INSIGHTS-IJHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

ORIGINAL RESEARCH

Volume 4 | Issue 2 | 2026
ISSN: 3007-2948

Impact of digital screen time in progression of myopia in children

Mahrukh Fatima[1]*, Saad Saleem[1], Qurba Kiran[1]

[1]Department of Rehabilitation Sciences, Faculty of Allied Health Sciences, The Superior University, Lahore, Pakistan

***Corresponding Author:** Mahrukh Fatima, Department of Rehabilitation Sciences, Faculty of Allied Health Sciences, The Superior University, Lahore, Pakistan

CONFLICT OF INTEREST
None declared.

GRANT SUPPORT
None declared.

ARTICLE TYPE
Original Research

ABSTRACT

Purpose:
The widespread adoption of digital devices among children has raised concerns about the potential impact on their eyes. This study investigates the potential link between digital screen usage and myopia progression in children.
Methods:
A cross sectional study designed, total 79 subjects were included within the age of 6 to 12 years, male 31(39.2%) female 48(60.8%) with BCVA 20/20. High astigmatic children were excluded, more than -1.00DC. Cycloplegia was performed. The questionnaire included items, age, sex, parental myopia status, multiple factors such as outdoor time, screen use time, screen type, near work activities, dim or adequate room light during study, reading in lying position or average.
Results:
The findings provide strong evidence for a significant association (p=0.002), showed positive correlation (p=0.026). Our findings are in line with those of prior research studies that have reported a positive correlation of screen time and myopia progression.
Conclusion:
The significant impact highlights the need for evidence-based guidelines and interventions to mitigate the adverse effects of prolonged screen use on eye health. Promote healthy screen use habits, such as 20-20-20 rule, adjust display settings to reduce blue light emission and promote spending time outdoors.

KEYWORDS Cycloplegia, Eye Health, Myopia Progression

INSIGHTS-IJHR
INSIGHTS-JOURNAL OF
HEALTH AND REHABILITATION

ORIGINAL RESEARCH

Volume 4 | Issue 2 | 2026
ISSN: 3007-2948

INTRODUCTION

Digital screens are indeed a factor is viewed as a potentially modifiable environmental element that may develop myopia. The link between this has yielded mixed results across studies.[1] Prolonged screen use, near work, and no outdoor activities have been linked to the development of myopia.[2] Globally, myopia rates are rising sharply. [3]

The condition's pathophysiology involves various factors, including decreased text-to-background contrast on digital screens, screen glare and reflections, suboptimal viewing distances and angles, inadequate lighting, poor posture, and reduced blink rate.[4] The precise eye movements and focusing needed to view digital screens demand a delicate balance between accommodation and convergence, further increasing susceptibility in individuals with uncorrected or under-corrected refractive errors.[5]

Children typically view screens at closer distances, leading to increased eye strain, prolonged accommodation, reduced blinking, and exposure to blue light, all factors that significantly contribute to myopia. The ciliary muscles contract to alter the lens's shape, enabling the eye to focus on objects at varying distances through a process known as accommodation, allowing the eye to focus light correctly on retina. Extended periods of focusing on nearby objects, like reading or using screens, demand continuous accommodative effort. This can lead to ciliary muscle fatigue, potentially causing these muscles to stay contracted even when shifting gaze to farther points, resulting from persistent strain. Continuous contraction of the ciliary muscles can induce structural changes in the eye, contributing to axial elongation (the measurement from the cornea to the back surface of the eye). Dr. Connie Gan and Dr. Kimberley Ngu highlight that “axial length change has the highest correlation with myopic progression”.[6] Technological devices are used at a closer distance, and prolonged screen usage has been involved in eye strain, which contributes to myopia. The development of myopia is attributed to a mix of genetic predisposition and environmental influences.[7]

The WHO reports that at least 2.2 billion people worldwide have a near or distance vision impairment. However, organization doesn't specify that a significant proportion of those affected are under 18 years old.[8] Screen use is a major factor for vision problems in children at population level.[9] Eye strain and fatigue can occur after just 60 minutes of smart phone use. [10], and the longer children use computers, the higher their risk of developing or worsening vision disorders.[11] Digital screen use is linked to a higher risk of myopia in children, with studies suggesting it explains around 25% of myopia cases in Danish youths. Prolonged screen time, especially over 6 hours a day, increases the risk of developing myopia.[12] In India, found that screen time exceeding 2 hours daily was linked to increased myopic progression rates. Notably, the impact of screen time was more pronounced in areas with lower myopia prevalence.[13] In China, research showed that just 60 minutes of daily computer use was significantly linked to myopia. [14]

