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Screen habits in childhood and self-reported myopia in rural young adulthood: a community based cross-sectional study.

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Abstract

Background: Myopia is a growing public health concern, and prolonged childhood screen exposure has been proposed as a modifiable risk factor. However, evidence linking recalled childhood screen-use habits with myopia among rural young adults remains limited, as most existing studies are urban, clinical, or student-based. ***Objective:*** To assess the association between childhood screen-use habits and self-reported myopia among rural young adults aged 18-25 years. ***Methods:*** A community-based analytical cross-sectional study was conducted in the field-practice area of a Rural Health Training Centre. Using total enumeration, 250 eligible young adults aged 18-25 years, residing in two villages for at least six months, were interviewed using a pretested, structured questionnaire covering sociodemographic characteristics, recalled childhood (6-17 years) screen-use habits, outdoor activity, parental history of myopia, and self-reported previously diagnosed myopia. Associations were assessed using the chi-square or Fisher's exact test, with p<0.05 considered significant. ***Results:*** Self-reported myopia was present in 99 participants (39.6%). Myopia prevalence increased significantly with daily childhood screen exposure, from 18.5% among those exposed for less than 2 hours per day to 58.0% among those exposed for more than 4 hours (p<0.001). Myopia was also significantly more common among participants who began regular screen use before 10 years of age (52.3%; p=0.008), maintained a viewing distance below 30 cm (54.0%; p<0.001), rarely or never took breaks during screen use (53.5%; p=0.001), and used screens under inadequate lighting (51.0%; p=0.005). A significant inverse association was observed with outdoor activity, with myopia present in 56.7% of participants spending less than 1 hour outdoors daily compared with 25.6% of those spending at least 2 hours (p=0.001). Myopia prevalence rose with parental history, from 26.3% with no affected parent to 71.4% with both parents affected (p<0.001). Neither predominant screen device (p=0.133) nor sex (p=0.458) was significantly associated with myopia. ***Conclusion:*** Childhood screen-use behaviours-particularly total exposure duration, early initiation, close viewing distance, infrequent breaks, and inadequate lighting-along with limited outdoor activity and parental history, were significantly associated with self-reported myopia among rural young adults. Community-based health education promoting healthier screen habits and outdoor activity, along with periodic vision screening, may help reduce the burden of myopia in similar rural populations.

Keywords: Myopia; Screen time; Digital device use; Outdoor activity; Rural population; Young adults.

INTRODUCTION

Myopia is a common refractive error in which parallel rays of light are focused in front of the retina, resulting in blurred distance vision.[1] It is generally defined as a spherical equivalent refractive error of −0.50 dioptres or less. The prevalence of myopia has increased considerably among children, adolescents, and young adults, making it an important public health concern. [2] When unrecognized or inadequately corrected, myopia can interfere with educational performance, occupational functioning, and quality of life. In addition, individuals with myopia have an increased long-term risk of ocular complications, including retinal detachment, myopic maculopathy, glaucoma, and cataract. [3]

The development of myopia is multifactorial and reflects an interaction between genetic susceptibility and environmental or behavioural exposures. [4] Parental myopia is an established risk factor, with the likelihood of myopia increasing when one or both parents are affected. [5] Environmental factors such as prolonged close viewing, reduced outdoor activity, early initiation of visually demanding activities, and urban living may further influence its development. [6] Exposure during childhood is particularly important because ocular growth and refractive development continue throughout this period, making the eyes more susceptible to behavioural and environmental influences. [7]

The widespread availability of smartphones, tablets, televisions, computers, and laptops has substantially altered the visual behaviour of children. [8] Digital devices are now used for education, communication, entertainment, and social interaction, often resulting in several hours of daily screen exposure. [9] Smartphones and tablets may create greater visual demands because they are commonly viewed at short distances and used continuously without adequate breaks. [10] Prolonged screen exposure may increase accommodative demand and contribute to sustained close focusing, while inappropriate viewing distance, inadequate lighting, and infrequent visual breaks may intensify visual strain. Early and repeated exposure to these behaviours may influence refractive development during childhood. [11]

