time is linked to reduced attention spans, procrastination, and diminished engagement with academic tasks [3]. Furthermore, adolescents often prioritize

smartphone-based activities such as gaming, social media, and video streaming over studying, leading to poor time management and academic underachievement. Smartphone use during bedtime has also been associated with sleep disturbances, which further impair memory retention, cognitive performance, and academic productivity [4].

In addition to academic challenges, smartphone usage has profound implications for physical health, particularly visual well-being. The phenomenon of digital eye strain, characterized by symptoms such as dry eyes, headaches, and blurred vision, has become increasingly prevalent among adolescents due to prolonged screen exposure [5]. Studies indicate that excessive smartphone use may accelerate the onset of myopia (nearsightedness) and necessitate early spectacle use, driven by factors such as high screen brightness, extended viewing durations, and improper viewing distances [6]. Alarming trends suggest that the prevalence of myopia among adolescents has risen sharply in the past decade, with smartphone usage cited as a primary contributor [7].

The interplay between smartphone usage, academic performance, and visual health is particularly concerning as adolescents represent a critical demographic for cognitive and physical development. Understanding the complex relationships between these factors is essential for identifying risks and implementing preventative measures. The existing body of research has predominantly focused on isolated aspects of smartphone usage, such as its effect on sleep or its implications for eye health. However, there is a lack of comprehensive studies that concurrently examine the dual impact of smartphone usage on academic outcomes and the prevalence of spectacle use.

This study seeks to bridge this gap by exploring the effect of smartphone usage duration on academic performance and spectacle use among adolescents. By investigating these interrelationships, the research aims to provide insights into how smartphone usage habits influence key developmental domains. Additionally, the findings will help educators, policymakers, and parents design targeted interventions that promote responsible smartphone use while mitigating its adverse effects.

## Objectives

- To examine the difference in academic achievement among groups based on different durations of smartphone usage.
- To examine the relationship between smartphone usage duration and academic performance among adolescents.
- To assess the association between smartphone usage duration and the prevalence of spectacle use among

adolescents.

## Hypotheses

**H1:** There will be a significant difference in academic achievement among groups based on different durations of smartphone usage.

**H2:** There will be a significant negative correlation between smartphone usage duration and academic performance among adolescents.

**H3:** There will be a significant positive correlation between smartphone usage duration and the prevalence of spectacle use among adolescents.

## Methods

### Study Design

The study employs a cross-sectional research design to investigate the relationships between smartphone usage, academic performance, and visual health outcomes among adolescents.

### Participants

**Sample Size:** A total of 140 adolescents aged 12–18 years will be recruited from schools and coaching institutes.

**Inclusion Criteria:** Adolescents who own a smartphone and use it daily for academic or non-academic purposes.

**Exclusion Criteria:** Adolescents with pre-existing vision problems unrelated to smartphone use or diagnosed learning disabilities.

### Sampling Method

A stratified random sampling technique was used to ensure representation across different socio-economic backgrounds, genders, and urban/rural settings.

### Measures

**Smartphone Usage Duration:** Measured using a self-reported questionnaire, recording the average daily hours spent on smartphones for academic and non-academic purposes.

**Academic Performance:** Assessed through the participants' most recent grade reports.

**Spectacle Use:** Recorded through direct observation and self-report, with verification from medical records where available.

**Control Variables:** Age, gender, socio-economic status, sleep duration, and type of smartphone activities (academic vs. entertainment).

### Procedure

**Ethical Approval:** Approval was obtained from the

institutional ethics committee.

**Informed Consent:** Written consent was obtained from participants and their guardians.

**Data Collection:** Questionnaires were distributed in schools, and academic and vision-related data was collected in collaboration with school authorities.

**Confidentiality:** Participant anonymity was maintained throughout the study.

## Data Analysis

**Descriptive Statistics:** Mean, median, and standard deviation to summarize smartphone usage duration, academic performance, and spectacle use rates.

