ORIGINAL ARTICLE

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WORK ACTIVITIES AFFECTING MYOPIA PREVELENCE

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ABSTRACT

Introduction: One of the eye diseases experienced by children, adults, and the elderly is Myopia. Myopia is a refractive error in the eye where the resulting image point falls in front of the retina. Time spent on near vision work and lack of outdoor activities are environmental factors of great concern .The purpose of this scoping review is to find out how work activities affect the prevalence of myopia. The method in this study uses the literature study method. The data was carried out by searching the Science Direct database, the Oxford Journal and Google Scholar. The result of this scoping review is that myopia is caused by using computers at a young age and sitting too much to read indoors which causes myopia and efforts to prevent myopia are by limiting the use of computer screens and doing outdoor activities.

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INTRODUCTION

Myopia, also known as nearsightedness, is the most common refractive error of the eye globally. Due to the relatively long axial length of the eye, light rays focus in front of the retina, which can appreciate the quality of blurred images. (Eppenberger & Sturm, 2020).

Myopia is generally experienced in school-age children, but can appear at any age. According to research (Holden et al., 2016), the prevalence of myopia incidence in the world reaches 28.3% and in 2050 it is predicted to reach 49.8%. In a study in Australia, the prevalence of myopia in school age children 12-17 years with East Asian ethnicity reached 42.7% and 59.1%, in China the prevalence of myopia reached 38.1% in Guangzhou and 36.7% in Hong Kong, while The prevalence of myopia in children and adolescents in Korea ranges from 50% in children aged 5-11 years to 78.8% in children aged 12-18 years. In Spain, the prevalence of myopia in children has also increased substantially over the last two decades. In 2000, a cross-sectional study conducted on 7,621 subjects reported a prevalence of myopia of 2.5% for the age range of 3 to 8 years. Recently, an epidemiological study conducted between 2016 and 2019 on 7,497 Spanish children aged 5 to 7 years found that the prevalence of myopia increased from 17% in 2016 to 19% in 2019 (Martínez-Pérez et al., 2022).

Recent studies have provided evidence of mechanisms by which eye growth is dependent on environmental factors; Excessive close-up work and lack of outdoor exposure, among other factors, time use for close-up work and lack of outdoor activity are environmental factors of concern. Reading, computer use, and watching television can also have an impact on the incidence of myopia. (Chiang et al., 2020).

According to the degree of severity, myopia is divided into three criteria, namely mild, moderate, and severe. Refractive disorders in the form of high myopia often cause problems in treatment, where the end result of correction of visual acuity often results in incomplete correction. The purpose of writing this scoping review is to find out how work activities affect the prevalence of myopia.

METHOD

The method used in this study is to use a scoping review. Based on the topic of this scoping review, the questions asked are related to work activities that affect the

prevalence of myopia. Identification of literature sources used in searching for this topic are Science Direct, Oxford Journal, Google Scholar. The keywords used are Myopia, Myopia and work, ophthalmology. In the article selection process, there are two stages, namely, first the articles obtained will be selected according to the inclusion or exclusion criteria, the second literature that has passed the first stage will be reviewed. The inclusion criteria of the articles used in this scoping review are articles that discuss the topic of work activities that affect the prevalence of myopia. The journals used are in English, published in 2013-2022, which are available in abstract and full text formats that can be accessed. The exclusion criteria for articles in this scoping review were multiple articles, title and abstract filtered articles, and full text filtered articles. Data extraction is the result of keyword searches in Science Direct, Oxford Journal and Google Scholar. Several journals have been collected and a list of all articles is entered into an excel table, then the articles are filtered according to the inclusion and exclusion criteria, so that there are several previous articles that are relevant to this writing. At this stage the researcher analyzes, summarizes and compiles the selected literature and then reports the results in the results and discussion. Consultation is the final stage in the preparation of a scoping review. At this stage, researchers consult with experts in their fields to provide suggestions and input, starting from the selection of literature, processes, searches, to the completion of the preparation of a scoping review.

RESULT

The results of the selection of sources of evidence obtained in the topic search were 13 articles. The article selection process consists of several stages. The first stage is to search for articles through the Science Direct, Oxford Journal and Google Scholar databases using predetermined keywords and queries. In the process of searching the journal, found 13,901 articles from Science Direct, 1,103 articles from the Oxford Journal, 1,000 articles from Google Scholar. The number of articles from the third database is 16,004. The second stage, where all articles were duplicated, obtained 1,108 duplicate articles, the article selection process was carried out using software, namely delay. The results of the duplication of the remaining 14,896 articles. The third stage is a re-search by filtering titles and abstracts that match the inclusion and exclusion criteria, from the collection 536 articles were published. The search results for titles and abstracts that met the inclusion and exclusion criteria left 32 articles. The fourth stage is done again by reading the full text. The full text search results obtained by reading all articles deemed relevant, found 13 articles that were used as literature.