MATERIAL AND METHODS

This cross-sectional study was conducted at Optical Lahore over a period of four months. A total of 79 myopic children were recruited using a non-probability convenient sampling technique. The sample size was estimated through G*Power software based on findings from previous studies. Both male and female children aged 6 to 12 years with best-corrected visual acuity of 6/6 and no ocular pathology were included. Participants had a spherical equivalent cylinder ranging from 0.50 to 1.00 diopters and were free from systemic diseases or medications affecting vision. Children with cataract, ocular opacities, fundus pathology, strabismus, history of ocular surgery, or astigmatism greater than 1.00 diopter were excluded. Visual acuity was assessed without refractive correction using a logarithmic chart at a distance of 6 meters. Cycloplegic refraction was performed using cyclopentolate, followed by objective and subjective refraction with a retinoscope, autorefractometer, trial box, and Snellen chart. A structured questionnaire was administered to collect demographic data and assess risk factors including family history of myopia and lifestyle habits. Information regarding sleep patterns, outdoor activities, screen time, homework duration, reading habits, lighting conditions, posture, and reading distance was obtained. Data were entered and analyzed using SPSS version 26. Since the data were not normally distributed, non-parametric statistical tests were applied. The Chi-square test was used to determine associations and correlations between study variables, with results considered statistically significant at an appropriate confidence level.

RESULTS

Table 1: : Frequency Distribution of GENDER OF PARTICIPANTS

Table 1 shows there are total 79 patients. 31(39.2%) are males and 48 (60.8%) are females.

Gender	Frequency
Male	31(39.2%)
Female	48(60.8%)
Total	79(100%)

INSIGHTS-IJHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION
ORIGINAL RESEARCH
Volume 4 | Issue 2 | 2026
ISSN: 3007-2948

Table 2: : Frequency Distribution of AGE OF THE PARTICIPANTS

Table 2 shows that there are total two age groups in this study. 31 (39.2%) patients from age group no.1 (6 to 9 years) and 48 (60.8%) patients from age group no.2 (10 to 12 years).

Age	Frequency
6-9 years	31(39.2%)
10-12 years	48(60.8%)
Total	79(100%)

Table 3: Involving Factors in Progression Of Myopia

Table 3 shows the percentage and frequencies of other involving factors in progression of myopia. Is there any myopic history or not, children have outdoor activities or not, reading while laying down or not, average reading distance is normal or closer to eyes, already glasses user or first time diagnosed myopia, adequate room light during Study or dim, taking breaks after 20 or 30 minutes during reading or screen using. These all factors includes to finding out the actual causes of progression in children.

Factors	Yes	No
Myopic History	31(39.2%)	48(60.8%)
Outdoor Activities	52(65.8%)	27(34.2)
Reading While laying down	34(43%)	45(57%)
Average reading distance	61(77.2%)	18(22.8%)
Already using glasses	68(86.1%)	11(12.9%)
Room light during Study	66(83.5%)	13(16.5%)
Break Interval during Screen	27(34.2%)	52(65.8%)

Table 4: Frequency of Screen Type

Table 4 shows that 43(54.4%) subjects using mobile or tablet and 36(45.6%) subjects were using laptop or TV most of the time.

Screen Type	Frequency
Mobile/Tablet	43(54.4%)
Laptop/TV	36(45.6%)
Total	79(100%)

Table 5: Frequency of Daily Screen Time

Table 5 shows there were three time categories for users. 19(24.1%) subjects were using screen almost 2 hours per day, 19(24.1%) subjects were using screen 2 to 4 hours per day and there were total 41(51.9%) subjects that using screen more than 4 hours a day.

Daily Screen Time	Frequency
2 hours	19(24.1%)
2 to 4 hours	19(24.1%)
More than 4 hours	41(51.9%)
Total	79(100%)

Table 6: Degree of Myopia

Table 6 shows the degree of myopia. Subjects with mild myopia (45.6%) were high as compared to other. 31(39.2%) subjects found with moderate myopia and there were total 12(15.2%) subjects with severe myopia.

