

Self-Reported Visual Clarity and Its Association with Refractive Error and Visual Acuity among Schoolchildren in Kuala Lumpur

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Abstract:

Objective: To determine the pattern of self-reported visual clarity across refractive error groups and examine its association with visual acuity among primary schoolchildren in Kuala Lumpur.

Material and Methods: This retrospective cross-sectional study analysed the vision screening data from 10 primary schools in Kuala Lumpur. A total of 930 children aged 7–9 years with complete records were included. Extracted variables comprised self-reported visual clarity, monocular distance visual acuity, and subjective refraction findings. Refractive errors were classified as myopia, hyperopia, mixed astigmatism, or antimetropia, while children without refractive error were categorised as emmetropic. Associations between self-reported visual clarity, refractive error type, and visual acuity were examined using chi-square tests.

Results: Myopia was the most prevalent refractive error (39.6%), followed by hyperopia (25.9%), mixed astigmatism (7.4%), and antimetropia (7.0%); 20.1% were emmetropic. Although 56.3% of children demonstrated suboptimal visual acuity, 71.6% reported clear vision. Self-reported visual clarity was significantly associated with refractive error overall (p -value=0.018), with a significant association observed for myopia (p -value<0.001). No significant associations were

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identified for hyperopia, mixed astigmatism, or antimetropia. Visual clarity was also significantly associated with visual acuity in both eyes (p -value<0.001), despite many children with reduced acuity reporting clear vision.

Conclusion: A discrepancy exists between subjective visual clarity and objective visual acuity among schoolchildren, particularly those with myopia. Reliance on self-reported measures alone may contribute to under-detection of visual impairment. Incorporating objective visual assessments into school screening programmes is important for improving the early identification and management of refractive errors at the primary school level.

Keywords: refractive error, self-reported visual clarity, vision screening, visual acuity

Introduction

Refractive error is an optical condition in which light is not properly focused on the retina, resulting in impaired vision. It is broadly classified into myopia (short-sightedness), hyperopia (long-sightedness), and astigmatism (distorted vision), and remains a leading cause of visual impairment worldwide. Globally, it is estimated that approximately 153 million individuals aged over five years are visually impaired due to uncorrected refractive error, including around 8 million who are blind¹. The prevalence and distribution of refractive error vary according to age, gender, ethnicity, and geographic location. Among schoolchildren, epidemiological studies have reported differing patterns, with some identifying myopia as the most prevalent subtype², while others reported higher rates of astigmatism^{3,4}. Nevertheless, a consistent trend across studies shows a shift towards myopia with increasing age. Similarly, local studies in Malaysia reported myopia as the most common type of refractive error among schoolchildren, followed by astigmatism and hyperopia⁵⁻⁷.

Given the rising prevalence of refractive error in this population, early detection through school-based vision screening programmes is a key public health strategy. Such a programme enables the identification of visual impairment that may otherwise go unrecognised, particularly in children who may lack awareness about visual difficulties⁸. Self-reported visual clarity surveys are widely used in clinical

practice and population-based studies due to their rapid, cost-effective approach to assessing perceived visual function. Individuals are typically asked to rate their overall vision quality, and this subjective measure is often used as an indicator of functional vision status. However, self-reported vision does not always correspond with objective findings, as studies have demonstrated variable validity and reliability when compared with clinical assessments⁹. The discrepancies between subjective and objective measures may be influenced by functional, demographic, and psychosocial factors¹⁰.

Evidence suggests that self-rated vision is associated with objective visual performance measures, including visual acuity, contrast sensitivity, visual field, and stereopsis¹⁰. Questionnaire-based approaches are also frequently used in large-scale studies to estimate refractive status due to the cost and logistical challenges of clinical examinations¹¹. However, the accuracy of such approaches depends on the design and validity of the questions used. While better visual acuity is generally associated with more favourable self-reported vision, the correlation between subjective and objective measures is often moderate, reflecting the influence of behavioural and psychosocial factors^{10,12}. Validation studies further indicate that self-reported ocular conditions tend to have higher specificity than sensitivity⁹, supporting their role as a complementary rather than standalone screening tool.