1. Charac

The characteristics of the source of evidence are the data on the articles that fall into the inclusion criteria sorted in a table. There are 13 articles that meet the inclusion criteria in this scoping review. Characteristics of 13 articles that have been identified by year of publication in the last 10 years. Found 2 articles in 2013-2015 with a percentage of 10% and 11 articles in 2020-2021 with a percentage of 90%. Based on the research location, there are 7 articles made in China with a percentage of 65%, 1 article made in Korea with a percentage of 5%, 1 article made in Euthopia with a percentage of 5%, 2 articles made in Spain with a percentage of 15%, 1 article made in Israel with a percentage of 5%, 1 article was made in the Netherlands with a percentage of 5%. Based on the language of 100% English articles, research methods from reviewed journals are using case reports with a percentage of 60% prospective cross-sectional studies with a percentage of 5%, cross-sectional studies with a percentage of 10%, observational cross-sectional studies with a percentage of 5%, questionnaires internet-based with a percentage of 10%, cohort studies with a percentage of 5%, logistic regression analysis with a percentage of 5%.

Based on the results of previous researchers, it was found that in a sample of children, increased computer use was associated with the development of myopia. The effects of close-up work diminish with outdoor exposure. The risk of digital devices on myopia and protection by outdoor exposure should be widely recognized. A study conducted (Enthoven & Klaver, 2020) on myopia management strategies and attitudes in clinical practice in Spain found that the prevalence of myopia (spherical equivalent of -0.5 diopters) was 11.5% at 9 years. Mean computer use was associated with myopia at age 9 (OR = 1.005, 95% CI = 1.001-1.009), as were reading time and reading distance (OR = 1.031; 95% CI = 1.007-1.055 (5-10 hours/week) ; OR = 1.113; 95% CI = 1.073–1.155 (> 10 hours/week) and OR = 1.072; 95% CI = 1.048-1.097

respectively). The combined effects of close work (computer use, reading time and reading distance) showed an increased odds ratio for myopia at age 9 (OR = 1.072; 95% CI = 1.047-1.098), whereas outdoor exposure showed a decreased odds ratio (OR = 0.996 ; 95% CI = 0.994–0.999) and the interaction term was significant (P = 0.036).

Based on a study conducted by (C. W. Wong et al., 2021) to review the impact of increased use of digital devices arising from the lockdown measures implemented during the COVID-19 pandemic on myopia and make recommendations to reduce potential side effects in myopia. myopia control. Increased digital screen time, close-up work, and limited outdoor activity were found to be associated with the onset and progression of myopia, and could potentially be exacerbated during and beyond the period of the COVID-19 pandemic outbreak. While school closures may be short-lived, increased access, adoption, and dependence on digital devices can have a long-term negative impact on a child's development. Raising awareness among parents, children, and government agencies is key to reducing myopigenic behavior that may take root during this period.

In a study (K. Wong & Dahlmann-Noor, 2020) on myopia and its development in children in London, UK: a retrospective evaluation included 63,854 data sets from 23,593 children (51.2% boys, mean age 5 years). ,4 years) years, IQR interquartile range 3.8---7.1). The proportion of myopic prescriptions increased from 24 to 32%. In n = 3355 with early mild/moderate myopia, the mean progression rate was 0.16 (0.5 to 0.04) D/year. In those who developed (n = 2095), the rate was -0.40 (0.19 to 0.74) H/year, slightly higher in girls than in boys (0.42vs/year; p = 0.02). Progression was faster at early moderate than early mild myopia (0.54vs/year; p < 0.001), and before than after the mean age of onset of puberty (0.41vs/year; p = 0.013). There were no statistically significant differences between children from different ethnic backgrounds. The study conducted (Kim et al., 2020) found that the prevalence of myopia and high myopia was 65.4 and 6.9%, respectively. Older age and parental myopia were significantly associated with high myopia and myopia, whereas higher body mass index (BMI) was associated with high myopia alone. Although the proportion of subjects spending more time on close work activities (≥4 h/day) increased sequentially with increasing refractive error, this trend was not statistically significant by multivariable logistic regression.