Outdoor activity has been recognized as a potentially protective behavioural factor against the development of myopia. [12] Greater exposure to natural light and engagement in distance-viewing activities may help regulate ocular growth and reduce the visual demands associated with prolonged screen use. [13] Conversely, children who spend limited time outdoors may have greater opportunities for screen exposure and other indoor activities. Therefore, the relationship between screen habits and myopia should be assessed alongside outdoor activity, parental history, age at initiation of screen use, viewing distance, lighting conditions, and the frequency of breaks during prolonged screen use. [14]

Existing evidence regarding the relationship between digital screen exposure and myopia remains inconsistent. Several investigations and pooled analyses have demonstrated an association between longer screen exposure and myopia, including evidence of increasing risk with each additional hour of daily use. [15] However, other studies have reported weak or nonsignificant associations, particularly after accounting for outdoor activity, genetic susceptibility, and related behavioural factors. Differences in age groups, device types, definitions of screen exposure, refractive assessment methods, and reliance on self-reported screen habits may explain this variation. The independent effects of screen duration and specific viewing behaviours therefore require further evaluation. [16]

Young adults aged 18–25 years provide an opportunity to examine the possible cumulative influence of childhood screen habits on subsequent refractive status. Nevertheless, evidence linking recalled childhood screen exposure with self-reported previously diagnosed myopia among young adults remains limited, particularly in the context of increasing smartphone and tablet use. Therefore, the present study aimed to assess the association between childhood screen-use habits and self-reported myopia among rural young adults aged 18–25 years.

Aims and Objectives

Aim

To assess the association between childhood screen-use habits and myopia among rural young adults aged 18–25 years.

Objectives

1. To determine the prevalence and diagnostic characteristics of myopia among rural young adults aged 18–25 years.
2. To assess the association of childhood screen exposure, screen-use practices, outdoor activity, parental history of myopia, and selected sociodemographic factors with myopia among rural young adults.

MATERIALS AND METHODS

Study Design and Setting

A community-based analytical cross-sectional questionnaire survey was conducted in the field-practice area of the Rural Health Training Centre (RHTC), Department of Community Medicine. The community-based design was selected to assess self-reported myopia and childhood screen-use patterns among young adults residing in a defined rural population without restricting recruitment to individuals attending an eye-care facility.

Study Population

The study population comprised young adults aged 18–25 years residing in two villages covered by the RHTC. Individuals who had resided in the study area for at least six months before recruitment were considered eligible residents. A total of 250 eligible young adults participated in the study.

Study Duration

The study was conducted over a period of two months. Participant enumeration, recruitment, questionnaire administration, data entry, and statistical analysis were completed during this period.

Inclusion and Exclusion Criteria

Young adults aged 18–25 years who had resided in the RHTC field-practice area for at least six months, were willing to participate, provided written informed consent, and could recall their childhood screen-use habits were included.

Individuals who were unable to provide reliable information because of cognitive or communication difficulties, those with a self-reported history of ocular trauma, refractive surgery, or ocular disorders causing visual impairment unrelated to refractive error, and those who submitted incomplete questionnaire responses were excluded.

Sample Size and Sampling Technique

The sample size was calculated based on the 44.87% prevalence of myopia among young adults reported by Kayina et al. [19]. Using the single-population proportion formula, $n = Z^2pq/d^2$, where Z = 1.96 at a 95% confidence level, p = 44.87% (0.4487), q = 1 − p = 55.13% (0.5513), and d = 6.2% (0.062) absolute precision, the sample size was calculated as $n = (1.96)^2 \times 0.4487 \times 0.5513/(0.062)^2 = 247.2$, which was rounded to 248. To ensure an adequate sample, 250 participants were included in the study. The two villages were selected purposively based on feasibility and accessibility, following which all eligible young adults were included through total enumeration.

Study Procedure

Data were collected through face-to-face interviews using a pretested, structured questionnaire. The questionnaire was prepared in English, translated into Tamil, and back-translated into English to ensure conceptual consistency. It was pretested among young adults residing outside the selected field-practice area, and the necessary modifications were made before data collection.