Despite the existing evidence, the relationship between self-reported visual clarity and specific types of refractive error among primary schoolchildren remains limited. Most studies have focused on the relationship between refractive error and visual acuity^{13–15}. For instance, a study in 2013 reported that in the presence of a refractive error, even if corrected by lenses and having a visual acuity comparable to that of emmetropia, the eye would correspond to an analogous defect in visual imagery, resulting in less vivid mental images, which reflects low quality of perception¹⁶. However, no studies have yet evaluated the relationship between the subjective visual clarity associated with refractive error and objective visual acuity. Therefore, this study investigated the association between self-reported visual clarity, refractive error, and visual acuity among primary schoolchildren. Specifically, it examined the patterns of self-reported visual clarity across refractive error categories and their relationship with objective visual acuity in a school-based screening setting.

Material and Methods

Subjects and sampling

This retrospective cross-sectional study investigated the association between self-reported visual clarity, refractive error, and visual acuity using the data obtained from vision screening programs conducted in public schools across Kuala Lumpur from June 2024 to September 2025. This approach was selected to facilitate evaluating the concordance between self-reported visual clarity and the different types of refractive error and their respective objective visual acuity. This study screened 930 primary schoolchildren aged 7 to 9 years from 10 public primary schools in Kuala Lumpur. This age group was selected because they represented the target population of the school-based vision screening programme and were in the early years of primary education, during which visual demands associated with classroom learning, such as

reading, writing, and board work, increase substantially¹⁷. The participating schools were randomly selected, and all eligible children present on the screening day were invited to participate. The number of participants recruited varied across schools based on attendance and eligibility at the time of screening. The collected datasets included self-reported visual clarity from the Eyes and Vision Survey, monocular distance visual acuity, and subjective refraction findings, all of which were analysed retrospectively. Only records with complete data across all components were included in the analysis; those with missing information were excluded to ensure data accuracy and completeness. Ethical approval for this study was granted by the Research Ethics Committee of Universiti Teknologi MARA (FERC/FSK/EM/2026/00034). All study procedures were carried out in compliance with the Malaysian Good Clinical Practice Guidelines and the Declaration of Helsinki.

Eyes and vision survey

An Eyes and Vision Survey was utilized during the vision screening program to facilitate participant triage. The survey was administered in Bahasa Malaysia in hard-copy format to ensure accessibility and ease of participation among the target population. It consisted of three closed-ended questions designed for rapid clinical intake rather than psychometric measurement; therefore, formal validation was not required. The first question assessed self-reported visual clarity by asking participants whether they were able to see clearly, with responses recorded as either “Yes” or “No”. The second question assessed spectacle use, while the third question evaluated the presence of specific visual symptoms, which include headache, dizziness, double vision, eye strain or discomfort, or mixed symptoms. For the present study, only data from the first question were extracted and analysed, as self-reported visual clarity was determined to be the primary outcome measure.

Visual acuity assessment

Habitual and best-corrected monocular distance visual acuity was measured using a standardised digital visual acuity chart (Canton Optics Equipment Co. Ltd., China) positioned at 6 meters, with results recorded in Snellen notation (e.g., 6/6). These values were subsequently converted to logMAR notation (e.g., 6/6 equivalent to 0.00 and 6/9 equivalent to 0.20) to allow standardised quantitative analysis. Distance visual acuity was then classified into 2 categories, where 6/9 or better was considered optimal, while visual acuity worse than 6/9 was categorised as suboptimal¹⁸.

Refractive error measurement and classification

Objective refractive measurements were first obtained using an autorefractor (NIDEK AR-1 Autorefractometer), followed by subjective refraction under non-cycloplegic conditions. For participants demonstrating unstable subjective responses suggestive of excessive accommodation, refraction was repeated using a delayed fogging procedure to reduce accommodative effects. The measured refractive values were then recorded in spherical power and minus cylinder format. These data were then converted to spherical equivalent refraction (SER), calculated as sphere power plus half of the cylindrical power ($SER = \text{Sphere} + \frac{1}{2} \text{Cylinder}$), to provide a single representative value of refractive status.

