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IMI-global trends in myopia management attitudes and strategies in clinical practice – A nine-year review

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ABSTRACT

Purpose: Surveys in 2015, 2019, and 2022 identified a high level of eye care practitioner activity and concern about pediatric myopia, reflected by an uptake of appropriate control techniques. This research provided updated information, examining global trends from 2015 to 2024.

Methods: A self-administered, internet-based questionnaire was distributed in 18 languages to eye care practitioners globally. The questions examined awareness of increasing myopia prevalence, perceived efficacy, prescribing of available strategies and barriers to adoption. Responses were compared with data from previous surveys.

Results: A total of 2,993 practitioners responded in 2024. From 2015 to 2024, practitioner concern had increased in all continents besides Australasia (all $p < 0.05$), being consistently highest in Asia (8.4 ± 1.8 to 8.6 ± 1.9, respectively). Practitioner activity level had increased markedly in every continent (all $p < 0.001$), with the greatest change in North America (4.7 ± 3.0 to 7.1 ± 2.6, respectively). Perceived efficacy of soft contact lenses approved for myopia control more than doubled since 2015 (24.4 ± 25.0 % to 52.2 ± 24.0 %, $p < 0.001$). Combination therapy and orthokeratology were perceived to be the most efficacious interventions, yet single vision spectacles were the most prescribed option. However, the frequency of prescribing single vision spectacles had decreased since 2015 (by −11.1 %, $p < 0.001$). Globally, cost to the patient remained practitioners' primary reason for not prescribing myopia interventions.

Conclusions: More practitioners are prescribing appropriate control methods to children with lower degrees of myopia than identified previously. However, consistent hindrances need addressing, namely increased affordability and accessibility of effective control options.

1. Introduction

Extensive advancements in myopia research have led to significant changes in the optical industry year by year, including updates of long-term efficacy data [1,2] and the manufacture of newer control technologies [3,4]. Additionally, non-profit organizations and membership bodies across the world are advocating for eye care practitioners to engage in myopia management, providing resources for practitioners and patients alike. With myopia research so dynamic at present, and an array of different control methods and options available, it is likely for practitioners' opinions and techniques of managing young myopic patients to adapt alongside the rapid developments in the field.

The first global survey of myopia management attitudes and strategies was conducted in 2015 [5], followed by 2019 [6]. The findings of the previous survey provided an overview of myopia management across the world in 2022 [7]. Each survey provided a valuable snapshot in time of the status of myopia management across the world. Since 2015, huge developments in identifying and controlling the myopia epidemic have occurred. Now cited well over 4000 times on Google Scholar (https://scholar.google.com), a systematic review and *meta*-analysis performed by Holden et al., was published in 2016, predicting 50 % of the world's population to be myopic by the year 2050 [8], alongside the World Health Organization (WHO) declaring myopia to be a public health issue. First formed in 2015, the International Myopia

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Institute (IMI) have since released three series of white papers and clinical summaries available in multiple languages, providing evidence-based recommendations in classifications and patient management [9]. In addition, rather than practitioners being limited to using conventional spectacles and contact lens options (such as traditional bifocals and progressive lenses), optical interventions specifically marketed for the purpose of myopia control have been manufactured, trialed, validated, and made accessible across various parts of the world since 2015 [7]. These landmark events in myopia management will naturally play a part in prescribing trends identified in previous years. Further analysis of how specific continent-wide responses have adapted with time will enable a deeper understanding of how advancements in ophthalmological research and industry are reflected in clinical practice.

Using the same methodology as that used in 2015 [5], 2019 [6], and 2022 [7], this article forms the fourth instalment in the series, providing an update of the attitudes towards myopia management strategies in clinical practice worldwide in 2024. Additionally, this paper delves further into practitioners' reasoning behind the previously identified global and regional trends, and reviews specific changes in clinical opinions and care of young myopes over the nine-year period.

2. Methods

2.1. Data collection procedures

A self-administered, internet-based cross-sectional survey in 18 languages (Simplified and Traditional Chinese, Danish, Dutch, English, French, Greek, Hebrew, Italian, Japanese, Norwegian, Polish, Portuguese, Russian, Spanish, Swedish, Turkish, and Vietnamese) was distributed using software SurveyMonkey (Momentive Inc, Palo Alto, California, USA). The survey was distributed across the world through various professional bodies (the same as for previous surveys, not specific to myopia) to reach eye care practitioners (optometrists, ophthalmologists, contact lens opticians, and others) globally. The survey was live between December 2023 and July 2024. Ethics approval was received from the Aston University Research Ethics Committee, and informed consent was received from all respondents.

Most questions matched the previous versions, however some important additions and modifications were made to the current survey based on IMI advisory board feedback and updated evidence, in the form of:

- Replacing the option of 'pharmaceuticals' with three concentrations of atropine (0.01 %, 0.05 %, and ≥0.5 %) in the list of possible management approaches
- Adding 'light therapy' (such as low-level red-light therapy) and 'alternating treatments' (using one intervention for a period to get the best effect, and then switching to a different intervention to try to get another initial year effect) to the list of possible management approaches
- Separating 'specific myopia control soft contact lenses' into daily and reusable modalities within the list of possible management approaches
- Condensing the list of options to treatment modalities when asking the minimum age practitioners would prescribe different management approaches
- Adding 'myopia progression rate' and changing parent/patient 'pressure' to 'preference' to the list of options to be ranked for beginning myopia control
- Adding 'corneal topography', 'myopia progression rate', and 'risk factors' to the list of possible options considered when selecting which myopia management strategy to use first
- Adding 'eye growth faster than expected for age' and 'treatment comfort' to the list of possible options when selecting triggers to adjust myopia management strategy

Fifteen questions relating to the self-reported clinical management behaviors of practitioners for progressing myopia and practitioner's current opinions on myopia-related clinical care were asked (new questions refined by the IMI advisory board, indicated by an asterisk):

- Level of concern about the increasing frequency of childhood myopia in their clinical practice (rated as "Not at all" to "Extremely" on a 10-point scale)
- Perceived effectiveness, defined as the expected level of reduction in childhood myopia progression of a range of myopia correction and control options (rated as a percentage from 0 % to 100 %)
- How active they would consider their clinical practice in the area of myopia control (rated as "Not at all" to "Fully" on a 10-point scale)
- *Whether they have access to equipment to measure (yes or no):
  - o Cycloplegic refractive error
  - o Autorefraction
  - o Corneal curvature
  - o Axial length
- Frequency of prescribing different myopia correction/control options for progressing/young myopes during a typical month
- Minimum age a patient would need to be for them to consider myopia control options (assuming average handling skills and child/parent motivation)
- Minimum amount of myopia that would need to be present to consider myopia control options (specified in half-diopter steps)
- Minimum level of myopia progression (diopters/year) that would prompt a practitioner to specifically adopt a myopia control approach (specified in quarter-diopter steps)
- Frequency of adopting single vision undercorrection as a strategy to slow myopia progression (reported as "no," "sometimes," or "always")
- If they had only ever fitted single vision spectacles/contact lenses for myopic patients, what had prevented them (multiple options could be selected) from prescribing alternative refractive correction methods; options consisted of the following:
  - o They don't believe that these are any more effective
  - o The outcome is not predictable
  - o Safety concerns
  - o Cost to the patient makes them uneconomical
  - o Additional chair time required
  - o Inadequate information/knowledge
  - o Low benefit/risk ratio
  - o Accessibility of treatment options
  - o Other
- Rank their criteria for starting myopia control in a young progressing myope (numbered 1 to 13); options consisted of the following:
  - o Refractive error
  - o Age
  - o Myopic parent (one)
  - o Myopic parents (two)
  - o Axial length
  - o Myopia progression rate
  - o Choroidal thickness
  - o Choroidal thickness responsiveness to early treatment
  - o Binocular vision status
  - o AC/A ratio
  - o Lifestyle
  - o Patient preference
  - o Parent/guardian preference
- How they select which myopia management strategy to use first on a young progressing myope; options consisted of the following:
  - o Only have one treatment available to me
  - o Only comfortable/trained to use one treatment
  - o Age
  - o Refractive error (non-cycloplegic)
  - o Cycloplegic refraction

Table 1
Total number of complete responses collected from each continent for each of the four global surveys. Figures marked with an asterisk were considered too low to be included in the analysis.

Survey	Continent							Total
	Africa	Asia	Australasia	Europe	North America	South America	Did not state	
2015	7*	291	119	339	133	82	None	971
2019	13*	207	79	717	147	173	None	1336
2022	74	1396	101	931	338	177	178	3195
2024	11*	746	94	1462	533	147	None	2993

Table 2
Data presented for countries reporting ≥ 30 responses in surveys conducted from 2015 to 2024.

Survey	Continent					
	Africa	Asia	Australasia	Europe	North America	South America
2015	None	China (n = 137) Hong Kong (n = 61) India (n = 37)	None	France (n = 34) Italy (n = 72) Netherlands (n = 38) Portugal (n = 48) Spain (n = 34) UK/EIRE (n = 52)	Canada (n = 33) USA (n = 100)	None
2019	None	China (n = 37) Hong Kong (n = 59) India (n = 30)	None	Germany (n = 68) Italy (n = 102) Netherlands (n = 40) Portugal (n = 76) Russia (n = 78) Spain (n = 173) UK/EIRE (n = 78)	Canada (n = 37) USA (n = 90)	None
2022	None	China (n = 1001) India (n = 65) Israel (n = 42) Philippines (n = 58) Turkey (n = 78) Vietnam (n = 101)	Australia (n = 87)	France (n = 31) Italy (n = 202) Norway (n = 40) Russia (n = 80) Spain (n = 380) UK/EIRE (n = 67)	Canada (n = 107) Mexico (n = 86) Puerto Rico (n = 30) USA (n = 77)	Argentina (n = 42) Brazil (n = 36) Ecuador (n = 40) Peru (n = 37)
2024	None	China (n = 232) India (n = 39) Malaysia (n = 65) Singapore (n = 35) Taiwan (n = 59) Turkey (n = 107) Vietnam (n = 143)	Australia (n = 67)	Denmark (n = 41) Italy (n = 149) Norway (n = 42) Portugal (n = 67) Russia (n = 666) Spain (n = 325) Sweden (n = 45) UK/EIRE (n = 37)	Canada (n = 143) Mexico (n = 207) USA (n = 101)	Brazil (n = 49) Ecuador (n = 32)

  - o Myopia progression
  - o Risk factors
  - o Axial length
  - o Choroidal thickness
  - o Binocular vision status
  - o Corneal topography
  - o Patient preference
  - o Parent/guardian preference
  - o Other
- *How frequently they follow-up myopic children they are managing (specified in months)
- Triggers to adjust their myopia management strategy; options consisted of the following:
  - o I don't
  - o Progression of refractive error
  - o Progression of axial length
  - o Changes in choroidal thickness
  - o Eye growth faster than expected for age
  - o A new treatment with a scientifically reported better efficacy
  - o Poor compliance
  - o Treatment comfort
  - o Complications
  - o Other
- How has managing myopia changed their patient loyalty, practice revenue and job satisfaction (each rated as "much less," "less," "no change," "more," and "much more")

Respondents had the option to add further comments to each of the questions and the topic as a whole. Following an explanation of the research, participation was voluntary and anonymous; however, respondents were asked to provide basic demographic information about themselves (years of being qualified and principal working environment). For the questions consistent with those included in the previous surveys, the results of the current survey were then compared with the previous data collected in 2015, 2019, and 2022. For those questions first asked in 2022, data were only compared between the two years.

2.2. Statistical analysis

The data from all four surveys was divided into year group (2015, 2019, 2022, and 2024) and into the continents the eye care practitioner was based in. Statistical analyses were conducted with IBM SPSS (Statistics for Windows v28; IBM Corp., Armonk, NY, USA). Ordinal data are presented as medians and interquartile ranges and continuous data as means and standard deviations. As the data were determined not to meet the normality assumption of parametric testing based on the Shapiro-Wilk test, the nonparametric Kruskal-Wallis test was used to compare responses between regions. Statistical significance was set at $p < 0.05$.

3. Results

A total of 2,993 responses were received in 2024, with the distribution by continent being: Africa n = 11; Asia n = 746; Australasia

Table 3
Breakdown of respondents' professions for the surveys used from 2015 to 2024. Green lines in significance plots represent significant differences ($p < 0.05$) and black lines represent no significant difference ($p \geq 0.05$).