Discussion

Based on a scoping review of several journals obtained regarding occupational activities affecting the prevalence of myopia, myopia or nearsightedness are the most common refractive vision disorders among children and young adults, and represent the highest prevalence of all refractive errors globally (Chakraborty et al., 2022). Myopia affects more children than the elderly. The average age affected by myopia is 16-19 years, this is because children sit indoors more to read and play computer than playing outside and tend not to have their eyes checked when experiencing symptoms of myopia. (Armarnik et al., 2021). In a study conducted (Xie et al., 2020) stated that the prevalence of myopia is higher in children in urban schools than in rural schools. This is because there are more activities indoors than outdoors.

According to (Y. Y. Lee et al., 2013) that higher urbanization rate is associated with all myopia indicators after controlling for several factors. There are a number of explanations for this finding. First, there may be factors that influence myopia in urban areas that have not been identified. Urbanization is usually accompanied by environmental pollution, differences in green open spaces, exposure to ambient light, and people's lifestyles, diet, and stress, all of which can affect myopia. Second, the effect of urbanization on myopia may reflect a synergistic effect of several factors. High myopia can lead to critical vision-threatening pathologies such as retinal detachment, glaucoma, and maculopathy. Efforts to reduce the high myopia population in children and adolescents need to be carried out, including the identification of modifiable risk factors for myopia and high myopia. As for what is done to prevent myopia, namely by limiting the use of computer screens, such as sleeping or doing other activities, because limiting the use of computer screens can reduce the occurrence of myopia.

The main impact of environmental factors on the prevalence of myopia. It is important to identify those at high risk based on their genetics, their geographic location and their behavior and provide timely intervention with existing and emerging treatments. Myopia is a potentially blinding disease. By identifying at-risk individuals and intervening before they become myopic, eye care practitioners can prevent or delay the use of eyeglasses, reduce the risk of various myopic complications thereby improving

patients' quality of life and positively impacting socioeconomic effects. (Bourke et al., 2019).

CONCLUSION

Based on the results of a scoping review of 13 articles, it was found that computer use, especially at a very young age, is moderately associated with the development of myopia in childhood. Reading time had a stronger association with myopia, possibly due to shorter close working distances. The combined effects of close work activities can be reduced by outdoor exposure. It is very likely that the increase in the use of digital devices can have an impact on the development of myopia in the years to come. Therefore, regulating its use and maximizing outdoor exposure in young children should be the main focus of myopia prevention.

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Article Characteristics	Number of articles(n=13)	Percentage
Publication Year		
1) 2013-2015	2	10%
2) 2020-2022	11	90%
Lokasi Penelitian		
1. China	7	65%
2. Korean	1	5%
3. Euthopia	1	5%
4. Spain	2	15%
5. Israel	1	5%
6. Dutch	1	5 %
Language :		
English	13	100 %
Research Methods :		
Case Report	4	60%
Prospective cross-sectional study	1	5%
Cross-sectional study	3	10%
Observational cross-sectional study	1	5%
Internet-based questionnaire	2	10%
Cohort Study	1	5%
Logistic regression analyses	1	5%
Publication Type :		
Journal Articles	13	100 %