Refractive errors were classified according to established clinical criteria¹⁹. Emmetropia was defined as a spherical equivalent refraction (SER) of >-0.50 D and $<+0.50$ D, with maximum astigmatism of -0.75 DC. Cases of very low simple myopic astigmatism and simple hyperopic astigmatism were also included in this category. Myopia was defined as an SER of ≤ -0.50 D in at least one eye, with a spherical power of zero or less, indicating that light focuses in front of the retina. Compound myopic astigmatism and simple myopic astigmatism, except for very low astigmatic errors, were included in this category.

As for hyperopia, it was defined as an SER of $\geq +0.50$ D in at least one eye, with the absolute cylindrical power less than or equal to the absolute spherical power, indicating that light focuses behind the retina. Compound hyperopic astigmatism and simple hyperopic astigmatism were also included in this category. Finally, astigmatism was defined as mixed astigmatism, where a spherical power >0 D, with the absolute cylindrical power exceeding the absolute spherical power and a cylindrical power of ≤ -1.00 D in both eyes, reflecting irregular curvature of the cornea or crystalline lens. Participants presenting with myopia in one eye (SER ≤ -0.50 D) and hyperopia in the fellow eye (SER $\geq +0.50$ D) were classified as having antimetropia, representing an interocular difference in refractive status. These criteria were applied to ensure consistent categorisation of refractive error types for subsequent analysis.

Statistical analysis

The finalised datasets were imported into SPSS version 29.0 for statistical analysis. Descriptive statistical analyses were first performed to summarise the participants' demographic characteristics, refractive error profiles, and self-reported visual clarity. All data were analysed as categorical variables and were presented as frequencies and percentages. These analyses were used to describe the distribution and trends of refractive error and visual clarity within the study population.

Subsequently, inferential statistical analysis was conducted to examine the association between refractive error and self-reported visual clarity. The chi-square test of independence was applied to determine whether a statistically significant association existed between categorical variables. A p-value of less than 0.05 was considered statistically significant. Throughout the study, all data were handled confidentially, anonymised prior to analysis, and managed in accordance with ethical guidelines to ensure participant privacy and research integrity.

Results

Demographic characteristics of participants

A total of 930 participants with complete datasets were included in the present study. The distribution of participants across schools ranged from 3.8% to 17.4% of children per school, as shown in Table 1. Table 2 summarises the age and gender distribution of the study participants. The age distribution showed a higher proportion of 7-year-old participants (38.8%), followed by 8-year-olds (32.3%) and 9-year-olds (28.9%), indicating a gradual decrease in sample size with increasing age. The gender distribution was nearly equal, with males comprising 50.1% and females 49.9% of the study population. This balanced distribution suggests that the sample was demographically comparable across age and gender, reducing the likelihood of age- or gender-related skewness in the observed outcomes.

Table 1 Distribution of participants by school

Randomly selected schools	Frequency (%)
SK Seri Bintang Utara	70 (7.5)
SK Sg Penchala	68 (7.3)
SK Tun Hussein Onn	69 (7.4)
SK Seri Mega	162 (17.4)
SK Jalan Bellamy	91 (9.8)
SK Bukit Pantai	68 (7.3)
SK Desa Tasik	77 (8.3)
SK Wangsa Maju Seksyen 1	35 (3.8)
SK Setiawangsa	147 (15.8)
SK La Salle 2 Jinjang	143 (15.4)

SK=Sekolah Kebangsaan

Visual acuity status

The presenting visual acuity was recorded from monocular distance visual acuity findings. Table 3 summarises the distribution of presenting and best-corrected distance visual acuity. For presenting visual acuity, a higher proportion of participants demonstrated suboptimal vision (worse than 6/9), with 56.3% and 55.8% in the right

and left eyes, respectively. Only 43.7% of right eyes and 44.2% of left eyes achieved visual acuity of 6/9 and better, with comparable patterns observed between eyes.