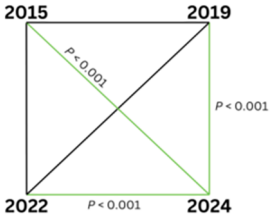
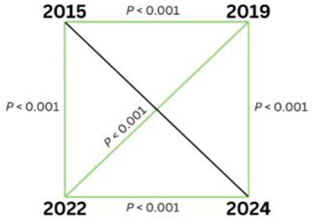
Survey	Profession					Significance plot
	Optometrist	Ophthalmologist	Contact lens optician	Other	Did not state	
2015	71.9 % (n = 698)	18.5 % (n = 180)	5.8 % (n = 56)	3.2 % (n = 31)	0.6 % (n = 6)	
2019	72.5 % (n = 968)	19.6 % (n = 262)	6.7 % (n = 90)	1.2 % (n = 16)	None	
2022	68.4 % (n = 2185)	23.0 % (n = 736)	6.1 % (n = 194)	2.4 % (n = 76)	0.1 % (n = 4)	
2024	52.7 % (n = 1577)	41.1 % (n = 1230)	3.0 % (n = 90)	3.1 % (n = 92)	0.1 % (n = 4)	

Table 4
Breakdown of respondents' principal working environments for the surveys used from 2015 to 2024. Green lines in significance plots represent significant differences ($p < 0.05$) and black lines represent no significant difference ($p \geq 0.05$).

Survey	Principal working environment					Significance plot
	Clinical practice	Academia	Industry	Other	Did not state	
2015	83.4 % (n = 814)	11.2 % (n = 109)	1.7 % (n = 16)	2.7 % (n = 26)	0.6 % (n = 6)	
2019	90.7 % (n = 1212)	5.1 % (n = 68)	2.1 % (n = 28)	2.1 % (n = 28)	None	
2022	78.5 % (n = 2507)	7.6 % (n = 244)	5.2 % (n = 165)	8.5 % (n = 272)	0.2 % (n = 7)	
2024	83.9 % (n = 2510)	5.8 % (n = 173)	3.1 % (n = 95)	6.3 % (n = 187)	0.9 % (n = 28)	

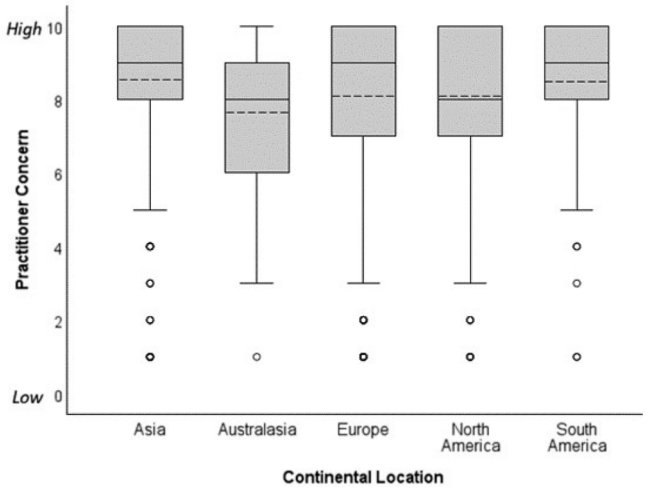


Fig. 1. Level of concern (rated from 0 [low] to 10 [high]) regarding the perceived increasing frequency of pediatric myopia in their practice for practitioners located in different continents in 2024. Box = 1 standard deviation (SD); solid line = median; dashed line = mean; whiskers = 95 % confidence interval.

(Australia, New Zealand, and neighboring islands in the Pacific Ocean) n = 94; Europe n = 1,462; North America n = 533; and South America n = 147. A comparison of the number of responses across the four surveys is presented in Table 1. Country-specific responses obtained from the four surveys are presented in Table 2.

Of the study participants in 2024, the majority were optometrists (52.7 %, n = 1577), followed by ophthalmologists (41.1 %, n = 1230), contact lens opticians (3.0 %, n = 90), and other types of eye care specialists (3.1 %, n = 92). The principal working environment for 83.9 % (n = 2510) of practitioners was clinical practice, 5.8 % (n = 173) worked in academia, 3.1 % (n = 95) worked within industry, and 6.3 % (n = 187) reported to work in other environments. Tables 3 and 4 show the breakdown for respondents' professions and principal working environments for surveys conducted from 2015 to 2024. All study participants reported being registered eye care practitioners with a median number of years qualified of 11 to 20, with a normal distribution. This level of experience was consistent with the previous three surveys, where 11 to 20 years was the median number of years qualified also.

3.1. Self-reported concern about the increasing frequency of childhood myopia

In 2024, practitioners in Asia reported the greatest level of concern about the increasing frequency of childhood myopia; however, practitioners in South America showed similar levels of concern (8.6 ± 1.9 and 8.5 ± 1.9, respectively, p = 0.603). Practitioners in Australasia reported a significantly lower level of concern than all other continents (7.7 ± 1.9, all $p < 0.05$) with Europe and North America showing similar levels (8.1 ± 2.1 and 8.1 ± 2.0, respectively, p = 0.402) (Fig. 1).

This pattern of practitioner concern has been consistent over recent years; from 2015 to 2022, Asia had consistently showed a significantly greater level of concern about the increasing frequency of childhood myopia than all other continents analyzed (all $p < 0.05$, Fig. 2). Conversely, practitioners in Australasia reported a statistically significant lower level of concern compared to all other continents since 2019 (all $p < 0.05$), besides Europe in 2022 (p = 0.143, Fig. 2). All continents besides Australasia have shown a significant increase in the level of concern regarding the growing numbers of myopic children from 2015 to 2024, with the greatest shift in concern being in South America (Fig. 3).

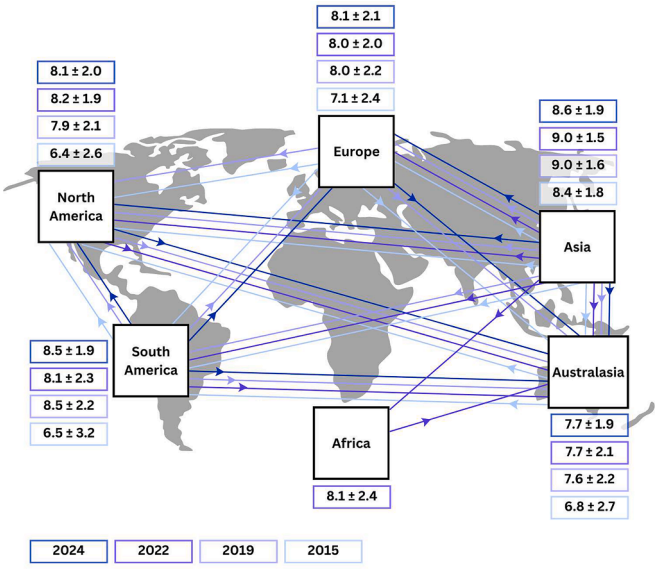


Fig. 2. Self-reported concern level for each continent from 2015, 2019, 2022, and 2024. Lines between continents indicate statistically significant differences ($p \leq 0.05$) between the concern levels of each year. No line indicates no statistically significant difference. Direction of arrows show the higher concern to lower concern. Note that responses from Africa were only included in the analysis in 2022 due to insufficient numbers in other years. Data are presented as mean ± SD.

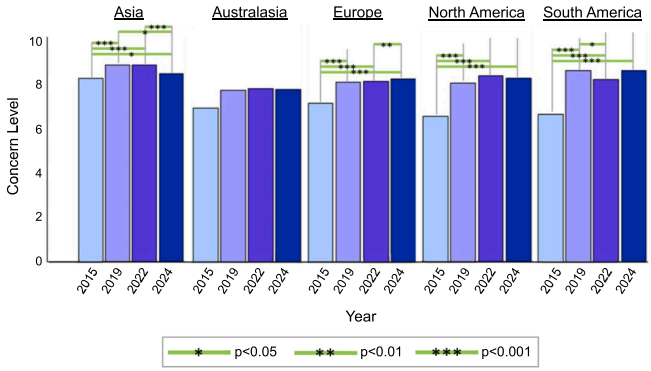


Fig. 3. Changes in mean self-reported concern levels by continent between 2015 and 2024. Green horizontal lines between years indicate statistically significant change ($p < 0.05$) and no line indicates no significant change ($p \geq 0.05$) such as for Australasia. Error bars not included for ease of interpretation.

3.2. Practitioners' perceived effectiveness of management options for myopia control

In 2024, combination therapy was perceived to be the most effective control option overall (59.0 ± 27.9 % expected level of reduction in childhood myopia progression), closely followed by orthokeratology (55.8 ± 25.2 %), approved myopia control spectacles (52.3 ± 23.8 %), and approved myopia control soft contact lenses (52.2 ± 24.0 %) (all $p < 0.001$). Undercorrection (7.1 ± 16.8 %), single vision spectacles (16.7 ± 25.0 %), single vision soft contact lenses (19.5 ± 26.2 %), and light therapy (21.4 ± 25.4) were perceived to be the least effective options (all $p < 0.001$). Continent-specific responses are presented in Table 5.

The worldwide changing perceptions of these correction and control techniques are presented in Fig. 4. Of note, the perceived efficacy of orthokeratology as a myopia control method markedly increased by 12.6 % ($p < 0.001$) from 2015 to 2022, with little change from there onwards. The greatest change in perception was of soft contact lenses approved for myopia control, with the expected percentage level of reduction in childhood myopia progression more than doubling between 2015 and 2024 (24.4 ± 25.0 % to 52.2 ± 24.0 %, respectively, $p < 0.001$). Although perceived to be the most effective control method in 2022 and 2024, the perceived efficacy of combination therapy by eye care practitioners has reduced by 9.7 % since 2022 ($p < 0.001$).

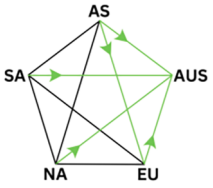
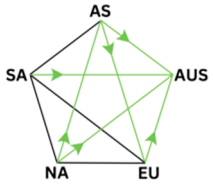
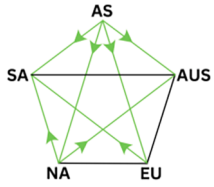
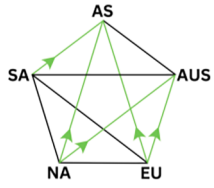
3.3. Practitioners' perceived level of clinical activity in myopia management

In 2024, the highest perceived levels of clinical activity were from practitioners in Australasia (8.2 ± 2.0 out of 10), Asia (7.9 ± 2.3), and South America (7.7 ± 2.6), with no significant difference between these three continents (all $p > 0.05$, Fig. 5). Europe and North America reported lower levels of clinical activity in myopia management (7.4 ± 2.4 and 7.1 ± 2.6, respectively, $p = 0.101$).

Since 2015, practitioners in Asia have consistently perceived themselves to have a high level of clinical activity in myopia management, being significantly greater than all continents in 2015 and all continents besides Australasia in 2019 and 2022 (Fig. 6). Conversely, the perceived level of clinical activity of practitioners in South America had notably increased in 2024 when compared to previous years; in 2022, practitioners in South America reported a significantly lower activity level than all other continents (all $p < 0.005$, Fig. 6), whereas responses of 2024 showed an activity level close to that of practitioners in Asia.

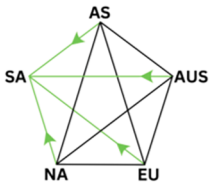
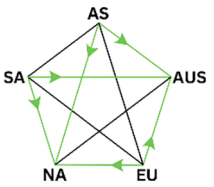
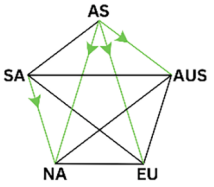
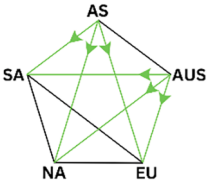
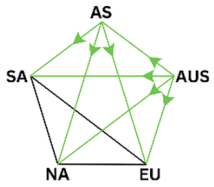
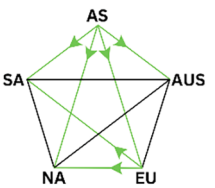
Every continent analyzed since 2015 has shown an increasing level of clinical activity in myopia management from 2015 to 2024 (Fig. 7).