**Inferential Statistics:**

- ANOVA to test hypothesis H1.
- Pearson's correlation to test hypotheses H2 and H3.

## Results

The results of this study are presented in this section through a series of tables that provide a detailed analysis of the data. Table 1 outlines the demographic profile of the participants, providing a foundational understanding of the sample characteristics. Table 2 presents the mean scores and standard deviations (SDs) for participants' age and academic performance, offering insight into the overall trends in academic outcomes.

Variables	N	%
<b>Gender</b>		
Female	87	62.1
Male	53	37.9
<b>Family Structure</b>		
Joint Family	43	30.7
Nuclear Family	90	64.3
Single Parent Family	7	5
<b>Smartphone Usage Duration</b>		
1-2 hours	11	7.9
2-3 hours	43	30.7
3-4 hours	27	19.3
4-5 hours	25	17.9
More than 5 hours	34	24.3
<b>Spectacle Use</b>		
No	56	40
Sometimes	13	9.3
Yes	71	50.7

**Table 1:** Demographic profile of participants.

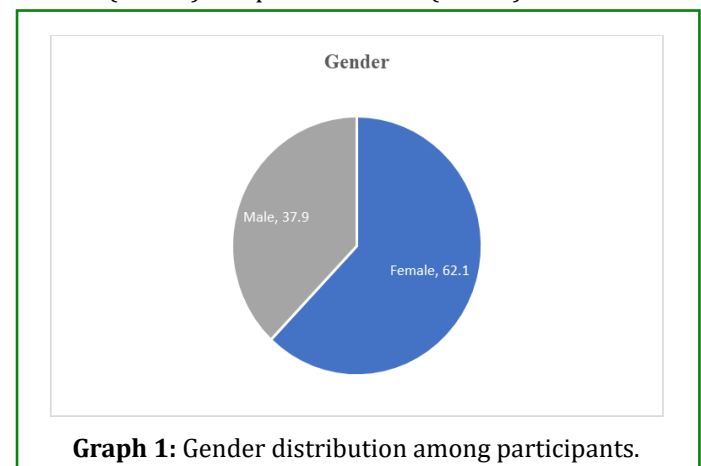
Table 3 compares the mean academic performance scores across groups based on different durations of smartphone

usage, along with the F-value from one-way ANOVA, highlighting significant group differences. Finally, Table 4 showcases Pearson's correlation coefficients, examining the relationships between smartphone usage duration, academic performance, and spectacle use. These results collectively explore the interplay between smartphone habits and key aspects of adolescent well-being.

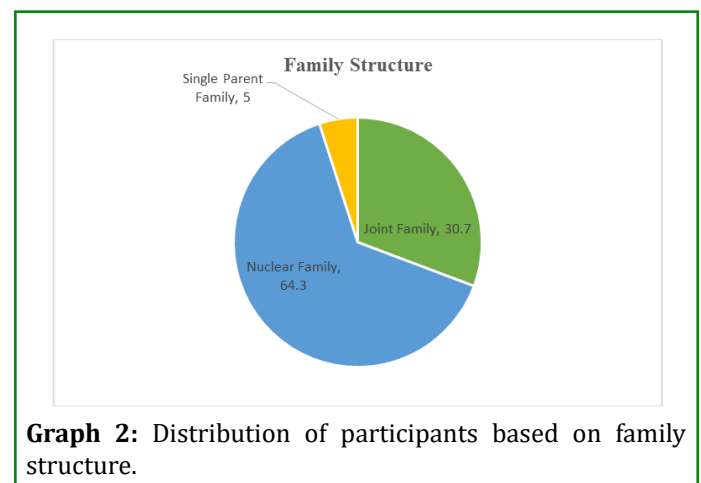
## Demographic Profile of Participants

The mean age of the participants was 15.04 years (SD = 1.419) – table 2, indicating that the study primarily included mid-adolescents. This age group is particularly significant for examining the effects of smartphone usage on academic performance and spectacle use, as adolescents in this developmental stage are often highly engaged with digital technology and are academically active.