The questionnaire collected information regarding age, sex, socioeconomic status, family type, childhood outdoor activity, sleep duration, parental history of myopia, previous eye examinations, and current awareness of healthy screen-use practices. Childhood screen-use habits between 6 and 17 years of age were assessed through participant recall. Screen-related information included average daily screen exposure, predominant screen device, age at initiation of regular screen use, usual screen-viewing distance, frequency of breaks during prolonged screen use, and screen use under inadequate lighting.

All participants were asked whether they had previously been diagnosed with myopia by an ophthalmologist or optometrist and whether spectacles or contact lenses had been prescribed for distance correction. Participants reporting previously diagnosed myopia were asked additional questions regarding their age at diagnosis, mode of initial detection, and current corrective method. No visual-acuity testing, objective refraction, cycloplegic refraction, or other ophthalmological examination was performed as part of the study.

Operational Definitions

Self-reported myopia: A participant-reported history of a previous diagnosis of myopia by an ophthalmologist or optometrist, with a history of being prescribed spectacles or contact lenses for distance correction. The diagnosis was not verified through refraction during the study.

Childhood screen exposure: The participant's recalled average daily duration of exposure to smartphones, tablets, televisions, computers, or laptops between 6 and 17 years of age. It was categorized as <2, 2–4, or >4 hours per day.

Regular screen use: Use of an electronic screen device on most days of the week for educational, communication, entertainment, or recreational purposes.
Predominantly used screen device: The electronic device on which the participant reported spending the greatest proportion of childhood screen time.
Age at initiation of regular screen use: The age at which the participant began using an electronic screen device regularly. It was categorized as <10, 10–14, or 15–17 years.
Screen-viewing distance: The usual distance between the participant's eyes and the screen, categorized as <30, 30–39, or ≥40 cm.
Breaks during screen use: Interruptions taken during prolonged screen exposure, categorized as frequent, occasional, or rare/none.
Inadequate lighting: Use of a screen in dark or dimly illuminated surroundings without sufficient ambient light.
Childhood outdoor activity: The recalled average daily duration spent outdoors during childhood, categorized as <1, 1 to <2, or ≥2 hours per day.
Parental history of myopia: A participant-reported history of diagnosed myopia in neither parent, one parent, or both parents.
Adequate childhood sleep: A participant-reported average sleep duration considered appropriate for their age during childhood.
Regular childhood eye examination: A reported history of undergoing a routine eye examination at least once every two years during childhood, irrespective of the presence of visual symptoms.

Current awareness of healthy screen-use practices: Awareness of measures such as maintaining an appropriate viewing distance, using adequate ambient lighting, taking regular visual breaks, and limiting prolonged screen exposure.
Socioeconomic status: Socioeconomic status was classified using the modified BG Prasad classification applicable to the study period and was grouped as upper/upper-middle, middle, or lower-middle/lower.

Statistical Analysis

Data were entered into Microsoft Excel and analysed using IBM SPSS Statistics for Windows, version 26.0. Continuous variables were summarized using mean and standard deviation, while categorical variables were presented as frequencies and percentages. The prevalence of self-reported myopia was calculated as the proportion of participants reporting a previous diagnosis of myopia. Associations between childhood screen-use habits, selected participant characteristics, and self-reported myopia were assessed using the Pearson chi-square test or Fisher's exact test, where appropriate. A p value <0.05 was considered statistically significant.

Ethical Consideration

Ethical approval was obtained from the Institutional Ethics Committee before commencement of the study. Written informed consent was obtained from every participant after explaining the study's purpose, procedures, voluntary nature, potential benefits, and minimal risks. Confidentiality was maintained by assigning unique identification numbers, and personally identifiable information was stored separately from the study data. Participants were permitted to withdraw at any stage without affecting their access to healthcare services. Participants reporting visual difficulties or previously diagnosed refractive errors were counselled to undergo an ophthalmological examination and were referred to an appropriate eye-care facility. The study was conducted in accordance with the principles of the Declaration of Helsinki and applicable national ethical guidelines.