Table 2 The age and gender distribution of study participants

Variables	Frequency (%)
Age (years)	
7	361 (38.8)
8	300 (32.3)
9	269 (28.9)
Gender	
Male	466 (50.1)
Female	464 (49.9)

Table 3 Presenting and best-corrected monocular distance visual acuity status

Variables	RE (%)	LE (%)
Presenting VA		
6/9 and better	406 (43.7)	411 (44.2)
Worse than 6/9	524 (56.3)	519 (55.8)
Best-corrected VA		
6/9 and better	843 (90.6)	849 (91.3)
Worse than 6/9	87 (9.4)	81 (8.7)

RE=right eye, LE=left eye, VA=visual acuity

Following the subjective refraction, most participants attained optimal visual acuity. Best-corrected visual acuity of 6/9 and better was observed in 90.6% of right eyes and 91.3% of left eyes. In contrast, only a small proportion, 9.4% of right eyes and 8.7% of left eyes, remained below the 6/9 threshold. The similar distribution of best-corrected visual acuity between eyes indicates a consistent improvement in visual performance after correction.

Distribution of refractive error

The distribution of refractive error types among the study participants is presented in Table 4. The refractive error profile of the study population was characterised by a predominance of myopia, followed by hyperopia. In contrast,

mixed astigmatism and antimetropia were observed less frequently, while approximately one-fifth of participants were classified as emmetropic. Overall, the findings indicate that myopia represented the principal refractive error among the schoolchildren studied.

Table 4 The frequency of participants based on type of refractive error

Variables	Frequency (%)
Emmetropia	187 (20.1)
Myopia	368 (39.6)
Hyperopia	241 (25.9)
Mixed-astigmatism	69 (7.4)
Antimetropia	65 (7.0)

Self-reported visual clarity

Table 5 summarises the findings on the self-reported visual clarity survey, indicating that most participants reported being able to see clearly. Similar patterns were observed across age and gender groups, although younger children tended to report clearer vision than older children. Gender differences between male and female participants were minimal, indicating broadly comparable levels of self-reported visual clarity.

Table 5 Percentage of participants able to see clearly

Variables	Are you able to see clearly?	
	No (%)	Yes (%)
Overall	264 (28.4)	666 (71.6)
Age (years)		
7	75 (20.8)	286 (79.2)
8	91 (30.3)	209 (69.7)
9	98 (36.4)	171 (63.6)
Gender		
Male	124 (26.6)	342 (73.4)
Female	140 (30.2)	324 (69.8)

Association Between Self-Reported Visual Clarity, Demographic Characteristics, Refractive Error, and Visual Acuity

Table 6 demonstrates the associations between self-reported visual clarity and age, refractive error status, presence of myopia, and presenting visual acuity. In contrast, no significant associations were observed for gender, hyperopia, mixed astigmatism, or antimetropia.

A statistically significant association was observed between age and self-reported visual clarity [χ^2 (2, N=930)=19.409, p-value<0.001]. Younger participants showed higher proportions of clear vision, with 7-year-olds reporting the highest clear vision (79.2%), followed by 8-year-olds (69.7%) and 9-year-olds (63.6%). Conversely, unclear vision reporting increased with age, with the highest rate among 9-year-olds (36.4%), followed by 8-year-olds (30.3%) and 7-year-olds (20.8%). These findings indicate an age-related shift in perceived visual clarity, with older children reporting relatively poorer perceived vision.

No statistically significant association was found between gender and self-reported visual clarity [χ^2 (1, N=930)=1.452, p-value=0.228], with 73.4% of males and 69.8% of females reporting clear vision, indicating comparable perceived visual clarity between genders.

A significant association was identified between refractive error and self-reported visual clarity [χ^2 (1, N=930)=5.637, p-value=0.018]. Participants without refractive error were more likely to report clear vision (78.6%) compared to those with refractive error (69.9%), while unclear vision was more frequently reported among those with refractive error (30.1% vs 21.4%). This indicates that refractive error negatively influences perceived visual clarity.