Table 1 provides an overview of the demographic characteristics of the participants in the study. A total of 140 adolescents were included, with a higher proportion of females (62.1%) compared to males (37.9%).



**Graph 1:** Gender distribution among participants.

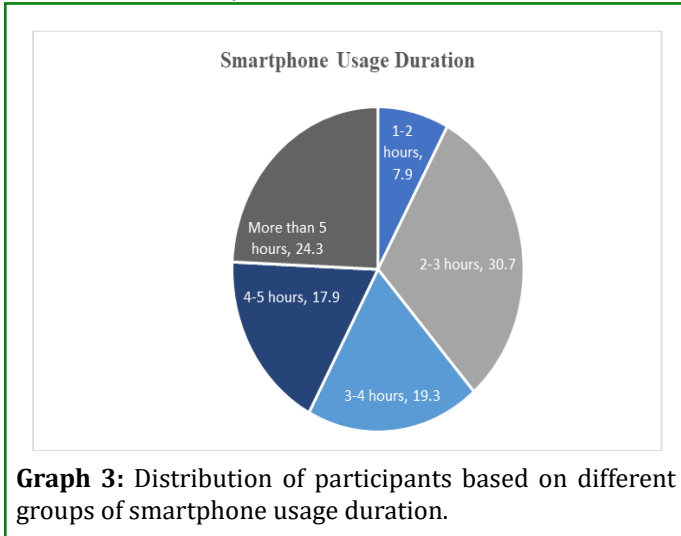


**Graph 2:** Distribution of participants based on family structure.

The majority of participants (64.3%) belonged to nuclear families, while 30.7% were from joint families, and only 5.0%

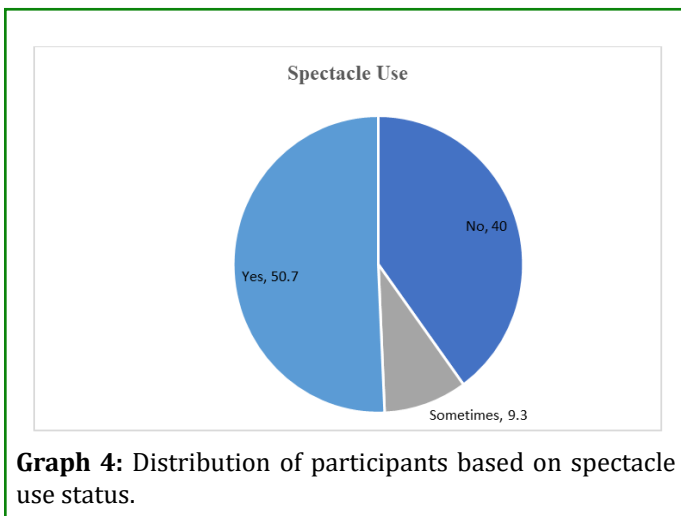
were from single-parent families, indicating a diverse family background.

Regarding smartphone usage duration, the data shows significant variation. A substantial proportion of participants reported using smartphones for extended periods, with 24.3% using them for more than 5 hours daily. Additionally, 30.7% used smartphones for 2-3 hours, while smaller percentages used them for shorter durations (7.9% for 1-2 hours) or moderate durations (19.3% for 3-4 hours and 17.9% for 4-5 hours).



**Graph 3:** Distribution of participants based on different groups of smartphone usage duration.

In terms of spectacle use, half of the participants (50.7%) reported regular use of spectacles, while 9.3% used them occasionally, and 40.0% did not use spectacles at all. These findings provide critical context for analyzing the relationships between smartphone usage, academic performance, and visual health. The observed variations underscore the relevance of studying these factors in a demographically diverse group of adolescents.