Table 5
Perceived effectiveness (% reduction myopia progression) in 2024 of myopia management options across continents. Data are expressed as mean ± SD. Green lines in significance plots represent significant differences ($p < 0.05$) and black lines represent no significant difference ($p \geq 0.05$). Arrows direct higher percentage to lower percentage. MC = myopia control. AS = Asia, AUS = Australasia, EU = Europe, NA = North America, SA = South America.

Continent							
Technique		**Asia**	**Australasia**	**Europe**	**North America**	**South America**	**Significance Plot**
Spectacles	Undercorrection	7.4 ± 15.7	0.1 ± 4.2	6.7 ± 16.6	9.4 ± 20.3	5.8 ± 13.8	
	Single Vision	18.1 ± 23.8	2.6 ± 8.0	15.4 ± 22.8	19.7 ± 30.7	21.8 ± 31.5	
	Bifocals	24.6 ± 21.4	13.8 ± 12.8	20.6 ± 21.8	22.6 ± 24.2	15.7 ± 20.0	
	Progressive Addition Lenses	27.6 ± 22.0	14.1 ± 10.9	23.9 ± 23.5	24.2 ± 25.8	21.4 ± 24.4	
	Approved MC	46.3 ± 21.7	47.5 ± 16.4	55.2 ± 23.6	53.5 ± 25.5	50.6 ± 27.9	
Contact Lenses	Rigid Corneal Lenses	31.3 ± 28.2	10.4 ± 15.9	26.1 ± 28.5	22.5 ± 28.8	18.5 ± 26.9	
	Single Vision Soft	19.6 ± 24.7	3.6 ± 9.6	20.0 ± 25.2	20.7 ± 30.3	21.2 ± 30.8	

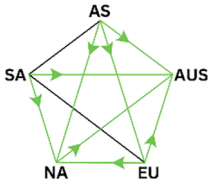
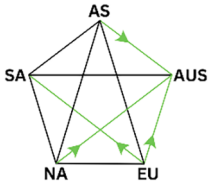
(*continued on next page*)

Table 5 (*continued*)

Continent							
Technique		**Asia**	**Australasia**	**Europe**	**North America**	**South America**	**Significance Plot**
	Multifocal Soft	31.6 ± 23.2	30.0 ± 17.5	30.1 ± 24.5	31.7 ± 24.4	25.7 ± 29.0	
	Approved MC Soft	46.2 ± 22.5	50.5 ± 15.8	55.1 ± 23.7	52.8 ± 24.8	48.4 ± 28.7	
Contact Lenses	Orthokeratology	56.2 ± 22.1	50.8 ± 16.4	59.1 ± 25.4	49.4 ± 26.7	45.6 ± 30.5	
Atropine	0.01 %	41.4 ± 23.5	27.9 ± 21.7	41.7 ± 28.5	34.0 ± 25.9	42.6 ± 28.9	
	0.05 %	48.0 ± 22.8	42.9 ± 18.5	41.7 ± 28.4	40.0 ± 24.8	46.0 ± 28.4	
	>0.05 %	47.6 ± 28.2	49.5 ± 25.2	38.6 ± 29.8	38.0 ± 27.7	38.9 ± 31.4	
Light Therapy		31.6 ± 27.5	48.3 ± 28.0	16.7 ± 22.3	20.0 ± 25.8	19.4 ± 26.5	
Combination Therapy		64.2 ± 23.7	58.9 ± 19.9	60.0 ± 29.0	50.6 ± 28.8	50.6 ± 29.8	

(*continued on next page*)

Table 5 (*continued*)

Continent / Technique	Asia	Australasia	Europe	North America	South America	Significance Plot
Alternating Treatments	36.3 ± 29.1	27.7 ± 25.0	37.5 ± 31.5	37.2 ± 30.6	31.0 ± 32.6	
Increased Time Outdoors	48.1 ± 26.6	26.2 ± 19.5	41.9 ± 28.3	38.1 ± 30.4	47.5 ± 30.3	

Practitioners in North America have had the greatest increase over the 9-year period, from 4.7 ± 3.0 in 2015 to 7.1 ± 2.6 in 2024 ($p < 0.001$) (Fig. 7). Practitioners in Asia have shown the most consistent level of clinical activity over this time (2015-2024), with a small yet significant increase of 0.4 on the 10-point scale ($p = 0.001$).

3.4. Practitioners' access to instrumentation

Across the world in 2024, 69.3 % of eye care practitioners reported having access to measure cycloplegic refractive error, 93.8 % reported access to measure autorefraction, 86.3 % reported access to measure corneal curvature, and 55.7 % reported access to measure axial length (all $p < 0.001$). The results and differences between continents are presented in Table 6.

3.5. Frequency of prescribing different myopia management methods by practitioners

All results from 2024 are presented in Table 7. Among all available prescribing options, single vision spectacles were the most frequently prescribed primary correction option for myopic children globally in 2024 (32.8 ± 30.7 %, $p < 0.001$), followed by myopia control spectacles (16.36 ± 21.4 %, $p < 0.001$). The tendency to prescribe single vision spectacles over any other option was not consistent between continents; practitioners in Asia and South America prescribed single vision spectacles most often, whereas practitioners in Australasia prescribed myopia control spectacles more frequently than they did single vision spectacles (Table 7).

Across the world, single vision soft contact lenses were prescribed more frequently than daily disposable and reusable soft contact lenses approved for myopia control (8.1 ± 12.4 %, 7.8 ± 13.1 %, and 3.3 ± 7.5 %, respectively, all $p < 0.05$); however, practitioners in Australasia and Europe deviated from this prescribing pattern (Table 7), opting to prescribe myopia control soft daily disposable contact lenses more frequently. Notably, practitioners in all continents prescribed more daily disposable than reusable soft contact lenses approved for myopia control. Lower concentrations of atropine were more frequently prescribed than higher concentrations in 2024, with a frequency of 5.6 ± 13.3 % for atropine 0.01 %, 3.3 ± 9.6 % for atropine 0.05 %, and 0.9 % ± 5.1 % for atropine > 0.05 % (all $p < 0.05$). This pattern was consistent across every continent (Table 7). A small percentage of practitioners across the world prescribed combination therapy, at 3.4 ± 8.7 % averaged globally. However, this percentage significantly varied between continents; in particular, practitioners in Australasia prescribed combination therapy approximately double the worldwide average (Table 7).

When assessed globally over time, there was a significant reduction in the frequency of prescribing single vision spectacles as the primary correction option to young myopic patients across the world between 2015 and 2024 (−11.1 %, $p < 0.001$, Fig. 8). However, a slight although statistically significant increase was found from 2022 to 2024 (+3.0 %, $p = 0.003$). No significant difference was identified in the frequency of prescribing spectacle lenses and soft contact lenses specifically indicated for myopia control between 2022 and 2024 (Fig. 8). Despite this, a notable increased frequency in prescribing myopia control soft contact lenses between 2015 and 2024 was identified, from 1.9 ± 7.6 % to 7.8 ± 13.1 %, respectively ($p < 0.001$). Other global changes with time of management options perceived to be the most effective or the most frequently prescribed are presented in Fig. 8.

3.6. Minimum age of prescribing myopia management options by practitioners

Overall, the minimum patient age for prescribing the different myopia correction and control options was lowest for spectacles (5.3 ± 1.7 years, with 2.5 % of all respondents choosing to not prescribe this option). This was followed by atropine (6.1 ± 2.3 years, 28.4 % would not prescribe), light therapy (6.4 ± 2.9 years, 49.0 % would not prescribe), daily disposable soft contact lenses (8.9 ± 3.6 years, 12.4 % would not prescribe), and rigid corneal lenses (10.0 ± 3.7 years, 26.5 % would not prescribe). Of the six options provided, practitioners on average felt children needed to be oldest to receive reusable soft contact lenses, with a minimum age of 10.4 ± 3.6 years (12.4 % would not prescribe). However, the minimum average ages considered necessary by practitioners to prescribe each option varied significantly between continents (Table 8). Similarly, there were significant changes in the averaged minimum ages globally since 2015 (Fig. 9); in particular, practitioners were willing to prescribe pharmaceuticals such as atropine to myopic children of a younger age in 2024 than first reported in 2015 (6.1 ± 2.3 and 6.9 ± 2.7 years, respectively, $p < 0.001$) (Fig. 9).

3.7. Minimum degree of myopia to begin myopia management

In 2024 alone, the minimum degree of myopia present in a child to warrant myopia management was of no significant difference between all continents besides Australasia; practitioners in Australasia on average chose to introduce a myopia management approach to children with lower levels of myopia (Fig. 10).

Since 2022, the global average had remained stable, with a minimum degree of −1.01 ± 0.71D in 2022 and −0.98 ± 0.70D in 2024 ($p = 0.052$). Significant differences between these two time points were only

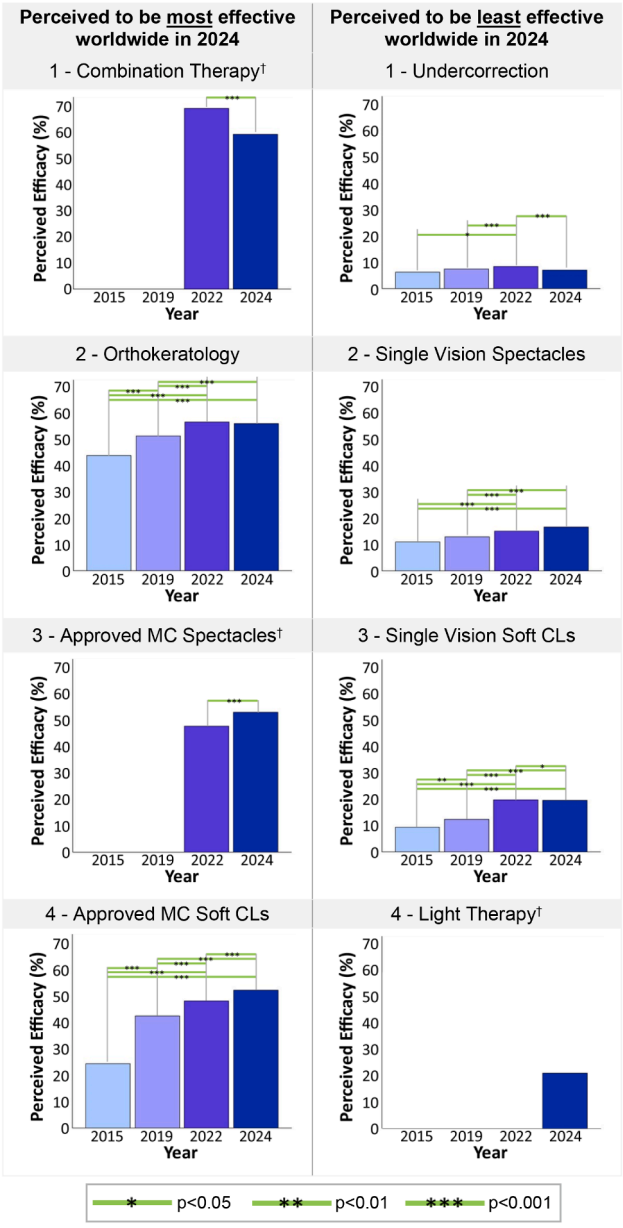


Fig. 4. Worldwide changes of the four myopia control / correction options perceived to be the most and least efficacious techniques to slow myopia progression. Green horizontal lines between years indicate statistically significant change ($p < 0.05$) and no line indicates no significant change ($p \geq 0.05$). Error bars not included for ease of interpretation. Options marked with † were not present in every survey since 2015. MC = myopia control, CLs = contact lenses.

present in North America and South America, with significant lower levels of myopia seen to necessitate myopia management in 2024 in comparison to 2022 (Table 9).

3.8. Minimum level of myopia progression that necessitates myopia management

The median level of myopia progression that was felt to warrant myopia management in 2024 was the same in all continents (i.e., 0.51–0.75D/year) besides Australasia (i.e., 0.26–0.50D/year); the latter different was statistically significant ($p < 0.001$).

From 2015 to 2024, the median minimum level of myopia progression that practitioners reported warrants myopia management has significantly decreased in every continent (all $p < 0.05$, Fig. 11).