Degree of Myopia	Frequency
Mild	36(45.6%)
Moderate	31(39.2%)
Severe	12(15.2%)
Total	79(100%)

Table 7: Myopia Duration

Table shows the duration years of myopic subjects. There were total 3 categories. 39(49.4%) subjects from 1st category with the duration of 1 to 2 years, 34(43.0%) subjects myopia duration was 3 to 4 years and 6(7.6%) subjects with duration of 5 to 6 years.

Myopia Duration	Frequency
1 to 2 years	39(49.4%)
3 to 4 years	34(43.0%)
5 to 6 years	6(7.6%)
Total	79(100%)

INSIGHTS-IJHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION
ORIGINAL RESEARCH
Volume 4 | Issue 2 | 2026
ISSN: 3007-2948

Table 8: Descriptive Statistics:

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Myopic history	79	1.00	2.00	1.6076	.49141
Daily Screen Time	79	1.00	3.00	2.0127	.79249
Screen Type	79	1.00	2.00	1.4557	.50122
Degree of Myopia	79	1.00	3.00	1.6962	.72243
Outdoor Activities	79	1.00	2.00	1.3418	.47733
Outdoor Time	79	1.00	3.00	1.7215	.67817
Reading While Lying Down	79	1.00	2.00	1.5696	.49829
Average Reading Distance	79	1.00	2.00	1.2278	.42212
Myopia Duration	79	1.00	3.00	1.5823	.63261
Use of Glasses	79	1.00	2.00	1.1392	.34841
Room Light	79	1.00	2.00	1.8354	.37315

Table 8: Test of Normality

The normality of the data was assessed using the Shapiro-Wilk test. This test is particularly reliable for small sample sizes. A variable is considered normally distributed if the significance (p-value) is greater than 0.05.

Shapiro-Wilk	Statistic	df	Sig.
Degree of Myopia	.774	79	.000
Daily Screen Time	.803	79	.000

The Shapiro-Wilk applied to assess the normality of two variables: Degree of Myopia and Daily Screen Time. These variables produced p-values lower than 0.05, indicating that the data for each not normally distributed. Given these results, non-parametric statistical test such as the Chi Square test considered appropriate for subsequent analysis.

Table 9: Correlation of myopia progression with Digital screen time

Spearman's rho	p-value
Degree of Myopia	0.026
Daily Screen Time	0.026

Table 9 shows the correlation of myopia progression with Digital screen time shows a significant value (p-value <0.05) which means there is a strong relation of both variables.

Table 10: Statistics of myopia progression with Digital screen time by Chi Square Test

Test	Daily Screen Time	Degree of Myopia
Chi-Square	12.253a	12.177a
Df	2	2
Asymp. Sig	.002	.002

Table 10 shows the null hypothesis of independence is rejected, indicating a statistically significant (p-value > 0.05) association between the variables. The significant association indicates that the variables are related, and change in one variable is associate with change in other.

DISCUSSION

Finding provides strong evidence for a significant association between digital screen time and the progression of myopia. The significant results obtained in this research support the growing body of evidence that prolonged digital screen use is a contributing factor to the development of myopia. These results are consistent with previous studies that have reported a positive correlation between screen time and myopia progression.

Blue light emitted by digital devices like smart phones, computers, and TVs. Digital Eye Strain: Blue light can contribute to eye fatigue. Sleep Disruption: Can suppress melatonin production, affecting sleep patterns. Retinal Cell Impact: Some studies suggest blue light may have potential toxic effects on retinal cells, though human evidence is limited and complex.

The impact of blue light may depend on exposure intensity and duration. Children's eyes are more susceptible to blue light due to clearer lenses letting more light reach retina. Sunlight is artificial sources add to overall exposure.

Healthy screen use habits, such as following:

1. 20-20-20 rule:
2. Every 20 minutes, look away from the screen and focus on something 20 feet away for 20 seconds.
3. Relaxes focusing muscles to helps reduce eye fatigue from continuous near-focus on screens.

INSIGHTS-IJHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION
ORIGINAL RESEARCH
Volume 4 | Issue 2 | 2026
ISSN: 3007-2948

4. Encourages blinking to help with dry eyes, as people often blink less when staring at screens.
5. Breaks screen fixation to give eyes a brief respite from digital device use.