**Graph 4:** Distribution of participants based on spectacle use status.

Variables	Mean	SD
Age	15.04	1.419
Academic Performance	82.14	11.74

**Table 2:** Mean scores and SDs for age and academic performance of participants.

Smartphone Usage Duration	N	Mean	SD	F (df = 4, 135)	P
1-2 hours	11	86.25	8.79	1.736	0.146
2-3 hours	43	83.52	11.83		
3-4 hours	27	82.43	10.23		
4-5 hours	25	83.46	10.86		
More than 5 hours	34	77.85	13.5		

**Table 3:** Mean scores and SDs for academic performance of students based on different groups of smartphone usage duration along with F value.

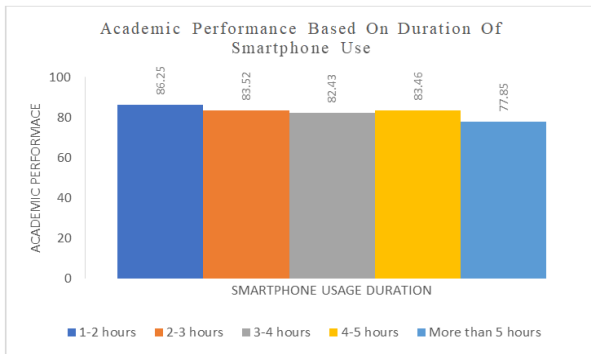
### Academic Performance Based on Smartphone Usage Duration

Table 3 presents the mean academic performance scores (out of 100) and standard deviations (SDs) for adolescents grouped by their daily smartphone usage duration. The overall mean academic performance score for all participants was 82.14 (SD = 11.74) as shown in Table 2, indicating a moderately high level of academic achievement across the sample. The data in Table 3 reveals the academic performance of students across different smartphone usage groups, with varying mean scores.

The group with 1-2 hours of smartphone usage per day had the highest mean academic performance score (M = 86.25, SD = 8.79), followed by those using smartphones for 2-3 hours (M = 83.52, SD = 11.83), 4-5 hours (M = 83.46, SD = 10.86), and 3-4 hours (M = 82.43, SD = 10.23). The group with more than 5 hours of smartphone usage per day had the lowest mean academic performance score (M = 77.85, SD = 13.50), which is notably lower than the other groups.

The analysis of variance (ANOVA) results show an F-value of 1.736 with a p-value of 0.146 (df = 4, 135), indicating that there is no statistically significant difference in academic performance among the different groups of smartphone usage duration at the 0.05 level. This suggests that while there is some variation in academic performance scores across the groups, the differences are not large enough to be considered statistically significant.

Overall, these findings suggest that smartphone usage duration does not have a strong direct impact on academic performance, although the lower scores in the "more than 5 hours" group may warrant further investigation.



\*p<0.05

**Graph 5:** Mean scores for academic performance of participants based on groups of smartphone usage duration.

	Smartphone Usage Duration	Academic Performance	Spectacle Use
Smartphone Usage Duration	1	-.189*	0.075
Academic Performance	-	1	-0.021
Spectacle Use	-	-	1

**Table 4:** Pearson's correlation coefficient between smartphone usage duration, academic performance, and spectacle use among participants.

### Relationship Between Smartphone Usage Duration, Academic Performance, and Spectacle Use

Table 4 presents the Pearson's correlation coefficients between smartphone usage duration, academic performance, and spectacle use among participants. The correlation values indicate the strength and direction of the relationships between these variables.

A significant negative correlation was found between smartphone usage duration and academic performance ( $r = -0.189$ ,  $p < 0.05$ ), suggesting that as smartphone usage duration increases, academic performance tends to decrease. This negative correlation, although modest, indicates a possible detrimental effect of prolonged smartphone use on students' academic outcomes.

There was no significant correlation between smartphone usage duration and spectacle use ( $r = 0.075$ ), indicating that the amount of time spent on smartphones does not have a substantial effect on whether or not participants use spectacles.