3.9. Using undercorrection as a strategy to control myopia

Most practitioners did not use undercorrection as a strategy to control myopia in 2024, with 82.8 % responding they never undercorrect their young myopic patients. Worldwide, 2.1 % of practitioners always use undercorrection as a method of myopia control, and 15.1 % use it sometimes. The use of undercorrection varied significantly between continents; Australasia had the lowest proportion of practitioners who used undercorrection, and Asia had the highest (Table 10).

The use of undercorrection as a myopia control method has significantly declined since 2015 in all continents (all $p < 0.05$) besides Asia, which has remained stable over the nine-year period ($p = 0.360$, Fig. 12). Between 2022 and 2024, figures in Australasia and Europe did not change significantly (both $p > 0.05$), whereas the use of undercorrection either always or sometimes significantly decreased in North America and South America (both $p < 0.001$).

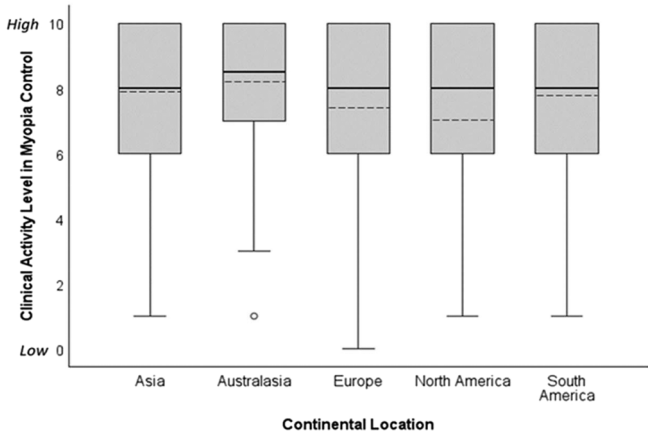


Fig. 5. Perceived level of clinical activity in myopia control (rated from 0 [low] to 10 [high]) for practitioners located in different continents in 2024. Box = 1 SD; solid line = median; dashed line = mean; whiskers = 95 % confidence interval.

3.10. Reasons for not prescribing an alternative method to single vision correction

Over half of respondents in South America (60.5 %) and Asia (55.8 %) reported one or more reasons for prescribing single vision correction to young myopic patients instead of a myopia control option in 2024. This was followed by 49.3 % of respondents in North America, 38.8 % in Europe, and 26.6 % in Australasia. Worldwide, 4.4 % of practitioners thought myopia control options were not effective and 4.5 % were concerned by unpredictable outcomes. The risk–benefit ratio, safety concerns, and additional chair time were of similar concern to practitioners, at 5.2 %, 5.6 %, and 6.2 %, respectively. Inadequate information and treatment availability were of greater concern, with 10.2 % and 12.5 % of practitioners reporting these as reasons for not prescribing a myopia control approach, respectively. Cost to the patient was of the greatest concern across the world, at 29.1 %. Fig. 13 presents the between-continent analysis of the reasons hindering practitioners from prescribing myopia intervention in 2024. Practitioners in Asia were significantly more concerned about safety, additional chair time, and the risk–benefit ratio than all other continents ($p < 0.05$). Further, all continents showed similar concerns regarding the additional cost of myopia interventions to the patient; only practitioners in Australasia had statistically significantly less concern about this factor than practitioners in Asia (Fig. 13).

From 2015 to 2022, the distribution of practitioners' reasons for not prescribing myopia significantly differed across each continent (all $p < 0.05$), and remained the same between 2022 and 2024 (all $p > 0.05$) (Fig. 14).

3.11. Ranked criteria for starting myopia control in a young progressing myope

In 2024, patient refractive error and age were the most highly ranked criteria for beginning myopia control across the world followed by (in order of importance): myopia progression, having two myopic parents, axial length, having one myopic parent, binocular vision status, lifestyle, choroidal thickness, choroidal thickness responsiveness to treatment, AC/A ratio, patient preference, and parent/guardian preference. Rankings by continent are presented in Fig. 15, and differences between continents for factors ranked from highest (1) to lowest (13) are presented in Fig. 16.

The rankings of the criteria for starting myopia control in a young progressing myope in 2024 were significantly different to the rankings in 2022 ($p < 0.001$). Refractive error and patient age were ranked highest in both years. Similarly, practitioners ranked patient and parent preference lowest in both surveys. Converse to 2022, binocular vision status was ranked higher than lifestyle, and AC/A ratio was ranked lower than choroidal thickness (all $p < 0.001$, Table 11).

3.12. Factors considered when choosing which myopia management strategy to use first

The key factors considered when choosing which myopia management strategy to use first were (in order of preference): patient age (73.9 %), myopia progression (71.8 %), risk factors such as parental myopia (62.5 %), cycloplegic refractive error (55.4 %), axial length (53.9 %), non-cycloplegic refractive error (50.3 %), parent/guardian preference (43.7 %), binocular vision status (35.2 %), patient preference (33.4 %), corneal topography (24.4 %), only comfortable/trained to use one treatment (11.2 %), choroidal thickness (8.8 %), and lastly only have one treatment available (7.7 %). Continent-wide responses are presented in Fig. 17.

Compared to responses from 2022, the proportion of practitioners

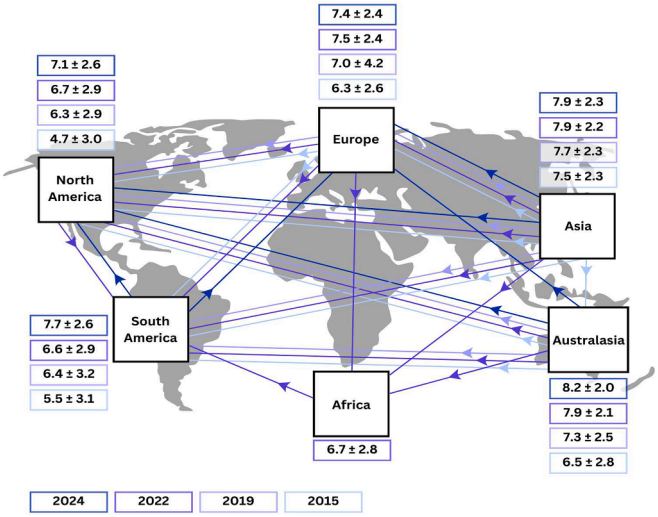


Fig. 6. Self-reported activity level for each continent from 2015, 2019, 2022, and 2024. Lines between continents indicate statistically significant differences ($p \leq 0.05$) between the concern levels of each year. No line indicates no statistically significant difference. Note that responses from Africa were only included in the analysis in 2022 due to insufficient numbers in other years. Direction of arrows show the higher activity to lower activity. Data are presented as mean ± SD.

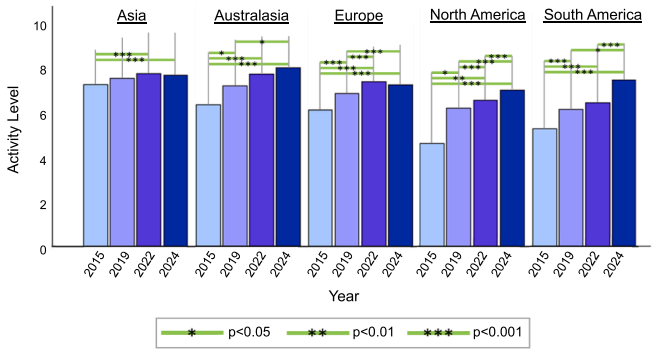
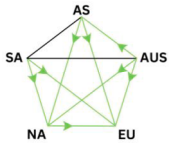
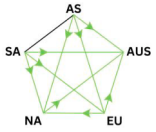
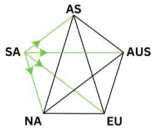
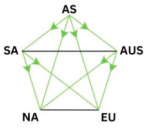


Fig. 7. Changes in practitioner's perceived level of clinical activity in myopia management by continent between 2015 and 2024. Green horizontal lines between years indicate statistically significant change ($p < 0.05$) and no line indicates no significant change ($p \geq 0.05$). Error bars not included for ease of interpretation.

Table 6
Percentage of practitioners with reported access to measure each of the listed ocular measurements in their clinical practice by continent in 2024. Green lines in significance plots represent significant differences ($p < 0.05$) and black lines represent no significant difference ($p \geq 0.05$). Arrows direct higher percentage to lower percentage. AS = Asia, AUS = Australasia, EU = Europe, NA = North America, SA = South America.

Measure	Continent					
	Asia	Australasia	Europe	North America	South America	Significance Plot
Cycloplegic Refractive Error	85.7 %	95.7 %	56.4 %	72.4 %	85.0 %	
Autorefraction	97.6 %	78.7 %	93.5 %	90.8 %	98.0 %	
Corneal Curvature	87.3 %	83.0 %	84.5 %	88.7 %	95.2 %	
Axial Length	81.6 %	64.9 %	45.6 %	42.6 %	67.3 %	

who consider patient age, cycloplegic refraction, axial length, and choroidal thickness when choosing which myopia management strategy to use first has remained stable (Table 12). A markedly lower proportion of practitioners across the world reported only have one treatment available to them (18.5 % in 2022 and 7.7 % in 2024).

3.13. Frequency of following up children undergoing myopia management

Over half of practitioners across the world followed-up their pediatric patients undergoing myopia management every 6 months (55.0 %), and nearly a third followed-up every 3 months (31.4 %). A smaller percentage of practitioners conducted follow-ups every 1 month (4.3 %), 12 months (3.7 %), 0.5 months (2.2 %), 2 months (2.1 %), or other length of time (1.3 %). A statistically significantly greater proportion of practitioners in Asia conduct follow-ups more frequently than practitioners from all other continents (all $p < 0.005$), whereas practitioners in Europe follow-up their young myopic patients less frequently than all continents besides South America (Fig. 18).

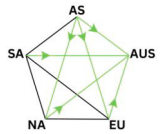
3.14. Triggers to adjust myopia management strategy

Overall, 3.5 % of practitioners did not adjust their myopia management strategy, whereas a greater percentage of practitioners used the following factors as a trigger to adjust their management approach in 2024 (in order of importance): progression of refractive error (80.3 %), progression of axial length (50.9 %), poor compliance (46.6 %), faster eye growth than expected for age (45.3 %), a new treatment with better reported efficacy (43.3 %), complications (38.7 %), treatment comfort (38.6 %), and changes in choroidal thickness (7.3 %).

A greater proportion of practitioners in Asia and South America used axial length progression as a trigger to change management strategy than practitioners in Australasia, Europe, and North America. Further, a significantly greater proportion of practitioners in Australasia considered poor compliance, treatment comfort, and complications than practitioners in all other continents (Fig. 19).

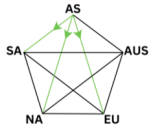
When compared with data from 2022, the proportion of practitioners around the world who did not adjust their myopia management strategy

Table 7
Frequency of prescribing myopia correction options (in percent) for progressing / young myopes by practitioners in different continents in 2024. MC = myopia control. Data are expressed as mean ± SD. Green lines in significance plots represent significant differences between continents ($p < 0.05$) and black lines represent no significant difference ($p \geq 0.05$). Arrows direct higher percentage to lower percentage. AS = Asia, AUS = Australasia, EU = Europe, NA = North America, SA = South America.