Among refractive error subtypes, only myopia showed a statistically significant association [χ^2 (1, N=555)=11.333, p-value<0.001]. Participants with myopia reported lower proportions of clear vision (64.7%) than those without myopia (78.6%), suggesting that myopia has a stronger functional impact on perceived visual clarity. No significant associations were observed for hyperopia [χ^2 (1, N=428)=0.723, p-value=0.395], mixed astigmatism [χ^2

Table 6 The association of self-reported visual clarity, refractive error, and visual acuity

Variables	Self-reported visual clarity						χ^2	p-values
	No		Yes		Total			
	n	%	n	%	n	%		
Age (years)							19.409	<0.001*
7	75	20.8	286	79.2	361	100.0		
8	91	30.3	209	69.7	300	100.0		
9	98	36.4	171	63.6	269	100.0		
Gender							1.452	0.228
Male	124	26.6	342	73.4	466	100.0		
Female	140	30.2	324	69.8	464	100.0		
Presence of refractive error								
Yes	224	30.1	519	69.9	743	100.0		
No	40	21.4	147	78.6	187	100.0	5.637	0.018*
Types of refractive error								
Myopia							11.333	<0.001*
Yes	130	35.3	238	64.7	368	100.0		
No	40	21.4	147	78.6	187	100.0		
Hyperopia							0.723	0.395
Yes	60	24.9	181	75.1	241	100.0		
No	40	21.4	147	78.6	187	100.0		
Mixed-astigmatism							0.307	0.579
Yes	17	24.6	52	75.4	69	100.0		
No	40	21.4	147	78.6	187	100.0		
Antimetropia							0.625	0.429
Yes	17	26.2	48	73.8	65	100.0		
No	40	21.4	147	78.6	187	100.0		
Presenting visual acuity								
RE							65.645	<0.001*
6/9 and better	60	14.8	346	85.2	406	100.0		
Worse than 6/9	204	38.9	320	61.1	524	100.0		
LE							64.103	<0.001*
6/9 and better	62	15.1	349	84.9	411	100.0		
Worse than 6/9	202	38.9	317	61.1	519	100.0		

*=statistically significant at p-value<0.001, RE=right eye, LE=left eye

(1, N=256)=0.307, p-value=0.579], or antimetropia [χ^2 (1, N=252)=0.625, p-value=0.429].

Presenting VA showed strong, statistically significant associations for both eyes. In the right eye, VA worse than 6/9 was the most common report of unclear vision compared with those with VA 6/9 or better [χ^2 (1, N=930)=65.645, p-value<0.001]. Similar patterns were also observed in the left eye [χ^2 (1, N=930)=64.103, p-value<0.001]. However, a notable proportion of participants with reduced VA still reported clear vision (61.1%), indicating partial discordance between subjective and objective measures.

Overall, self-reported visual clarity was significantly associated with age, the presence of refractive error (specifically myopia), and presenting VA. In contrast, gender and other refractive error subtypes showed no significant association.

Discussion

This study demonstrated a statistically significant relationship between self-reported visual clarity with refractive error and objective visual acuity among primary schoolchildren. Refractive error, particularly myopia, and

presenting visual acuity were significantly associated with perceived visual clarity. However, many children still reported having clear vision despite measurable visual deficits, suggesting that subjective perception alone may not accurately reflect actual visual function. This discordance supports a previous study, which suggests that self-reported visual clarity captures only part of the visual experience and is influenced by factors beyond optical status alone¹⁰.

Other than that, a key analytical insight from this study is the observed perceptual adaptation among children. The finding that a substantial proportion of participants with suboptimal visual acuity still reported clear vision suggests a normalisation of blurred vision. This may occur because children lack a reference for optimal vision or experience a gradual visual decline that goes unnoticed²⁰. Such adaptation reduces the sensitivity of self-reported measures, particularly in early or mild visual impairment, and may explain the moderate correlations reported in previous studies^{10,12}. Therefore, reliance on subjective reporting alone may systematically underestimate the true burden of visual impairment in paediatric populations. To mitigate this limitation, school-based vision programs may benefit from incorporating age-appropriate educational activities that increase children's awareness of visual symptoms and encourage the reporting of visual difficulties. Improving symptom awareness may reduce the effects of visual adaptation and enhance the effectiveness of self-reported screening measures.