Similarly, the correlation between academic performance and spectacle use was also very weak and not statistically significant ( $r = -0.021$ ), suggesting that academic performance does not appear to be related to the frequency of spectacle use among the participants in this study.

In summary, the results highlight a modest negative association between smartphone usage duration and academic performance, but no significant relationships were observed between smartphone usage or academic performance and spectacle use. These findings underscore the need for further research to explore the potential impacts of excessive screen time on academic success.

## Discussion

The present study aimed to explore the effects of smartphone usage duration on academic performance and spectacle use among adolescents. The findings provide important insights into the relationship between digital habits and adolescent well-being, with implications for academic achievement and eye health.

### Hypothesis 1: There will be a significant difference in academic achievement among groups based on different durations of smartphone usage.

The first hypothesis, which predicted significant differences in academic achievement across groups with varying smartphone usage durations, was not supported by the results. Although the academic performance scores differed across groups (Table 3), the analysis of variance (ANOVA) yielded a p-value of 0.146, which is greater than the 0.05 significance threshold. This indicates that there were no statistically significant differences in academic performance between the groups. Previous studies have reported mixed findings on the impact of smartphone use on academic performance, with some suggesting negative effects [8], while others show minimal impact or even benefits [9]. The lack of a significant result in this study may be due to various factors, such as individual differences in study habits or the type of smartphone activities engaged in, which were not explored in this study. Future research could benefit from examining the specific types of smartphone usage (e.g., educational vs. recreational) and their differential effects on academic performance.

### Hypothesis 2: There will be a significant negative correlation between smartphone usage duration and academic performance among adolescents.

The second hypothesis posited that there would be a significant negative correlation between smartphone usage duration and academic performance. This hypothesis was partially supported, as a weak but significant negative correlation ( $r = -0.189$ ,  $p < 0.05$ ) was found between these two



variables (Table 4). This finding aligns with prior research that suggests excessive screen time can have a detrimental effect on academic outcomes [10]. Extended smartphone use may lead to distractions, reduced study time, and disrupted sleep patterns, all of which could negatively impact cognitive function and academic performance. However, the relatively modest correlation observed in this study indicates that other factors, such as the quality of smartphone use or external influences like family support, may play a more significant role in academic success.

**Hypothesis 3: There will be a significant positive correlation between smartphone usage duration and the prevalence of spectacle use among adolescents.**

The third hypothesis, which predicted a significant positive correlation between smartphone usage duration and spectacle use, was not supported by the results. The correlation between smartphone usage duration and spectacle use was found to be very weak and not statistically significant ( $r = 0.075$ ) (Table 4). This suggests that the amount of time adolescents spend on their smartphones does not appear to directly influence their likelihood of requiring spectacles. This finding is inconsistent with some studies that have reported an increase in eye strain and other visual problems associated with prolonged screen exposure [11]. It is possible that the sample in this study did not include enough individuals with significant visual impairments or that other factors, such as environmental lighting and screen distance, were more influential in determining spectacle use than smartphone duration.

## Conclusion

The study aimed to examine the effects of smartphone usage duration on academic performance and spectacle use among adolescents. The results revealed a weak but significant negative correlation between smartphone usage and academic performance, suggesting that prolonged smartphone use may have a modest detrimental impact on students' academic outcomes. However, no significant correlation was found between smartphone usage and the prevalence of spectacle use, indicating that screen time may not directly contribute to visual problems in this sample of adolescents. Despite the lack of significant findings on spectacle use, the study underscores the potential academic risks associated with excessive smartphone use, reinforcing the need for interventions that encourage balanced screen time. The absence of significant differences in academic performance among groups with varying smartphone usage durations highlights the complexity of the issue and suggests that other factors, such as the type of smartphone use or environmental influences, might also play a role in academic success. Future research should adopt a longitudinal design to better assess the long-term effects of smartphone usage on both academic performance and eye health. Additionally,

exploring the types of smartphone activities and their specific impacts on adolescents' well-being would provide a more nuanced understanding of how digital habits influence developmental outcomes.