Technique		Continent					Significance Plot
		Asia	Australasia	Europe	North America	South America	
Spectacles	Single Vision	39.0 ± 34.6	17.8 ± 24.3	30.1 ± 28.2	33.4 ± 29.6	37.0 ± 34.3	
	Bifocals	1.6 ± 5.3	0.6 ± 2.3	1.8 ± 6.9	3.9 ± 8.5	1.3 ± 4.2	
	Progressive Addition Lenses	3.6 ± 10.8	3.0 ± 11.9	2.2 ± 7.3	5.8 ± 11.5	3.0 ± 10.1	
	Approved MC	14.1 ± 20.3	22.9 ± 24.3	16.9 ± 20.0	16.5 ± 23.7	17.0 ± 26.3	
Contact Lenses	Rigid Corneal Lenses	1.5 ± 2.7	0.5 ± 2.7	0.8 ± 3.2	1.6 ± 5.4	1.4 ± 4.5	
	Single Vision Soft	2.4 ± 7.0	5.0 ± 8.5	10.5 ± 13.5	10.1 ± 13.1	8.4 ± 11.9	
	Multifocal Soft	0.8 ± 2.7	3.4 ± 5.7	2.0 ± 5.6	3.4 ± 7.8	2.7 ± 7.6	
	Approved MC Soft Daily Disposable	2.1 ± 6.1	13.0 ± 10.5	10.7 ± 15.3	7.5 ± 11.7	4.6 ± 9.8	
Contact Lenses	Approved MC Soft Reusable	0.8 ± 3.7	3.2 ± 6.7	4.8 ± 8.2	2.8 ± 7.7	2.7 ± 9.8	
	Orthokeratology	6.6 ± 11.5	8.9 ± 12.3	10.4 ± 17.7	4.4 ± 10.5	2.7 ± 11.8	

(continued on next page)

Table 7 (*continued*)

Technique		Continent					Significance Plot
		Asia	Australasia	Europe	North America	South America	
Atropine	0.01 %	13.5 ± 18.7	3.9 ± 8.6	2.1 ± 7.1	2.5 ± 7.7	12.6 ± 23.7	
	0.05 %	6.1 ± 14.0	8.7 ± 11.3	1.2 ± 5.5	4.3 ± 9.5	3.1 ± 8.0	
	>0.05 %	1.9 ± 8.5	1.1 ± 4.5	0.5 ± 3.4	0.4 ± 2.6	0.8 ± 4.2	
Light Therapy		1.7 ± 7.6	1.3 ± 6.3	2.6 ± 7.9	1.1 ± 6.6	1.3 ± 6.5	
Combination Therapy		4.5 ± 9.9	6.8 ± 8.7	3.4 ± 8.9	2.1 ± 6.3	1.5 ± 4.3	

or changed strategy on access to treatment with better reported efficacy remained stable in 2024 (Table 13). All other factors showed a statistically significant difference from 2022 to 2024 (Table 13).

3.15. Impact of myopia management on your practice

Worldwide in 2024, practitioners felt practicing myopia management enhanced their patient loyalty (much more: 28.5 %; more: 32.7 %; and no change: 29.9 %), increased practice revenue (much more: 15.0 %; more: 34.5 %; and no change: 40.9 %), and improved job satisfaction (much more: 37.1 %; more: 36.3 %; and no change: 20.9 %). There were some variations between continents, displayed in Table 14.

The impact of myopia management on patient loyalty in 2024 reflected that recorded in 2022 as there was no significant difference in the distribution of practitioners' opinions between the two years ($p = 0.199$). However, practitioners felt a significant enhancement in practice revenue and job satisfaction in 2024 compared to 2022 (both $p < 0.05$).

4. Discussion

This study provides an update of the self-reported attitudes and approaches of eye care practitioners towards myopia management on young myopic patients across the world in 2024, forming the fourth contribution to a study series beginning in 2015 [5]. Further, this report examines how practitioner concern, activity, and strategies of myopia management have changed alongside the substantial advancements in myopia research and developments of novel intervention methods over the nine-year period.

Nearly 3000 practitioners responded to this survey in 2024, with such figure being close to that achieved in 2022. The responses from Africa were too low (n = 11) to be included in the analysis, however global changes from 2015, 2019, 2022, and 2024 were possible to assess in Asia, Australasia, Europe, North America, and South America. Consistent from 2015 to 2024, the greatest proportion of respondents worked principally in clinical practice, were optometrists by profession, and had been qualified from 11 to 20 years. The average number of years qualified was consistent over all four surveys, however the distributions of respondents' scope of practice, such as those who can prescribe optical correction and pharmaceuticals (albeit differing by region), and working environments gradually changed in the most recent surveys. Naturally, these demographic differences among respondents affect the interpretation of trends in myopia management over time. Perhaps the changing demographics of survey participants reflect shifts in interest and understanding of myopia management across various eye care professions and working environments. For example, in 2015, few ophthalmologists responded to the survey compared to optometrists (18.5 % and 71.9 %, respectively), whereas this difference was markedly smaller in 2024 (41.1 % and 52.7 %, respectively). This significant increase in the proportion of ophthalmologist respondents in 2024 may indicate that the management of young myopic patients has become of more concern across a broader range of eyecare services, extending beyond optometric practice in recent years.

The increasing frequency of pediatric myopia has sustained the previously recorded generally high levels of concern across the five continents analyzed. The high prevalence and progression rate of childhood myopia in Asia in comparison to the other continents [8,10–12] is likely a contributing factor to practitioners in Asia consistently reporting the greatest concern level since 2015. However, the current study demonstrates that consistency throughout time is not uniform across the world. The most recent survey shows the concern level of practitioners in South America to have risen noticeably;

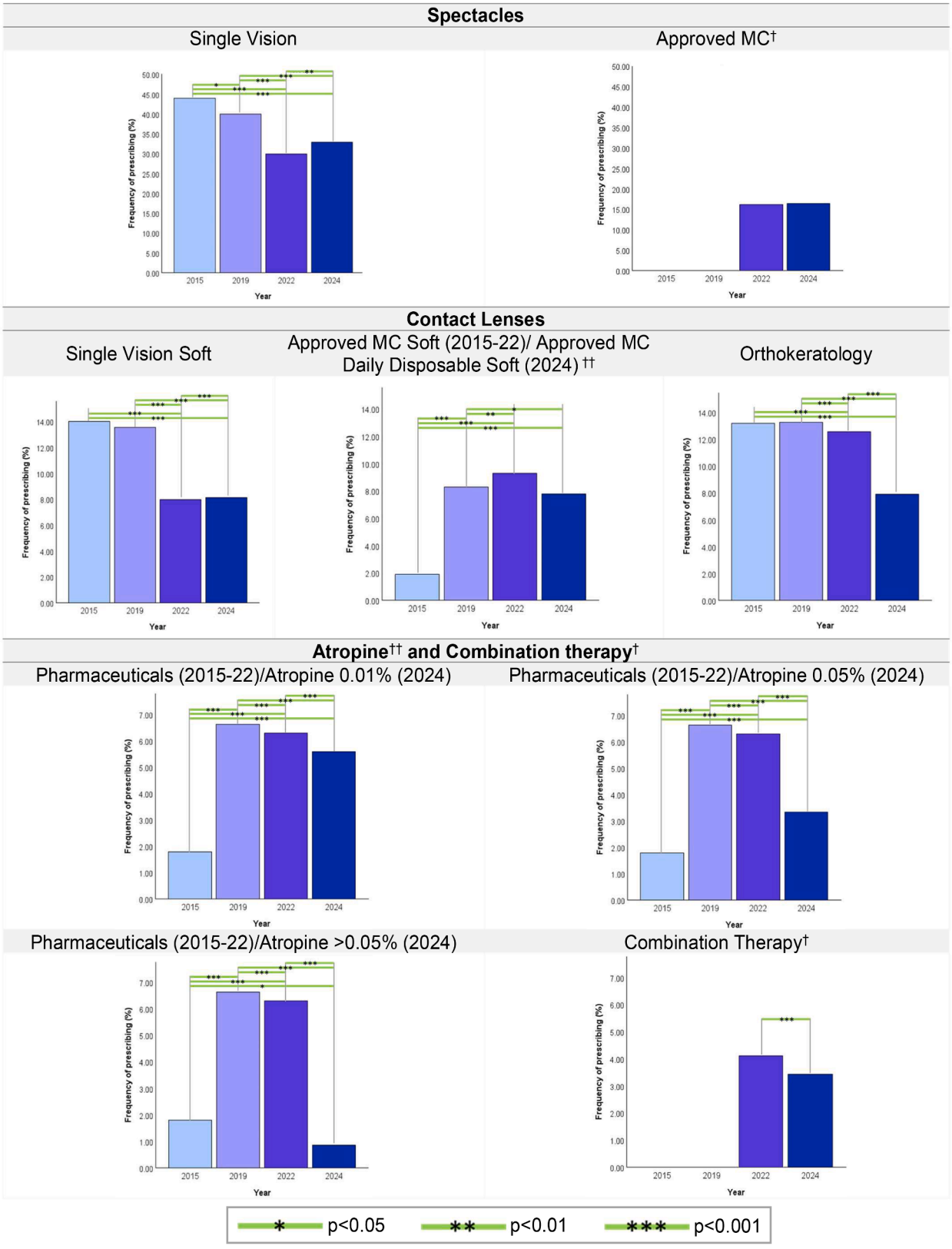
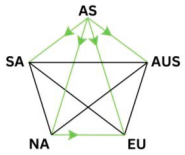
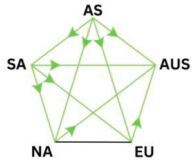
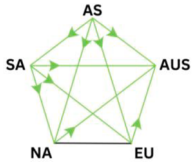
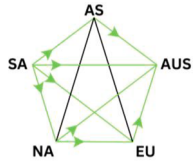
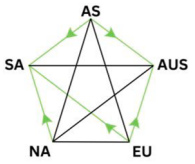
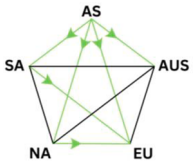


Fig. 8. Changes in the worldwide averaged frequency of prescribing myopia correction options (%) for young myopes by practitioners from 2015 to 2024. Green horizontal lines indicate a significant difference ($p < 0.05$) and no line indicates no significant difference ($p \geq 0.05$). Error bars not included for ease of interpretation. Options marked with † were not present in every survey since 2015, and options marked with †† differed in wording in the 2024 survey (i.e. 'Pharmaceuticals' was listed in surveys from 2015 to 2022, whereas the different concentrations of atropine were listed in the 2024 survey, all presented above). Note that y-axis scales differ for spectacles, contact lenses, and atropine/combination therapy. MC = myopia control.

Table 8
Minimum patient age considered necessary by practitioners from different continents in the prescription of different correction/control options. Data are expressed as mean ± SD years (% that would not prescribe this refractive modality). Green lines in significance plots represent significant differences ($p < 0.05$) and black lines represent no significant difference ($p \geq 0.05$). Arrows direct higher age to lower age. AS = Asia, AUS = Australasia, EU = Europe, NA = North America, SA = South America.

Technique	Continent					Significance Plot
	Asia	Australasia	Europe	North America	South America	
Spectacles	5.8 ± 2.0 (6.0 %)	5.3 ± 0.9 (0.0 %)	5.1 ± 1.6 (1.1 %)	5.4 ± 1.6 (2.3 %)	5.6 ± 2.2 (1.4 %)	
Daily Disposable Soft Contact Lenses	10.7 ± 3.6 (17.2 %)	7.5 ± 2.1 (2.1 %)	8.3 ± 3.0 (2.2 %)	8.7 ± 3.4 (2.1 %)	9.7 ± 3.4 (4.1 %)	
Reusable Soft Contact Lenses	11.7 ± 3.7 (24.5 %)	8.9 ± 3.0 (10.6 %)	10.0 ± 3.5 (6.4 %)	10.1 ± 3.8 (12.6 %)	10.7 ± 3.5 (11.6 %)	
Rigid Corneal Lenses	10.0 ± 3.5 (23.3 %)	8.6 ± 3.4 (24.5 %)	9.7 ± 3.6 (27.3 %)	10.6 ± 4.0 (27.6 %)	11.6 ± 4.0 (31.3 %)	
Atropine	6.2 ± 2.0 (11.5 %)	5.5 ± 1.0 (13.8 %)	6.0 ± 2.7 (39.9 %)	6.3 ± 2.7 (25.9 %)	5.7 ± 1.8 (18.4 %)	
Light Therapy	7.2 ± 3.0 (46.4 %)	6.1 ± 2.0 (70.2 %)	5.8 ± 2.7 (45.5 %)	6.9 ± 3.2 (57.8 %)	6.3 ± 2.0 (52.4 %)	

originally reporting the second lowest concern level in 2015, practitioners in South America now report concern matching that of Asia. This was reflected in the reported clinical activity level of myopia management; in 2022, continent-wide analysis showed practitioners in South America to rate themselves the least active, yet practitioners in South America subsequently showed the greatest increase in perceived activity level between 2022 and 2024. Although to varying degrees, it appears that practitioners' engagement in myopia management has also grown over time in other parts of the world; the average perceived level of clinical activity in myopia management from each continent significantly increased from 2015 to 2022, remaining stable or increasing further in 2024.