RESULTS

Table 1. Distribution of Participants According to Sociodemographic Characteristics (N = 250)

Characteristic	Category	n	%
Age group (years)	18–20	78	31.2
	21–23	112	44.8
	24–25	60	24.0
Sex	Male	112	44.8
	Female	138	55.2
Socioeconomic status	Upper/upper-middle	62	24.8
	Middle	124	49.6
	Lower-middle/lower	64	25.6
Type of family	Nuclear	174	69.6
	Joint/extended	76	30.4

The mean age of the 250 participants was 21.6 ± 2.1 years. Most participants were aged 21–23 years (n = 112, 44.8%), followed by those aged 18–20 years (n = 78, 31.2%) and 24–25 years (n = 60, 24.0%). Females constituted 55.2% (n = 138) of the study population, while males accounted for 44.8% (n = 112). Regarding socioeconomic status, nearly half belonged to the middle socioeconomic category (n = 124, 49.6%), followed by the lower-middle/lower (n = 64, 25.6%) and upper/upper-middle categories (n = 62, 24.8%). Most participants belonged to nuclear families (n = 174, 69.6%), while 76 (30.4%) belonged to joint or extended families (Table 1).

Table 2. Distribution of Participants According to Childhood Screen-Use Habits and Viewing Practices (N = 250)

Screen-use characteristic	Category	n	%
Daily childhood screen exposure	<2 hours/day	54	21.6
	2–4 hours/day	108	43.2
	>4 hours/day	88	35.2
Predominantly used screen device	Smartphone/tablet	148	59.2
	Television	58	23.2
	Computer/laptop	44	17.6
Age at initiation of regular screen use	<10 years	86	34.4
	10–14 years	110	44.0
	15–17 years	54	21.6
Usual screen-viewing distance	<30 cm	100	40.0
	30–39 cm	96	38.4
	≥40 cm	54	21.6

Breaks during prolonged screen use	Frequent	73	29.2
	Occasional	91	36.4
	Rare/none	86	34.4
Screen use under inadequate lighting	Yes	98	39.2
	No	152	60.8

Note. Childhood screen exposure was assessed through participant recall for the period between 6 and 17 years of age.

Regarding recalled childhood screen exposure between 6 and 17 years of age, 43.2% (n = 108) of the participants reported using screens for 2–4 hours per day, while 35.2% (n = 88) reported more than 4 hours and 21.6% (n = 54) reported less than 2 hours per day. Smartphones or tablets were the predominant devices used (n = 148, 59.2%), followed by television (n = 58, 23.2%) and computers or laptops (n = 44, 17.6%). Regular screen use was most commonly initiated between 10 and 14 years of age (n = 110, 44.0%), whereas 34.4% (n = 86) began before 10 years. A viewing distance of less than 30 cm was reported by 40.0% (n = 100), and 34.4% (n = 86) rarely or never took breaks during prolonged screen use. Furthermore, 39.2% (n = 98) reported using screens under inadequate lighting conditions (Table 2).

Table 3. Distribution of Participants According to Outdoor Activity, Family History, and Eye-Care Practices (N = 250)

Characteristic	Category	n	%
Average childhood outdoor activity	<1 hour/day	67	26.8
	1–<2 hours/day	105	42.0
	≥2 hours/day	78	31.2
Parental history of myopia	Neither parent	152	60.8
	One parent	70	28.0
	Both parents	28	11.2
Adequate sleep during childhood	Yes	158	63.2
	No	92	36.8
Regular childhood eye examination	Yes	84	33.6
	No	166	66.4
Current awareness of healthy screen practices	Yes	72	28.8
	No	178	71.2

Regarding childhood outdoor activity, 42.0% (n = 105) of the participants reported spending 1 to less than 2 hours outdoors per day, while 31.2% (n = 78) spent at least 2 hours and 26.8% (n = 67) spent less than 1 hour outdoors daily. Most participants had no parental history of myopia (n = 152, 60.8%), whereas 28.0% (n = 70) had one myopic parent and 11.2% (n = 28) had both parents affected. Adequate age-appropriate sleep during childhood was reported by 63.2% (n = 158). However, only 33.6% (n = 84) underwent regular childhood eye examinations, and 28.8% (n = 72) were aware of healthy screen-use practices. Thus, most participants did not undergo regular eye examinations (n = 166, 66.4%) and lacked awareness of healthy screen practices (n = 178, 71.2%) (Table 3).