Promote spending time outdoors, as natural light exposure has been associated with a lower risk of developing myopia. By understanding this relationship individuals can take proactive steps to reduce their risk of developing myopia and slow its progression. Outdoor light exposure is thought to play a role in this potential protective effect. Some research hints at a possible association between more outdoor time and lower myopia risk. Bright outdoor light might influence eye growth patterns. Light exposure can stimulate dopamine release in the retina, potentially affecting eye growth. Outdoor activities might balance screen time or other near-work activities associated with myopia risk.

Research on blue light's long-term ocular effects is ongoing and sometimes conflicting. Blue light's impact likely depends on overall lifestyle, screen habits, and individual factors. Genetics, screen time, reading habits also influence myopia risk. Effects might be more pronounced in younger children. Research results aren't uniform; more studies are ongoing. The reducing digital screen time or implementing strategies to minimize its impact on eye health could be an effective way to slow the progression of myopia.

Study's findings on reading while lying down potentially influencing myopia progression. Lying down might lead to closer reading distances or unusual viewing angles, potentially stressing the focusing system of the eyes. Reading in a reclined position could lead to less stable posture, affecting how text is viewed. Prolonged near work (like reading) in non-optimal positions might contribute to accommodative stress, linked in some theories to myopia development. Focused activities like reading might lead to decreased blinking, contributing to eye strain.

Eyes work harder focusing on near objects; abnormal patterns might influence eye growth in children. Patterns of near work (like prolonged reading) are considered risk factors for myopia in some studies. Encourage Good Reading Habits, adequate lighting, comfortable posture, appropriate viewing distances and balance activities, near work with outdoor time and breaks. This study explores links between near work, posture, lighting, and myopia progression.

Exposure to computers and TVs was linked to a higher incidence of myopia, whereas smart phone use didn't show a significant correlation. This suggests that the type of screen or device may influence the risk of developing myopia, with certain devices potentially having a greater impact than others.. Eye care advice might need tailoring based on device types and usage habits. Computers often have a fixed viewing distance (typically farther than handheld devices like smart phones), potentially affecting accommodative demands differently. Differences in screen resolution refresh rates, blue light emission, and glare might play roles. People might use computers for prolonged, focused tasks (like work/study), whereas smart phone use can be more fragmented (shorter bursts, varied contexts).

The widespread digitalization of education has made it increasingly difficult to limit computer screen time, particularly when compared to restricting leisure-based screen time on devices like smart phones or gaming consoles. This shift highlights the need for effective strategies to manage screen time in both educational and recreational contexts.

Finding suggesting dim light during reading or study might contribute to myopia progression aligns with some research exploring environmental lighting conditions and eye health. Dim lighting can increase eye strain as pupils dilate to let in more light, potentially affecting focusing effort. In low light, eyes might work harder to focus, possibly influencing accommodative mechanisms linked to myopia in some theories. Dim light might lead to closer reading distances or squinting, impacting visual demands. Reduced lighting can decrease text contrast, making reading more challenging. Bright light exposure (like outdoor light) is thought to stimulate retinal dopamine, potentially influencing eye growth patterns. Research on lighting, near work, and myopia shows mixed but intriguing results. So, encourage sufficient lighting for reading and tasks to reduce strain. Close Viewing Distances contribute in progression of myopia, handheld devices often encourage closer viewing distances, adding to visual stress. Need proper lighting and ergonomics - Optimize screen settings and workspace.

Future research should investigate the effectiveness of interventions aimed at reducing digital screen time and promoting healthy screen use habits. Additionally, studies could explore the potential benefits of novel technologies, such as blue light filtering glasses or apps that track and limit screen time.

Population demographics, study design, and measurement methods can influence findings. Research on screens and myopia shows varied results; more studies are needed.

CONCLUSION

The significant impact highlights the need for evidence-based guidelines and interventions to alleviate adverse effects of screen use on vision. Adopt healthy screen use habits, such as 20-20-20 rule, adjust display settings to reduce blue light emission and promote spending time outdoors.