For the first time, pharmaceutical approaches alone were not within the top three most effective options of myopia control as perceived by practitioners. Matching the results found in 2022, combination therapy and orthokeratology interventions were perceived to be the first and second most effective approaches, respectively; however, results from 2024 showed spectacle and soft contact lenses approved for myopia control were thought to be more efficacious than atropine preparations overall. This change may be attributed to an increasing awareness, regulatory approval, and accessibility of novel optical approaches to slow myopia progression together with their growing evidence base [13,14].

Across all four surveys, single vision spectacles have been the most frequently prescribed form of primary optical correction to young myopic patients despite being rightly perceived as an ineffective myopia control option. Encouragingly, over the nine-year period, there has been a significant decrease in the frequency of prescribing single vision spectacles by 11 %, indicating a greater number of practitioners are providing myopic children with alternative options. Although perceived to be the most effective option, combination therapy was one of the least prescribed methods, following the same pattern as that identified in 2022 [7]; this may be attributed to limited access to atropine or the ability to prescribe low dose atropine not falling within an optometrists'

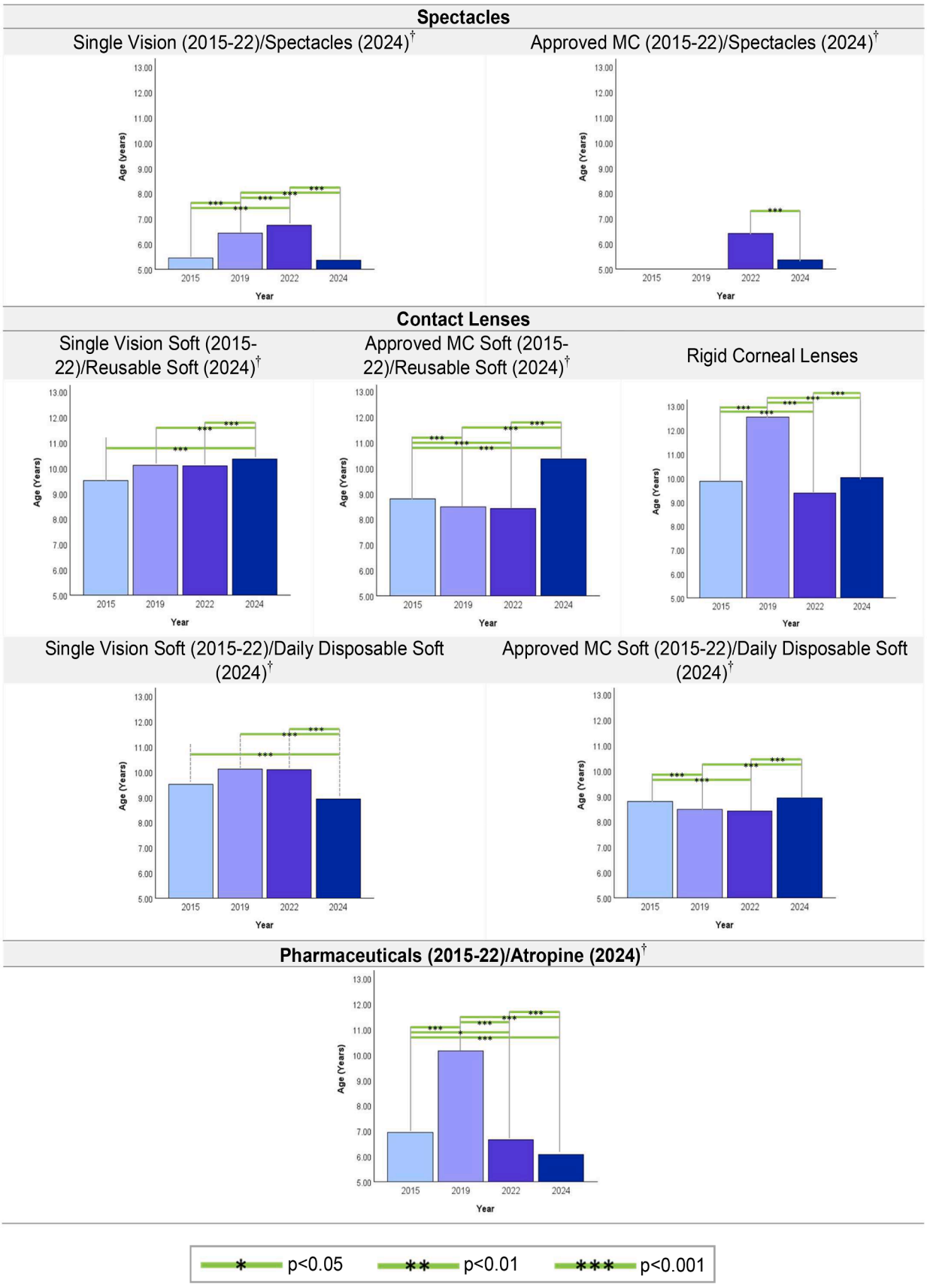


Fig. 9. Changes in the worldwide averaged frequency of prescribing myopia correction options (%) for young myopes by practitioners from 2015 to 2024. Green horizontal lines indicate a significant difference ($p < 0.05$), and no line indicates no significant difference ($p \geq 0.05$). Error bars not included for ease of interpretation. Options marked with † differed in wording in the 2024 survey (i.e. the option 'Single Vision Spectacles' was listed in surveys from 2015 to 2022, whereas 'Spectacles' was listed in the 2024 survey). MC = myopia control.

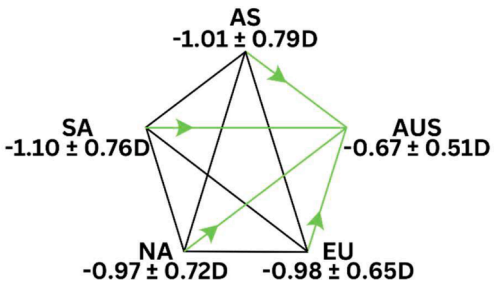


Fig. 10. The minimum degree of myopia present in a child to warrant beginning myopia management in 2024, presented as a significance plot between continents. Data are expressed as mean ± SD. Green lines in significance plots represent significant differences ($p < 0.05$) and black lines represent no significant difference ($p \geq 0.05$). Arrows direct higher level of myopia to lower level. AS = Asia, AUS = Australasia, EU = Europe, NA = North America, SA = South America.

Table 9
The minimum degree of myopia present in a child to warrant beginning myopia management by continent in 2022 and 2024. P-values represent significance in change with time from 2022 to 2024. Data are expressed as mean ± SD.

Continent	2022	2024	P value
Asia	−0.97 ± 0.70	−1.01 ± 0.79	0.824
Australasia	−0.64 ± 0.34	−0.67 ± 0.51	0.645
Europe	−0.97 ± 0.63	−0.98 ± 0.65	0.906
North America	−1.21 ± 0.81	−0.97 ± 0.72	<0.001
South America	−1.37 ± 0.81	−1.10 ± 0.76	<0.001

scope of practice in many parts of the world. Lower concentrations of atropine (≤0.05 %) were much more frequently prescribed than higher concentrations (>0.05 %) in every continent, suggesting easier access to low-dose formulations or a preference for avoiding the side effects associated with stronger preparations although the long-term efficacy of low dose atropine use for slowing myopia progression is being questioned [15].

Detailed in an IMI white paper [16], monitoring a myopic child's axial length is the advisable method of observing myopia progression due to the pathological consequences of excessive ocular elongation [17,18], stronger relation to visual impairment, and its immunity to accommodation artifacts [19]. The findings of the previous survey in 2022 [7] highlighted that a large proportion of practitioners were aware that the assessment of axial length is an important consideration for monitoring myopia progression; however, it was unclear whether this was routinely being measured. In addition, the accessibility of instrumentation to provide comprehensive myopia management, such as that used to measure cycloplegic autorefraction to objectively monitor of refractive progression, was unknown. Access to instrumentation to measure refraction and corneal curvature was generally high across all continents, ranging from 78.7 to 98.0 % and from 83.0 to 95.2 %, respectively. On the other hand, access to instrumentation/pharmaceuticals to measure cycloplegic refractive error and axial length was much more varied between continents (range 56.4 to 95.7 % and 42.6 to 81.6 %, respectively). In particular, practitioners in North America and Europe reported the least accessibility to both measures, whereas practitioners in Asia had high accessibility to both. As the market for myopia control intervention options expands further over time, it will be valuable to assess whether accessibility to the recommended instrumentation increases concurrently.

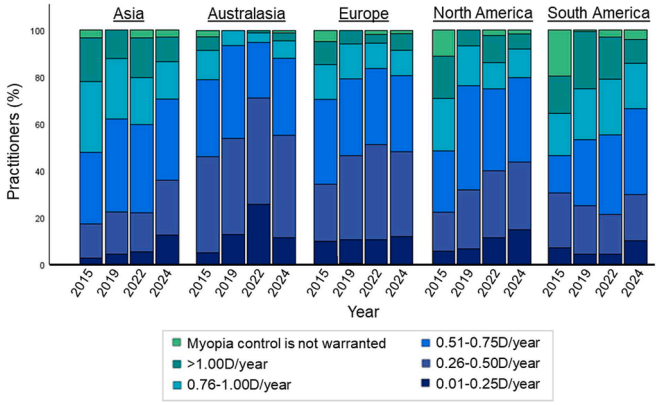
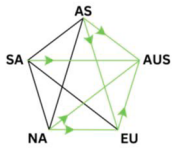


Fig. 11. Minimum annual amount of myopia progression, in dioptres per year (D/year), that practitioners located in different continents considered to warrant myopia management from 2015 to 2024.

Table 10
Percentage of practitioners who never, sometimes, and always use undercorrection as a strategy to control myopia in 2024, presented by continental location. Green lines in significance plots represent significant differences ($p < 0.05$) and black lines represent no significant difference ($p \geq 0.05$). Arrows direct continents with a higher percentage of practitioners who use undercorrection as a myopia control method to continents with a lower percentage. AS = Asia, AUS = Australasia, EU = Europe, NA = North America, SA = South America.

Frequency	Continent					
	Asia	Australasia	Europe	North America	South America	Significance Plot
Never	78.6	98.9	85.5	79.4	81.6	
Sometimes	18.6	1.1	12.6	19.1	15.0	
Always	2.8	0.0	1.9	1.5	3.4	

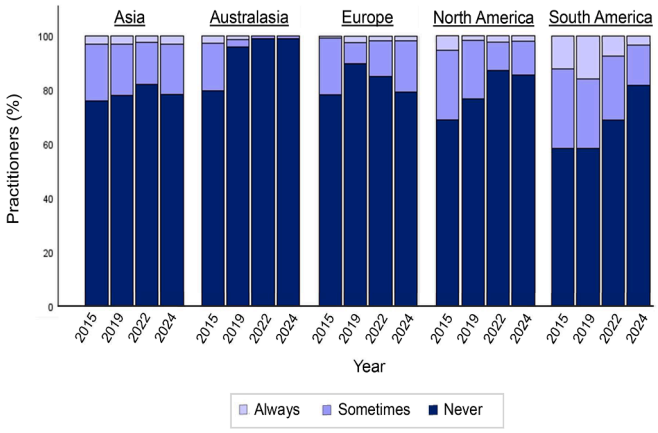


Fig. 12. Use of single vision, distance undercorrection as a strategy to slow myopia progression by practitioners located in different continents from 2015 to 2024.