Although self-reported visual clarity demonstrated statistically significant associations with objective measures, the presence of substantial discordant cases limits its utility as a standalone screening tool. Consistent with previous validation studies, self-report appears to have greater specificity than sensitivity, meaning it may identify children with pronounced visual difficulties but may fail to detect those with unrecognized impairment⁹⁻¹¹. This has important public health implications, as undetected visual deficits may

negatively impact academic performance and development.

Importantly, the findings suggest that the effectiveness of self-reported measures is context dependent. In large-scale or resource-limited settings, subjective assessments may serve as an initial screening layer; however, their diagnostic value is significantly enhanced when combined with objective measures such as visual acuity testing. The integration of both approaches may improve the detection rates of visual impairment. Alternatively, future screening tools may be strengthened by incorporating multiple symptom-based questions addressing difficulties with distance vision, near vision, classroom activities, and visual discomfort. A more comprehensive questionnaire may improve the reliability and consistency of self-reported visual assessments among children.

Besides that, the predominance of myopia found in this study aligns with the established epidemiological trends, indicating a global increase in myopia among school-aged children^{5,21,22}. A study on the global prevalence of myopia predicted that nearly half of the world population, 49.8%, was estimated to be affected by myopia and 9.8% by high myopia by 2050²³. A similar trend was observed in local studies conducted among children aged 7–15 years in Gombak, Wangsa Maju, and the islands of the East Coast of Peninsular Malaysia⁵⁻⁷. This trend may have resulted from lifestyle changes following the COVID-19 pandemic, with studies reporting decreases in physical activity, increases in screen time, and decreases in visual acuity^{24,25}. Nevertheless, the stronger association between myopia and reduced self-reported clarity, compared to other refractive subtypes, is particularly noteworthy. One possible explanation is the distance-dependent visual tasks commonly encountered in school settings, which could make the blurry vision associated with myopia more noticeable than the other refractive error types⁸. In contrast, hyperopia may remain asymptomatic due to accommodative compensation in younger children, whereas mild mixed

astigmatism may not produce sufficiently noticeable blur to affect subjective reporting²⁶⁻²⁸. This differential functional impact highlights that not all refractive errors contribute equally to perceived visual impairment, which has important implications for screening sensitivity.

Additionally, the significant association between age and self-reported visual clarity further supports a developmental interpretation. As children grow older, increasing academic demands and prolonged near work may both exacerbate refractive error progression and enhance awareness of visual difficulties^{8,29}. However, this relationship is likely bidirectional, reflecting both physiological changes in refractive status and cognitive maturation in symptom recognition. This reinforces the complexity of interpreting subjective visual responses in children, as they are shaped by both visual function and perceptual awareness.

Despite its strengths, including the use of real-world screening data and analysis of refractive error subtypes, this study has limitations that should be considered when interpreting the findings. The cross-sectional design precludes causal inference, and the use of non-cycloplegic refraction may underestimate hyperopia due to accommodative effects. As the study was limited to children aged 7–9 years, the findings may not be directly generalizable to other age groups. Additionally, self-reported responses in younger children may be influenced by comprehension, attention, or response bias, further contributing to measurement variability.

Overall, this study advances current understanding by demonstrating that while self-reported visual clarity is associated with objective visual status, it is insufficiently sensitive to detect all cases of visual impairment. These findings underscore the need for multimodal screening strategies that integrate the objective assessments of visual acuity with the subjective measures of self-reported visual clarity.

Conclusion

Self-reported visual clarity demonstrates meaningful but incomplete agreement with refractive error and objective visual measures. Children with refractive error, particularly myopia, and poorer visual acuity were more likely to report reduced visual clarity. However, a substantial proportion of children with measurable visual deficits still perceived their vision as clear, indicating that subjective visual perception does not always reflect actual visual status. These findings suggest that self-reported visual clarity is influenced by refractive error and visual performance. However, as subjective visual perception does not always correspond with objective visual status, self-reported visual clarity should be considered a complementary indicator rather than a replacement for clinical assessment. The present study contributes to the limited evidence on subjective visual perception in paediatric populations and highlights the potential role of self-reported measures in population-based school vision screening.