INSIGHTS-IJHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION
ORIGINAL RESEARCH
Volume 4 | Issue 2 | 2026
ISSN: 3007-2948

REFRENCES

1. Lanca, C. and S.M. Saw, The association between digital screen time and myopia: A systematic review. Ophthalmic and Physiological Optics, 2020. 40(2): p. 216-229.
2. Wong, C.W., et al., Digital screen time during the COVID-19 pandemic: risk for a further myopia boom? American journal of ophthalmology, 2021. 223: p. 333-337.
3. Foreman, J., et al., Association between digital smart device use and myopia: a systematic review and meta-analysis. The Lancet Digital Health, 2021. 3(12): p. e806-e818.
4. Sheppard, A.L. and J.S. Wolffsohn, Digital eye strain: prevalence, measurement and amelioration. BMJ open ophthalmology, 2018. 3(1).
5. Németh, J., et al., Update and guidance on management of myopia. European Society of Ophthalmology in cooperation with International Myopia Institute. European journal of ophthalmology, 2021. 31(3): p. 853-883.
6. Ayyagari, A.V., Understanding Myopia in the Digital Age: The Role of Screen Time in Myopia Prevalence.
7. Martínez-Albert, N., I. Bueno-Gimeno, and A. Gené-Sampedro, Risk factors for myopia: A review. Journal of Clinical Medicine, 2023. 12(18): p. 6062.
8. Organization, W.H., World report on vision. 2019.
9. Smaldone, G., et al., Computer use and onset of myopia in children: a systematic review. Senses and sciences, 2015. 2(1).
10. Long, J., et al., Viewing distance and eyestrain symptoms with prolonged viewing of smartphones. Clinical and Experimental Optometry, 2017. 100(2): p. 133-137.
11. Paudel, P., et al., Prevalence of vision impairment and refractive error in school children in B a R ia – V ung T au province, V ietnam. Clinical & experimental ophthalmology, 2014. 42(3): p. 217-226.
12. Hansen, M.H., et al., Low physical activity and higher use of screen devices are associated with myopia at the age of 16-17 years in the CCC2000 Eye Study. Acta ophthalmologica, 2020. 98(3): p. 315-321.
13. Saxena, R., et al., Prevalence of myopia and its risk factors in urban school children in Delhi: the North India Myopia Study (NIM Study). PloS one, 2015. 10(2): p. e0117349.
14. Guan, H., et al., Impact of various types of near work and time spent outdoors at different times of day on visual acuity and refractive error among Chinese school-going children. PloS one, 2019. 14(4): p. e0215827.
15. Berticat, C., et al., Probability of myopia in children with high refined carbohydrates consumption in France. BMC ophthalmology, 2020. 20: p. 1-8.
16. Yang, G.-Y., et al., Associations between screen exposure in early life and myopia amongst Chinese preschoolers. International journal of environmental research and public health, 2020. 17(3): p. 1056.
17. Khalaf, A.M., et al., Prevalence of Myopia Among Schoolchildren and the Impact of Increased Screen Time: A Systematic Review. Cureus, 2024. 16(8): p. e66815.
18. Xie, J., C. Lu, and J. Zhu, Screen time and myopia: A serial multiple mediator SEM analysis. Frontiers in Public Health, 2022. 10: p. 860098.
19. Filkina, O., et al., Long use of digital devices as a risk factor that causes myopia occurrence in schoolchildren. Health Risk Analysis, 2020(4): p. 77-84.
20. Swetha, K., EVALUATING THE IMPACT OF DIGITAL SCREEN USE ON PAEDIATRIC MYOPIA DEVELOPMENT: A CROSS-SECTIONAL ANALYSIS. Int J Acad Med Pharm, 2023. 5(6): p. 243-246.
21. Mohan, A., et al., Impact of online classes and home confinement on myopia progression in children during COVID-19 pandemic: Digital eye strain among kids (DESK) study 4. Indian journal of ophthalmology, 2022. 70(1): p. 241-245.
22. National Academies of Sciences, E. and Medicine, Onset and Progression of Myopia, in Myopia: Causes, Prevention, and Treatment of an Increasingly Common Disease. 2024, National Academies Press (US).
23. AlShamlan, F.T., et al., Myopia progression in school children with prolonged screen time during the coronavirus disease confinement. Medical Hypothesis, Discovery and Innovation in Ophthalmology, 2023. 12(2): p. 90.