Table 1. Characteristics of Evidence Sources

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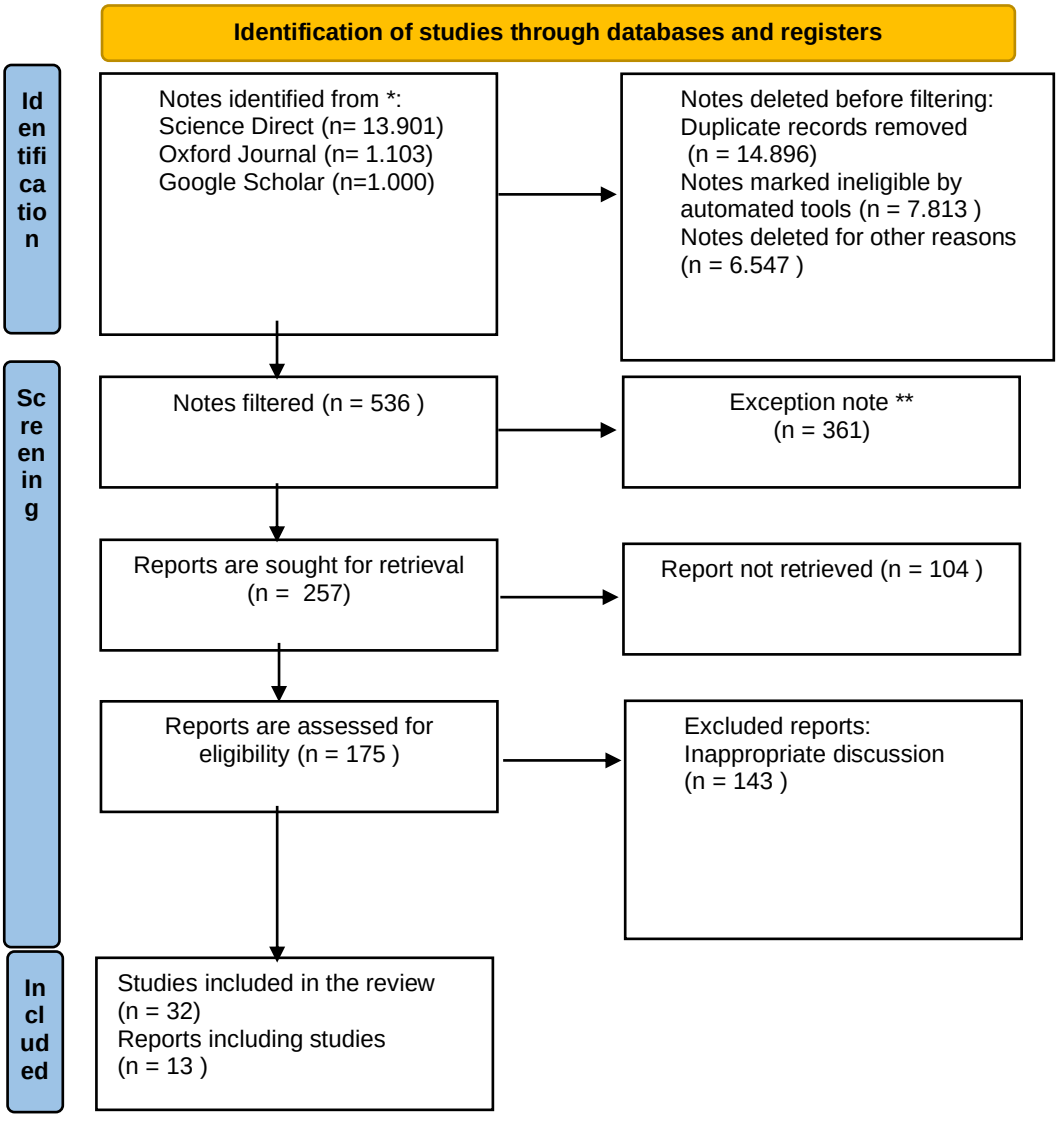

Figure 1. The Process of Article Selection Results

Table 2. Results Characteristics of Evidence Sources

	esearch Methods	esearcher Name, year	esults
	Prospective cross-sectional study	eng et al., 2021)	e overall myopia prevalence was 28.0%, from 7.5% to 50.6% for first and sixth grades, respectively. Low, moderate and high myopia significantly increased with school grades from 7.30% to 35.0%, 0.3% to 13.60% and 0.00% to 1.9%, respectively. Multiple regression analysis revealed that longer average cumulative daylight hours were connected to lower myopia prevalence in primary school students (OR, 0.721; 95% CI, [0.593–0.877]; P=0.001), whereas girls and higher grade was independently associated with higher myopia prevalence (girls: β=0.189; OR, 1.208; 95% CI, [1.052–1.387]; P=0.007; higher grade:

		β=0.502; OR, 1.652; 95% CI, [1.580–1.726]; P<0.001)
se report	rmarnik et al., 2021)	1 questioners were collected, mostly completed by mothers (n = 110, 68%). The average number of children per family was 6 (range 1–16). In 148 families (92%) at least one of the parents has myopia. The average parent refraction was − 4.5 diopters (range − 0.5 to 15 diopters). Out of 935 children, 410 (44%) wore glasses. Twelve parents (7%) believe that myopia is a disease and 94 (58%) reported that they are concerned because their child wears glasses. Twenty-four (15%) believe that glasses are a sign of a high education level. Regarding treating myopia progression, 144 (89%) think that myopia progression should be treated, but only 36 (22%) are aware of the available treatments for it.
ɔss-sectional study	ie et al., 2020)	e overall prevalence of myopia was 33.9% [95% confidence interval (CI) = 31.0–36.8]; myopia prevalence significantly increased with age. Girls were at a higher risk of myopia than boys [odds ratio (OR) = 1.449, 95% CI = 1.060–1.979]. Children with paternal myopia (OR = 2.130, 95% CI = 1.376–3.297) or maternal myopia (OR = 1.861, 95% CI =1.153–3.002) had a higher risk of myopia than those without myopic parents. Children who spent more than 1 h daily outdoors were less likely to have myopia; meanwhile, children who did homework more than 3 h daily (OR = 2.237, 95% CI = 1.041–4.804), watched television more than 3 h daily (OR = 2.106, 95% CI = 1.200–3.697), or played
ɔss-sectional observasional	uo et al., 2015)	The mean refractive error in the worse eye was -1.38 6 2.04 diopters (D) (median, -0.88 D; range, -13.00 to þ6.50 D). In multivariate analysis, more myopic refractive errors were associated with older age (P < 0.001; regression coefficient B: -0.26; 95% confidence interval [CI]: -0.28, -0.23), female sex (P ¼ 0.005; B: -0.26; 95%CI: -0.43, -0.08), more myopic paternal refractive errors (P < 0.001; B: 0.20; 95%CI: 0.14, 0.27), more myopic maternal refractive errors (P < 0.001; B: 0.18; 95%CI: 0.12, 0.24), and fewer hours spent outdoors (P ¼ 0.038; B: 0.18; 95%CI: 0.01, 0.35). The prevalence of myopia, defined as refractive errors (spherical equivalent) of

			≤ −0.50, ≤ −1.00, and ≤ −6.00 D in the worse eye, was 60.0 6 1.2%, 48.0 6 1.3%, and 2.9 6 0.4%, respectively. The prevalence of high myopia (≤ −6.00 D) was 2.9 6 0.4% in the whole study population, and it was 9.9 6 3.0% in 17-year- olds. It was not associated with time spent outdoors (P ¼ 0.66).
	se report	. Y. Lee et al., 2013)	Among 5145 eligible participants, 5048 (98.11%) had data and questionnaire refraction; 2,316 (45.88%) of them received axial length examination. The prevalence of myopia was 86.1% with a mean refractive error of 3.66 D (SD 2.73) and an axial length of 25.40 mm (SD¼1.38). Older age, having myopic parents, higher education level, more time spent reading, shorter distances, less outdoor activity, and higher urbanization rate with myopia and longer length of action . more computer use is associated with a longer axial length. All risk factors associated with myopia were also predictors of high myopia (6.0 D), with outdoor activities. Finally, long-term and long-term interaction analysis shows simply more time spent outdoors at high urbanization rates.
	ɔss-sectional study	essesse & Teshome, 2020)	total of 1271 students with a response rate of 89.4% were evaluated. The mean age was 16.56+ 1.51 years. Eighty three students were identified to have myopic refractive error making the prevalence of 6.5% (95% CI: 5.30, 8.02). Of 648 females, 50 (7.7%) had myopia while 33 (5.3%) of 623 males had myopia making females relative risk to be 1.5 times that of males. From the total students diagnosed to have refractive error (n = 92), myopia constituted 83/92 (90.2%) of the students indicating that it is the commonest type of refractive error found amongst secondary school students. Only 36.1% of students with myopia wore eyeglasses when they attended the survey. Myopia was more common among older age group 17–21 years (OR: 1.54 95% CI 0.986–2.415) and higher grade level 11–12 (OR: 1.14 95% CI 0.706–1.847). Conclusions:
	ɔss-sectional study	im et al., 2020)	e prevalence of myopia and high myopia was 65.4 and 6.9%, respectively. Older age and parental myopia were significantly associated with both myopia and high myopia, while higher body mass index (BMI) was associated with high