Moreover, future research should include longitudinal designs in order to evaluate how self-reported visual clarity changes with refractive error progression and treatment. Standardised self-report instruments tailored for paediatric populations should be developed to improve reliability. Additionally, more studies should be conducted in Southeast Asian populations to account for any regional differences in refractive error epidemiology and environmental exposure patterns.

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Conflict of interest

There are no conflicts of interest to declare.

References

- Resnikoff S, Pascolini D, Mariotti SP, Pokharel GP. Global magnitude of visual impairment caused by uncorrected refractive errors in 2004. *Bull World Health Organ* 2008;86:63–70. doi: 10.2471/BLT.07.041210.
- Alghamdi W. Prevalence of refractive errors among children in Saudi Arabia: a systematic review. *Open Ophthalmol J* 2021. doi: 10.2174/1874364102115010089.
- Santiago HC, Rullán M, Ortiz K, Rivera A, Nieves M, Piña J, et al. Prevalence of refractive errors in children of Puerto Rico. *Int J Ophthalmol* 2023;16:434–41. doi: 10.18240/ijo.2023.03.15.
- Tajbakhsh Z, Talebnejad MR, Khalili MR, Masoumpour MS, Mahdaviadzad H, Mohammadi E, et al. The prevalence of refractive error in schoolchildren. *Clin Exp Optom* 2022;105:860–4. doi: 10.1080/08164622.2021.2003687.
- Goh P, Abqariyah Y, Pokharel G, Ellwein L. Refractive error and visual impairment in school-age children in Gombak district, Malaysia. *Ophthalmology* 2005;112:678–85. doi: 10.1016/j.opthta.2004.10.048.
- Ismail LA, Sukumaran S. Prevalence of refractive errors among school children in Wangsa Maju, Kuala Lumpur, Malaysia. *Med Hypothesis Discov Innov Optom* 2022;3:106–12. doi:10.51329/mehdiopometry158.
- Wardati HJ, Karimmah W, Khadijah M, Ahmad-Sharmizi M, Wan-Julyatee WY, Ain-Nasyrah AS, et al. Refractive error and amblyopia among primary school children in remote islands of east coast of Peninsular Malaysia. *Med J Malaysia* 2024;79:499–506.
- Amiebenomo OMA, Isong EM, Edosa ME, Woodhouse JM. Habitual visual acuity and visual acuity threshold demands in Nigerian school classrooms. *Sci Rep* 2022;12:17816. doi: 10.1038/s41598-022-21048-z.
- Foreman J, Xie J, Keel S, van Wijngaarden P, Taylor HR, Dirani M. The validity of self-report of eye diseases in participants with vision loss in the national eye health survey. *Sci Rep* 2017;7:8757. doi: 10.1038/s41598-017-09421-9.
- El-Gasim M, Munoz B, West SK, Scott AW. Associations between self-rated vision score, vision tests, and self-reported visual function in the salisbury eye evaluation study. *Invest Ophthalmol Vis Sci* 2013;54:6439–45. doi: 10.1167/iov.12-11461.
- Cumberland PM, Chianca A, Rahi JS, for the UK Biobank Eye and Vision Consortium. Accuracy and utility of self-report of refractive error. *JAMA Ophthalmol* 2016;134:794–801. doi: 10.1001/jamaophthalmol.2016.1275.
- Coyle CE, Steinman BA, Chen J. Visual acuity and self-reported vision status: their associations with social isolation in older adults. *J Aging Health* 2017;29:128–48. doi: 10.1177/0898264315624909.
- Leone JF, Mitchell P, Morgan IG, Kifley A, Rose KA. Use of visual acuity to screen for significant refractive errors in adolescents: is it reliable? *Arch Ophthalmol* 2010;128:894–9. doi: 10.1001/archophthalmol.2010.134.
- van der Zee C, Muijzer MB, Claessens JIJ, Wisse RPL. Determining the variability associated with visual acuity and refractive error measurements: a systematic review. *Ophthalmology* 2025;132:1020–32. doi: 10.1016/j.opthta.2025.04.021.
- Doustkouhi SM, Turnbull PRK, Dakin SC. The effect of refractive error on optokinetic nystagmus. *Sci Rep* 2020;1:20062. doi: 10.1038/s41598-020-76865-x.
- Palermo L, Nori R, Piccardi L, Zeri F, Babino A, Giusberti F, et al. Refractive errors affect the vividness of visual mental images. *PLOS ONE* 2013;8:e65161. doi: 10.1371/journal.pone.0065161.
- Azizan IA, Qi EY, Kaur S, Narayanasamy S. Visual acuity demands of different language mediums in modern primary school classrooms in Malaysia [monograph on the Internet]. F1000Research; 2019 [cited 2026 Jun 6]. Available from: <https://f1000research.com/articles/8-2143> doi: 10.12688/f1000research.20699.1.
- Buari NH, A. Rahman NES. An Analysis of visual outcomes in the community-based vision screening programs. *Malays J Med Health Sci* 2022;18:245–51. doi: 10.47836/mjmh.18.s15.34.
- Galvis V, Tello A, Camacho PA, Gómez LM, Rey JJ, Serrano AA. Definition of refractive errors for research studies: Spherical equivalent could not be enough. *J Optom* 2021;14:224–5. doi: 10.1016/j.optom.2020.10.003.