## Implications and Limitations

The results of this study suggest that while smartphone usage duration may have a modest negative impact on academic performance, it does not significantly affect spectacle use in adolescents. This highlights the need for educational programs that promote responsible smartphone use, as excessive screen time may still pose risks to academic success. However, given the lack of a strong relationship between smartphone usage and spectacle use, further research is necessary to explore other contributing factors to vision problems in adolescents.

One limitation of the study is the cross-sectional design, which does not allow for causal inferences. Longitudinal studies could provide more robust evidence on the long-term effects of smartphone usage on academic performance and eye health. Additionally, the study did not account for the specific types of smartphone activities (e.g., social media, gaming, or educational apps), which could have varying effects on the outcomes of interest.

## Future Directions

Future research could explore several key areas to expand on the findings of this study:

- **Longitudinal Studies:** Conducting longitudinal studies would help determine the long-term effects of smartphone usage on academic performance and spectacle use.
- **Types of Smartphone Usage:** Investigating the specific types of smartphone activities (e.g., social media, and educational apps) could shed light on how different uses impact academic outcomes and eye health.
- **Mediating Factors:** Research could examine factors like sleep, physical activity, and parental involvement as potential mediators in the relationship between smartphone use and academic performance.
- **Visual Health:** Further studies could explore other factors influencing spectacle use, such as screen brightness, posture, and duration of screen exposure.
- **Interventions:** Evaluating the effectiveness of interventions aimed at reducing smartphone usage could provide practical solutions for mitigating its negative effects on academics and health.
- **Cultural Factors:** Exploring cultural and contextual differences in smartphone usage could enhance the understanding of its impacts on adolescents from diverse backgrounds.

### Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this study.

### References

1. Twenge JM, Krizan Z, Hisler G (2018) Decreases in psychological well-being among American adolescents after 2012 and links to screen time during the rise of smartphone technology. *Emotion* 18(6): 765-780.
2. Hawi NS, Samaha M (2016) The relations among social media addiction, self-esteem, and satisfaction with life. *Computers in Human Behavior* 35(5): 321-325.
3. Lepp A, Barkley JE, Karpinski AC (2014) The relationship between cell phone use and academic performance in a sample of U.S. college students. *SAGE Open* 4(1): 2158244014527471.
4. Cain N, Gradisar M (2010) Electronic media use and sleep in school-aged children and adolescents: A review. *Sleep Med* 11(8): 735-742.
5. Hoseini-Blum M, Rajabi H, Nourian M (2020) The effects of digital device usage on eye health and vision. *Journal of Vision Health* 14(3): 125-132.
6. Wu PC, Tsai CL, Wu HL (2016) Myopia prevention and smartphone usage patterns among children and adolescents. *Ophthalmology Journal* 21(2): 99-105.
7. Holden BA, Fricke TR, Wilson DA, Jong M, Naidoo KS, et al. (2015) Global prevalence of myopia and high myopia and temporal trends from 2000 through 2050. *Ophthalmology* 123(5): 1036-1042.
8. Kuss DJ, Griffiths MD (2017) Social Networking Sites and Addiction: Ten Lessons Learned. *Int J Environ Res Public Health* 14(3): 311.
9. Lepp A, Barkley JE, Karpinski AC (2015) The Relationship between Smartphone Use and Academic Performance. *Computers in Human Behavior* 49: 1-8.
10. Rosen LD, Lim AF, Carrier LM, Cheever NA (2013) An Empirical Examination of the Educational Impact of Text Message-Induced Distractions in the Classroom. *Computers in Human Behavior* 29(3): 1256-1265.
11. Chou RS (2009) The Effect of Computer Use on Eye Strain and Vision Problems. *Journal of the American Optometric Association* 80(10): 608-617.