Table 4. Prevalence and Diagnostic Characteristics of Self- Reported Myopia Among the Participants (N = 250)

Characteristic	Category	n	%
Self-reported Myopia status	Present	99	39.6
	Absent	151	60.4
Age at diagnosis of myopia (n = 99)	<12 years	30	30.3
	12–17 years	45	45.5
	≥18 years	24	24.2
Mode of initial detection (n = 99)	Routine eye examination	32	32.3
	Visual difficulty or ocular symptoms	67	67.7
Current corrective method (n = 99)	Spectacles	78	78.8
	Contact lenses	13	13.1
	Not using correction	8	8.1

Self-reported myopia was present in 99 participants (39.6%), while 151 (60.4%) did not report myopia. Among participants reporting myopia, the condition was most frequently diagnosed between 12 and 17 years of age (n = 45, 45.5%), followed by before 12 years (n = 30, 30.3%) and at 18 years or older (n = 24, 24.2%). Visual difficulty or ocular symptoms were the most frequently reported reason for the initial diagnosis (n = 67, 67.7%), whereas 32 participants (32.3%) reported that myopia was detected during a routine eye examination. Spectacles were the most commonly reported corrective method (n

= 78, 78.8%), followed by contact lenses (n = 13, 13.1%), while eight participants (8.1%) were not currently using any corrective method (Table 4).

Table 5. Association of Childhood Screen Habits and Selected Factors with Self-Reported Myopia (N = 250)

Characteristic	Category	Self-Reported Myopia present, n (%)	Self-Reported Myopia absent, n (%)	p-value
Daily childhood screen exposure	<2 hours/day	10 (18.5)	44 (81.5)	<0.001*
	2–4 hours/day	38 (35.2)	70 (64.8)	
	>4 hours/day	51 (58.0)	37 (42.0)	
Predominantly used screen device	Smartphone/tablet	66 (44.6)	82 (55.4)	0.133
	Television	20 (34.5)	38 (65.5)	
	Computer/laptop	13 (29.5)	31 (70.5)	
Age at initiation of regular screen use	<10 years	45 (52.3)	41 (47.7)	0.008*
	10–14 years	39 (35.5)	71 (64.5)	
	15–17 years	15 (27.8)	39 (72.2)	
Screen-viewing distance	<30 cm	54 (54.0)	46 (46.0)	<0.001*
	30–39 cm	33 (34.4)	63 (65.6)	
	≥40 cm	12 (22.2)	42 (77.8)	
Breaks during screen use	Frequent	18 (24.7)	55 (75.3)	0.001*
	Occasional	35 (38.5)	56 (61.5)	
	Rare/none	46 (53.5)	40 (46.5)	
Screen use under inadequate lighting	Yes	50 (51.0)	48 (49.0)	0.005*
	No	49 (32.2)	103 (67.8)	
Childhood outdoor activity	<1 hour/day	38 (56.7)	29 (43.3)	0.001*
	1–<2 hours/day	41 (39.0)	64 (61.0)	
	≥2 hours/day	20 (25.6)	58 (74.4)	
Parental history of myopia	Neither parent	40 (26.3)	112 (73.7)	<0.001*
	One parent	39 (55.7)	31 (44.3)	
	Both parents	20 (71.4)	8 (28.6)	
Sex	Male	41 (36.6)	71 (63.4)	0.458
	Female	58 (42.0)	80 (58.0)	