			myopia only. Although the proportion of subjects who spent more time on near work activities (≥4 h/day) was sequentially increased with increased refractive error, this tendency was not statistically significant by multivariable logistic regression.
	ernet-based questionnaire	[artínez-Pérez et al., 2022)	total of 173 Spanish optometrists, of the 1,336 practitioners from the five different continents who participated in the study, responded to the online survey. Spain, Asia and South America were found among the regions with the highest concern regarding the increased inci- cles and single-vision contact lenses continues to be the main methods of visual correction dence of myopia (p ? 0.001). However, in these regions, the prescription of single-vision specta- prescribed to young myopic patients (p ? 0.001). Spanish practitioners, like those from other regions, considered orthokeratology to be the most effective treatment to control myopia progression (p ? 0.001). The major reasons why Spanish practitioners were not prescribing myopia control strategies were increased cost, inadequate information and unpredictable outcomes (p < 0.05). Conclusions:
	se report	. W. Wong et al., 2021)	creased digital screen time, close-up work, and limited outdoor activity were found to be associated with the onset and progression of myopia, and could potentially be exacerbated during and beyond the period of the COVID-19 pandemic outbreak. While school closures may be short-lived, increased access, adoption, and dependence on digital devices can have a long-term negative impact on a child's development. Raising awareness among parents, children, and government agencies is key to reducing myopigenic behavior that may take root during this period.
	hort study	nthoven & Klaver, 2020)	e prevalence of myopia (spherical equivalent of -0.5 diopters) was 11.5% at 9 years. Mean computer use was associated with myopia at age 9 (OR = 1.005, 95% CI = 1.001-1.009), as were reading time and reading distance (OR = 1.031; 95% CI = 1.007-1.055 (5-10 hours/week))); OR = 1.113; 95% CI = 1.073–1.155 (> 10 hours/week) and OR = 1.072; 95% CI = 1.048–1.097 respectively). The combined effects of

			close work (computer use, reading time and reading distance) showed an increased odds ratio for myopia at age 9 (OR = 1.072; 95% CI = 1.047-1.098), whereas outdoor exposure showed a decreased odds ratio (OR = 0.996). ; 95% CI = 0.994–0.999) and the interaction term was significant (P = 0.036).
gistic analyses	regression	hiang et al., 2020)	total of 9,960 participants were included in the prevalence analysis, and 6,571 in the risk factor analysis. Participants of other races (excluding Mexican Americans, other Hispanics, non-Hispanic whites, non-Hispanic blacks) had the highest myopia frequency (42.77%). Multivariate analysis of the entire population showed that the likelihood of myopia was significantly lower in participants with household smokers (odds ratio [OR] Z 0.79, 95% confidence interval [CI]: 0.66e0.97), and significantly greater on Mexican-American race (OR Z 1.28, 95% CI: 1.01e1.62), other Hispanic (OR Z 1.79, 95% CI: 1.10e2.92) and some with a high school graduate education (OR Z 1.79 , 95% CI: 1.01e3.18), watched 2 hours of television daily (OR Z 1.27, 95% CI: 1.02e1.59), used a computer for 1 hour daily (OR Z 1.276, 95% CI: 1.02e1 .57). When examined by race/ethnicity, 1 hour of computer use increased the likelihood of myopia in non-Hispanic whites, in Mexican-Americans a higher ratio of poor family income and 2 hours of television viewing time was associated with myopia, and in Hispanics Others. group, a higher family income poverty ratio was associated with myopia, while men and those with higher sugar levels had a lower myopia risk.
ernet-based questionnaire		olffsohn et al., 2020)	Of the 1336 respondents, concern was highest (9.0 ± 1.6; $p < 0.001$) in Asia and lowest (7.6 ± 2.2; $p < 0.001$) in Australasia. Practitioners from Asia also considered their myopia control clinical practice the most active (7.7 ± 2.3; $p < 0.001$), North American practitioners as the least active (6.3 ± 2.9; $p < 0.001$). Orthokeratology was considered the most effective method to control myopia, followed by pharmaceutical approaches and approved myopia control soft contact lenses ($p < 0.001$). Despite the significant intra-regional differences, overall, most practitioners did not consider single-vision distance correction an effective strategy to

		attenuate myopia progression (79.6%), but single-vision glasses or contact lenses were determined as the primary mode of correction. for myopic patients (63.6 ± 21.8%). The main justification for their reluctance to prescribe alternatives to single-vision refractive correction was the increased cost (20.6%) and insufficient information (17.6%).
se report	. Wong & Dahlmann-Noor, 2020)	We included 63,854 datasets from 23,593 children (51.2% boys, mean age 5.4 years) years, IQR interquartile range 3.8---7.1). The proportion of myopic prescriptions increased from 24 to 32%. In n = 3355 with early mild/moderate myopia, the mean developmental rate was 0.16(0.5 to 0.04) D/year. In those with progression (n = 2095), the rate was -0.40 (0.19 to 0.74) D/yr, slightly higher in girls than in boys (0.42vs/yr; p = 0.02). Progression was faster at early moderate than early mild myopia (0.54vs/year; p < 0.001), and before than after the mean age of onset of puberty (0.41vs/year; p = 0.013). There were no statistically significant differences between children from different ethnic backgrounds.