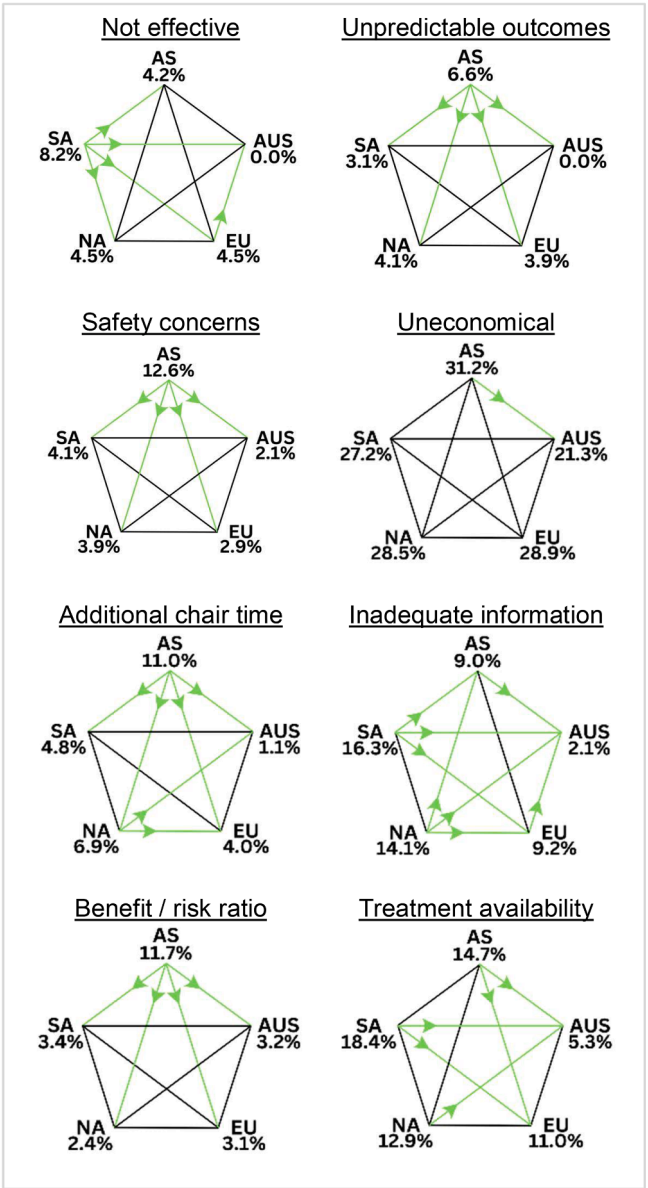


Fig. 13. Significance plots of factors cited by practitioners in different continents for not adopting myopia control approaches in 2024 (percentage of practitioners). Green lines represent significant differences ($p < 0.05$) and black lines represent no significant difference ($p \geq 0.05$). Arrows direct a higher percentage of practitioners to a lower percentage. AS = Asia, AUS = Australasia, EU = Europe, NA = North America, SA = South America.

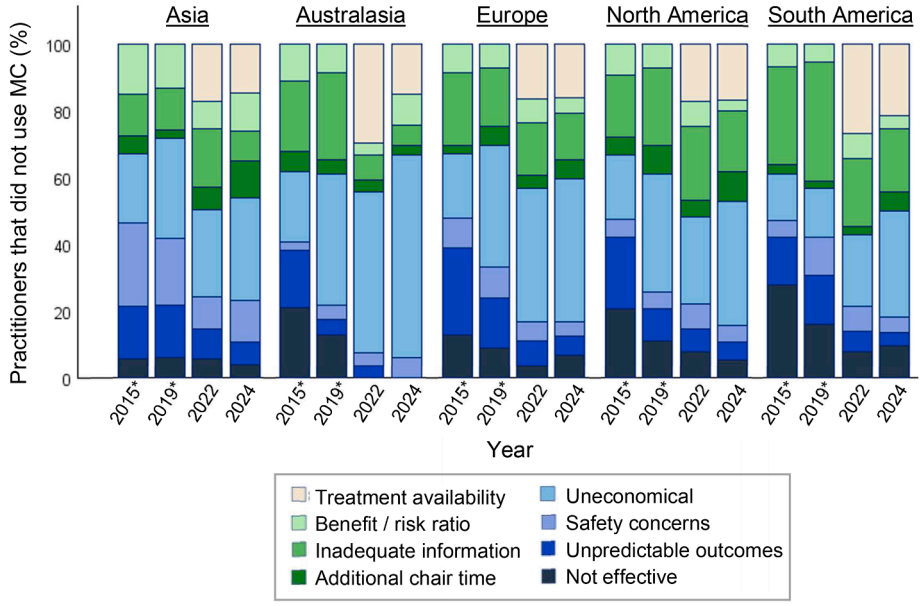


Fig. 14. Factors cited by practitioners that reported one or more reason for not prescribing myopia control (MC) in different continents for not adopting myopia control approaches from 2015 to 2024. The option of 'Treatment availability' was not included in the surveys conducted in 2015 and 2019 (marked with *).

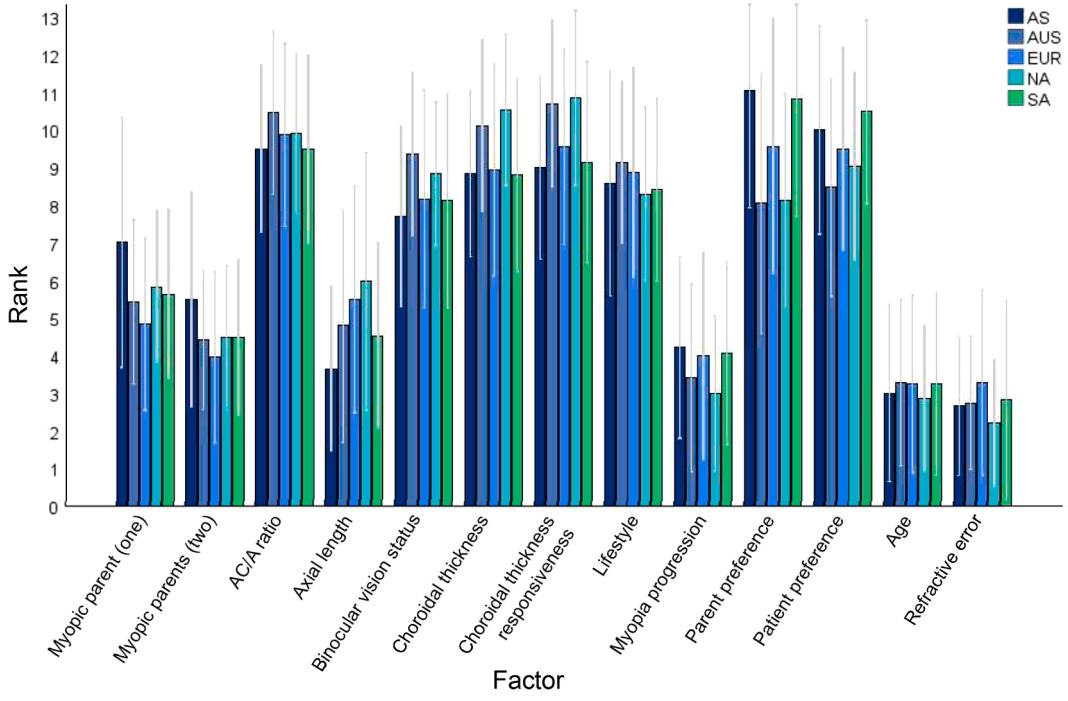


Fig. 15. Ranked criteria for beginning myopia control in a young progressing myopia in 2024 (where 1 = highest and 13 = lowest rank). AC/A ratio = accommodative convergence / accommodation ratio. AS = Asia, AUS = Australasia, EU = Europe, NA = North America, SA = South America. Error bars represent ± 1 SD.

A patient's age was the most considered factor when choosing which myopia management strategy to use, which agrees with previous studies indicating that age is the primary determinant of myopia progression [12,20]. Previous surveys in this series identified a clear disparity between the minimum age (between 5 to 18 years) of prescribing spectacles versus soft contact lenses; in 2022, the minimum age practitioners were prepared to prescribe contact lenses (soft and orthokeratology) was over 3 years older than that of spectacles. The latest survey found that replacement frequency of soft contact lenses makes a significant difference; on average, practitioners were prepared to prescribe daily disposable soft contact lenses to children 1.5 years younger than that of reusable soft contact lenses, likely due to the practicality and lower risk of adverse ocular events seen with daily disposables [21–23]. However, the previously established age gap between the prescription of spectacles and soft contact lenses remained, equaling 3.6 years for daily disposables and 5.1 years for reusable soft contact lenses, remains unclear. As both forms of myopia control were perceived to have similar efficacy, the child's age is likely a contributing factor to the lower frequency of prescribing approved myopia control soft contact lenses than approved myopia control spectacles in every continent. This is despite the safety and efficacy of long-term myopia control soft contact lens wear in childhood being well established from longitudinal clinical trials [1,24].

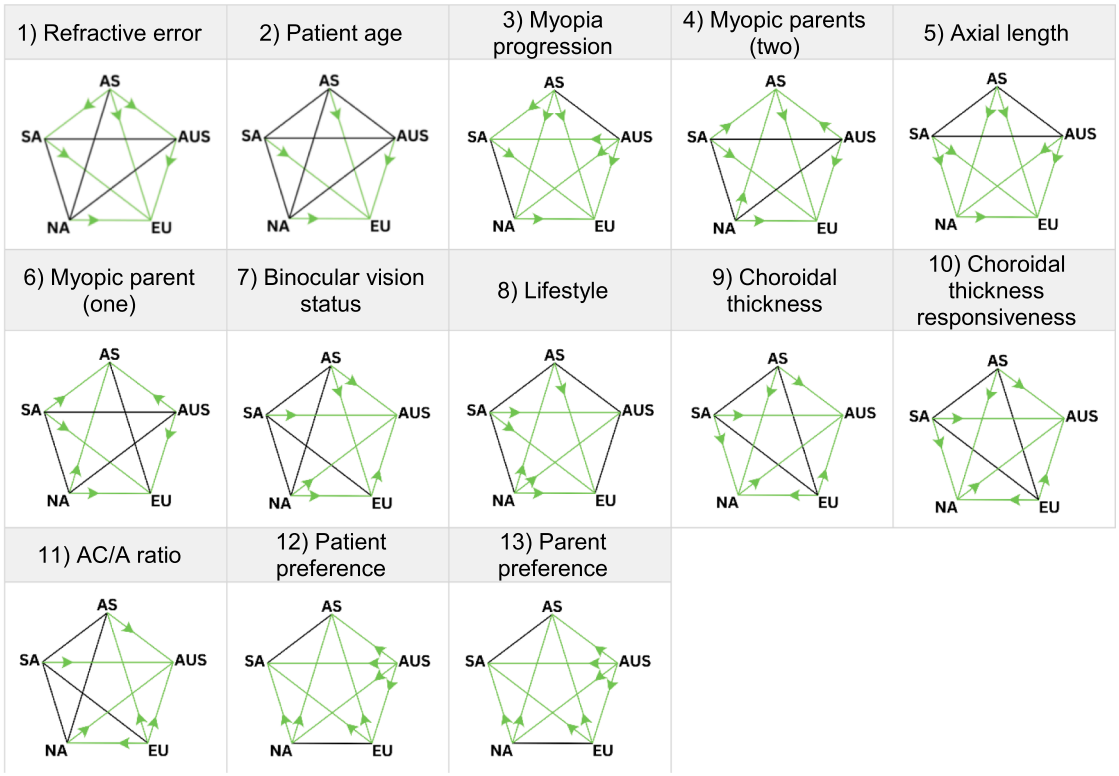


Fig. 16. Significance plots of ranked criteria for beginning myopia management in 2024 (where 1 = highest and 13 = lowest rank). Green lines = $p < 0.05$, black lines = $p \geq 0.05$. Arrows direct a higher rank to a lower rank. AS = Asia, AUS = Australasia, EU = Europe, NA = North America, SA = South America.

Table 11
Ranked criteria, from highest at the top to lowest at the bottom, for beginning myopia management in a young progressing myopia in 2022 and 2024.

	2022	2024
Highest rank	Refractive error	Refractive error
	Patient age	Patient age
		*Myopia progression**
	Myopic parents (two)	Myopic parents (two)
	Axial length	Axial length
	Myopic parent (one)	Myopic parent (one)
	Lifestyle	Binocular vision status
	Binocular vision status	Lifestyle
	AC/A ratio	Choroidal thickness
	Choroidal thickness	Choroidal thickness responsiveness
	Choroidal thickness responsiveness	AC/A ratio
	Patient preference	Patient preference
Lowest rank	Parent preference	Parent preference

*Myopia progression was not included as a factor in the 2022 survey.

Reports have suggested impressive efficacy of repeated low-level red-light therapy in reducing axial length and refractive progression in myopic children [3,25,26], yet over half of practitioners stated they would not prescribe light therapy as a myopia intervention, at 55 % worldwide. Researchers have questioned the safety of repeated exposure to current such light sources, with one report determining two low-level red-light emitting devices marketed for myopia control to be Class 1 laser products, potentially putting the retina at risk of thermal and photochemical damage [27]. Red light therapy may also be associated with high levels of rebound, raising further concerns about the true efficacy of the treatment [28].