*Statistically significant

Daily childhood screen exposure was significantly associated with myopia (p < 0.001), with the prevalence increasing from 18.5% (n = 10) among those exposed for less than 2 hours per day to 35.2% (n = 38) among those exposed for 2–4 hours and 58.0% (n = 51) among those exposed for more than 4 hours. Myopia was significantly more prevalent among participants who initiated regular screen use before 10 years of age (n = 45, 52.3%; p = 0.008), maintained a viewing distance of less than 30 cm (n = 54, 54.0%; p < 0.001), rarely or never took breaks during screen use (n = 46, 53.5%; p = 0.001), and used screens under inadequate lighting (n = 50, 51.0%; p = 0.005). A significant inverse association was observed for outdoor activity, with myopia present in 56.7% (n = 38) of those spending less than 1 hour outdoors daily, compared with 25.6% (n = 20) of those spending at least 2 hours outdoors (p = 0.001). Myopia prevalence was also significantly higher among participants with one myopic parent (n = 39, 55.7%) or both parents affected (n = 20, 71.4%) than among those with no parental history (n = 40, 26.3%; p < 0.001). Although myopia was more frequent among predominant smartphone or tablet users (n = 66, 44.6%), the type of screen device was not significantly associated with myopia (p = 0.133). Similarly, no significant association was observed between sex and myopia (p = 0.458) (Table 5).

DISCUSSION

The present study included 250 rural young adults with a mean age of 21.6 ± 2.1 years, and the largest proportion belonged to the 21–23-year age group (44.8%). Females constituted 55.2% of the participants, nearly half belonged to the middle socioeconomic category, and 69.6% lived in nuclear families. The age distribution was comparable with Manchikanty et al., who studied medical students predominantly within the young-adult age range and reported the highest myopia prevalence among those aged 20–22 years [18]. Niazi et al. similarly included young adults aged 18–25 years while examining digital behaviour and myopia [17]. Singh and Choudhary reported mean ages ranging from approximately 17.5

to 18.6 years across different myopia groups, with an almost equal male-to-female ratio [20]. Kayina et al. also evaluated screen exposure and refractive error among young adults, although their relatively smaller student-based sample differed from the present community-based rural population [19]. These comparisons indicate that the present participants were within the age range commonly considered vulnerable to the cumulative effects of childhood and adolescent visual behaviours.

In the present study, 43.2% of participants reported childhood screen exposure of 2–4 hours per day, while 35.2% reported exposure exceeding 4 hours. Smartphones or tablets were the predominant devices used by 59.2%, regular screen use commonly began between 10 and 14 years, and 40.0% reported a viewing distance below 30 cm. Moreover, 34.4% rarely or never took breaks, and 39.2% used screens under inadequate lighting. Foreman et al. documented the growing contribution of smartphones and other digital devices to screen exposure among children and young adults [8]. Enthoven et al. found that computer use during childhood was moderately associated with myopic refractive development, particularly when combined with limited outdoor exposure [9]. Their subsequent Myopia App Study showed that teenagers used smartphones for prolonged periods and that continuous-use episodes were associated with more myopic refractive errors, especially among those with low outdoor exposure [10]. Singh and Choudhary also observed that longer mobile and laptop use and shorter working distances were associated with myopia progression among young people [20]. Collectively, these findings support the relevance of assessing not only total screen duration but also device type, viewing distance, lighting, and break practices.

The present study found that 26.8% of participants had spent less than 1 hour outdoors daily during childhood, while only 31.2% reported at least 2 hours of outdoor activity. A parental history of myopia was present in 39.2%, including 11.2% with both parents affected. In addition, 66.4% had not undergone regular childhood eye examinations, and 71.2% lacked current awareness of healthy screen practices. Mutti et al. demonstrated that parental myopia was strongly related to childhood refractive error and that children with myopia spent comparatively less time participating in sports and outdoor activities [5]. Xiong et al., in a systematic review and meta-analysis, found that increased outdoor time was associated with a reduced likelihood of myopia onset [12]. Rose et al. similarly reported a lower prevalence of myopia among children with higher levels of outdoor activity [13]. Alvarez-Peregrina et al. observed that children with myopia spent more time using screens and less time outdoors than those without myopia [14]. The low frequency of regular eye examinations and limited awareness observed in the present rural population further indicate the need for community-level eye-health education and screening.