20. Horwood AM. When does blur matter? A narrative review and commentary. *J Binocul Vis Ocul Motil* 2022;72:57–68. doi: 10.1080/2576117X.2022.2033588.
21. Holden BA, Fricke TR, Wilson DA, Jong M, Naidoo KS, Sankaridurg P, et al. Global prevalence of myopia and high myopia and temporal trends from 2000 through 2050. *Ophthalmology* 2016;123:1036–42. doi: 10.1016/j.ophtha.2016.01.006.
22. Surico PL, Parmar UPS, Singh RB, Farsi Y, Musa M, Maniaci A, et al. Myopia in children: epidemiology, genetics, and emerging therapies for treatment and prevention. *Children* 2024;11:1446. doi: 10.3390/children11121446.
23. Holden BA, Fricke TR, Wilson DA, Jong M, Naidoo KS, Sankaridurg P, et al. Global prevalence of myopia and high myopia and temporal trends from 2000 through 2050. *Ophthalmology* 2016;123:1036–42. doi: 10.1016/j.ophtha.2016.01.006
24. Bao WW, Zhao Y, Dadvand P, Jiang N, Chen G, Yang B, et al. Urban greenspace and visual acuity in schoolchildren: a large prospective cohort study in China. *Environ Int* 2024;184:108423. doi: 10.1016/j.envint.2024.108423.
25. Noi S, Shikano A, Imai N, Tamura F, Tanaka R, Kidokoro T, et al. The changes in visual acuity values of Japanese school children during the COVID–19 pandemic. *Children* 2022;9:342. doi: 10.3390/children9030342.
26. Hopkins S, Read SA, Cox RA, Oduro BA, Strang N, Wood JM. Hyperopia in schoolchildren: Investigating the impact on vision and determining appropriate methods for screening. *Ophthalmic Physiol Opt* 2024;44:42–51. doi: 10.1111/opo.13236.
27. Kulp MT, Ciner EB, Candy TR, Ying G shuang, Hall C, Quinn G, et al. Impact of uncorrected hyperopia on visual function and academic performance in preschool and school–age children. *Optom Vis Sci* 2026;103:e70018. doi: 10.1002/ovs2.70018.
28. Lin J, An D, Zhu J, Yan D. Comparison of ocular residual astigmatism between children with clinically significant and non–significant astigmatism. *BMC Ophthalmol* 2025;26:2. doi: 10.1186/s12886–025–04533–7.
29. Zhuang M, Xie H, Zhang Y, Li S, Xiao P, Jiang Y, et al. Prevalence and influence factors for myopia and high myopia in schoolchildren in Shandong, China. *Cent Eur J Public Health* 2022;30:190–5. doi: 10.21101/cejph.a7158.