Self-reported myopia was present in 39.6% of participants. Among those reporting myopia, 45.5% were diagnosed between 12 and 17 years of age, 67.7% were initially evaluated because of visual difficulty or ocular symptoms, and 78.8% currently used spectacles. The prevalence was almost identical to the 39.4% reported among young adults by Niazi et al. [17] and was reasonably comparable with the 44.87% prevalence reported by Kayina et al. [19]. However, it was lower than the 61.55% prevalence observed by Manchikanty et al. among medical students, possibly because medical students experience greater academic visual demands and prolonged digital exposure than community-based rural young adults [18]. Singh and Choudhary studied young individuals with established myopia and demonstrated that prolonged electronic-device use was associated with subsequent progression [20]. Comparisons should nevertheless be interpreted cautiously because the present study relied on self-reported previous diagnosis, whereas several comparison studies employed objective refractive assessment. Undiagnosed and uncorrected cases may therefore have been missed in the present study.

Daily childhood screen exposure demonstrated a significant graded association with self-reported myopia, increasing from 18.5% among participants exposed for less than 2 hours per day to 58.0% among those exposed for more than 4 hours. Earlier initiation of screen use, a viewing distance below 30 cm, infrequent breaks, inadequate lighting, limited outdoor activity, and parental myopia were also significantly associated with the outcome. Ha et al. demonstrated a dose–response relationship in which the odds of myopia increased with each additional hour of daily digital screen exposure [15]. Zong et al. similarly reported higher pooled odds of myopia among individuals with high screen exposure and found evidence of increasing risk with longer daily exposure [11]. Enthoven et al. observed that prolonged uninterrupted smartphone-use episodes were associated with more myopic refractive error, supporting the importance of regular breaks [10]. Ip et al. reported that close reading distances below 30 cm and prolonged continuous visual activity were associated with greater odds of myopia [6]. The strong association with parental history was also consistent with Mutti et al., while the lower occurrence among participants with greater outdoor activity agreed with the findings of Xiong et al. and Rose et al. [5,12,13].

Although smartphones or tablets were the most commonly used devices and self-reported myopia was more frequent among their predominant users, device type itself was not significantly associated with the outcome. Sex was also not significantly associated with self-reported myopia. These findings reflect the continuing inconsistency in the literature. Lanca and Saw found mixed evidence across available studies, with their pooled analysis failing to demonstrate a significant overall association between screen time and prevalent or incident myopia [16]. Kayina et al. similarly reported no significant correlation between screen duration and refractive error among young adults, despite a high frequency of screen exposure and myopia [19]. Manchikanty et al. found a weak and nonsignificant association between screen time and myopia but reported a significant association with female sex and family history [18]. In contrast, Foreman et al. concluded that digital smart-device exposure was associated with myopia, although variations in exposure measurement and outcome definitions limited causal interpretation [8]. The present findings suggest that total exposure duration and specific viewing behaviours may be more relevant than the predominant device alone; however, the cross-sectional design, retrospective recall, and self-reported outcome precluded conclusions regarding causality.

Limitations

The study was limited by recall bias because childhood screen-use habits were reported retrospectively. As myopia was self-reported without ophthalmological examination or refraction, undiagnosed cases may have been missed or misclassified. The short study duration, inclusion of only two villages, and possible residual confounding limited the generalizability and interpretation of the findings.

CONCLUSION

Self-reported myopia was observed in 39.6% of the rural young adults. Longer childhood screen exposure, initiation of regular screen use before 10 years of age, shorter viewing distance, infrequent breaks, inadequate lighting, limited outdoor activity, and parental history of myopia were significantly associated with self-reported myopia. However, these associations should be interpreted cautiously because the cross-sectional design did not establish causality and myopia was not confirmed by refraction.

Community-based health education should promote age-appropriate limits on screen exposure, adequate viewing distance and lighting, regular visual breaks, and increased outdoor activity during childhood. Periodic vision screening should be strengthened in schools and rural communities, particularly for children with prolonged screen exposure or a parental history of myopia. Future multicentre longitudinal studies using standardized screen-exposure assessment and objective cycloplegic refraction are recommended to confirm these findings and clarify temporal relationships.

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