Since 2015, there has been an increase in proactivity of practitioners across the world in response to myopia onset, with a shift toward a lower minimum degree of myopia (between −0.50 to −1.0D) being considered to begin a myopia control intervention method than that seen in prior years (approximately −1.50D). Similarly, the minimum annual amount of myopia progression that practitioners feel necessitates myopia management has reduced since 2015, indicating a growing awareness of the detrimental impacts of seemingly small increases in a child's myopia [29] or the importance of early intervention. These developments are arguably a work in progress; delaying treatment until a child's myopia progresses to approximately −1.0D may be too late to minimize the associated risks, particularly considering that age is the primary determinant of myopia progression [12,20].

The declining proportion of practitioners who deliberately undercorrect their young myopic patients from 2015 to 2022 (and stable in 2024) also demonstrates increased practitioner knowledge of advisable control approaches. However, over 17 % of respondents still either sometimes or always use undercorrection as a myopia control approach worldwide, despite ample reports of its ineffectiveness or exacerbation of myopia progression [30–32]. In particular, the results of the current survey show over 1 in 5 practitioners in Asia and North America adopt this method. As undercorrection was once thought to be an effective method of myopia control due to reducing a child's accommodative response [33], the results of the current study stress the importance of developments in research being readily accessible and communicated to those practitioners who may not be exposed to important updates in the field.

Practitioners felt the higher cost of myopia interventions relative to single vision correction in isolation was once again the primary prevention to prescribe such intervention techniques. This was true for every continent, with no improvement over the last 2-year period. Estimated lifetime myopia costs suggest the initial financial investment in pharmaceutical or optical intervention may cost less than uninhibited refractive progression and the associated risk of ocular pathology and vision loss [34]. In addition to ocular health, vision, and lifestyle benefits, educating patients and parents of research supporting the benefit

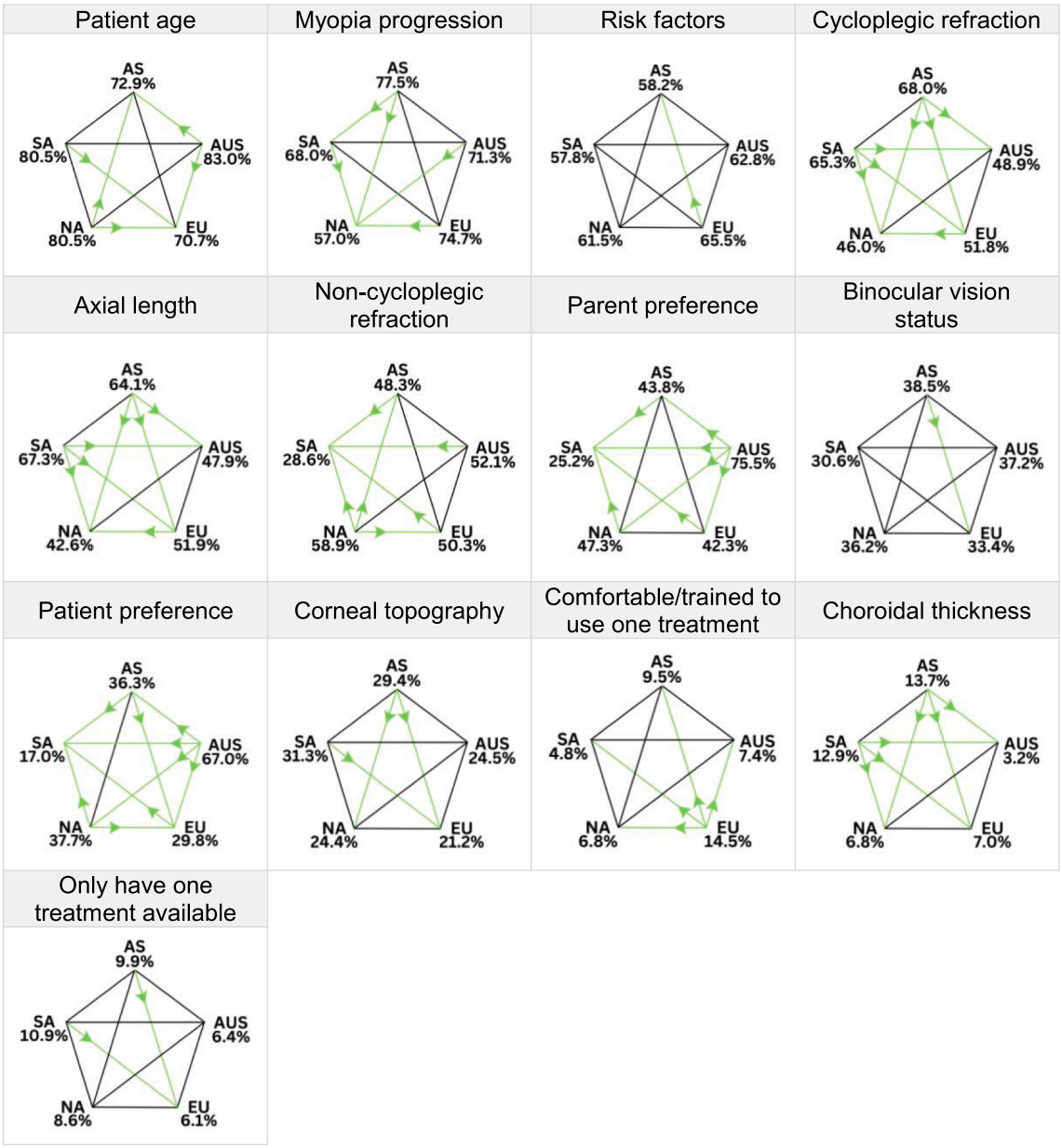


Fig. 17. Significance plots of factors considered when choosing which myopia management strategy to use first in 2024. Data represents the proportion of respondents (%) from each continent. Green lines = $p < 0.05$, black lines = $p \geq 0.05$. Arrows direct a higher percentage of practitioners to a lower percentage. AS = Asia, AUS = Australasia, EU = Europe, NA = North America, SA = South America.

Table 12
Factors considered by practitioners when choosing which myopia management strategy to use first in 2022 and 2024. Data represents the proportion of respondents (%). P-values represent statistical significance in changes with time from 2022 to 2024. The following factors were not included in the 2022 survey: myopia progression, risk factors, corneal topography.

Factor	2022	2024	P-value
Patient age	75.5 %	73.9 %	0.054
Non-cycloplegic refraction	55.0 %	50.3 %	<0.001
Cycloplegic refraction	52.4 %	55.4 %	0.014
Axial length	51.3 %	53.9 %	0.118
Parent preference	48.4 %	43.7 %	<0.001
Binocular vision status	39.8 %	35.2 %	<0.001
Patient preference	38.4 %	33.4 %	<0.001
Only have one treatment available	18.5 %	7.7 %	<0.001
Comfortable/trained to use one treatment	15.8 %	11.2 %	<0.001
Choroidal thickness	9.8 %	8.8 %	0.124

of myopia management from a financial perspective may encourage further uptake.

When surveyed in 2022, it appeared that practitioners were aware of the four key risk factors of childhood myopia [16] (patient age, refractive error, parental myopia, and patient axial length), ranking these as the most important criteria for beginning myopia management [7]. In the most recent survey, 'myopia progression' was a new factor for practitioners to consider. Interestingly, myopia progression was ranked below patient age overall, suggesting that practitioners may prioritize age when assessing the risk of rapid progression. This may also reflect a belief that myopic children will progress to some extent, and that the rate of progression can vary from year to year.

Reassuringly, few practitioners reported having only one myopia control treatment available to them; since 2022, the number of practitioners who could offer their patients only one control option has decreased by nearly 11 %. Similarly, fewer practitioners are only comfortable or trained to use one intervention method, decreasing by

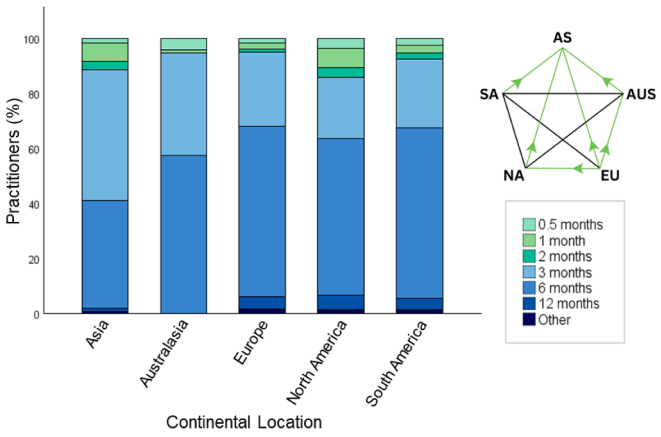


Fig. 18. Frequency reported by practitioners (as a percentage) of following up young myopic patients undergoing myopia management for different month periods. Green lines of plot = $p < 0.05$ and black lines = $p \geq 0.05$. Arrows direct longer follow-up intervals to shorter follow-up intervals. AS = Asia, AUS = Australasia, EU = Europe, NA = North America, SA = South America.

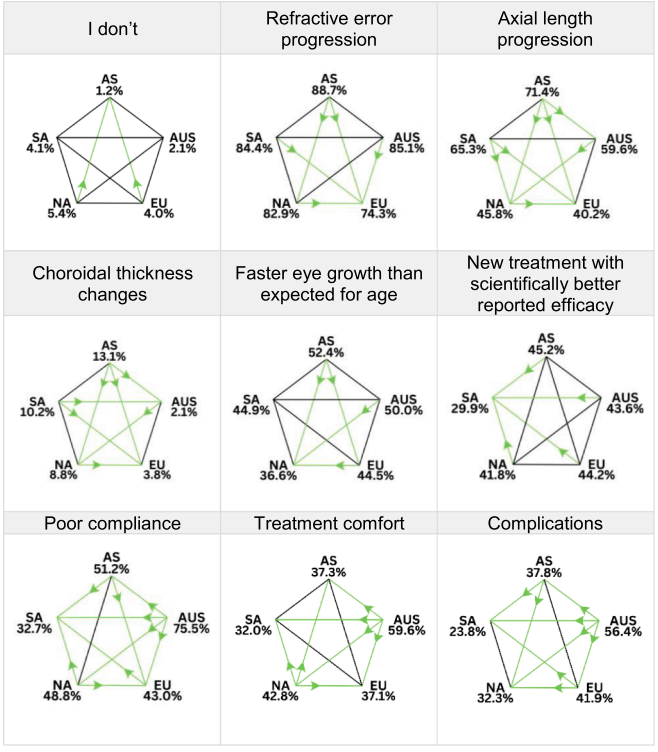


Fig. 19. Significance plots of triggers to adjust myopia management strategy in 2024. Data represents the proportion of respondents (%) from each continent. Green lines = $p < 0.05$, black lines = $p \geq 0.05$. Arrows direct a higher percentage of practitioners to a lower percentage. AS = Asia, AUS = Australasia, EU = Europe, NA = North America, SA = South America.

nearly 5 % from 2022. This shows that, despite treatment availability still being an issue in some parts of the world, there has been movement towards increased accessibility and training to prescribe control options in clinical practice.

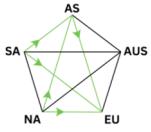
For the first time in this series of surveys, practitioners were asked how frequently they generally follow-up patients undergoing myopia management to establish how this aligns with clinical guidance: The IMI Clinical Management Guidelines Report [16] suggests patients undergoing any myopia control method should be reviewed at least every 6 months to ensure safety and effectiveness of treatment. Positively, in every continent, few practitioners review their young myopic patients undergoing management at intervals longer than 6 months. Similarly, the majority of practitioners in every continent were proactive in adjusting their management approach at follow-up visits, with over 80 % on average adjusting their management approach if a patient's refractive error was still progressing.

Despite differences in prescribing patterns, methods of management, and levels of training and engagement, the practice of myopia

Table 13
Proportion of practitioners (%) who used triggers to adjust myopia management strategy in 2022 and 2024. P-values represent significance in changes from 2022 to 2024. Statistically significant changes are shaded in green ($p < 0.05$). The following factors were not included in the 2022 survey: faster eye growth than expected for age and treatment comfort.

Trigger	2022	2024	P-value
I don't	4.0 %	3.5 %	0.311
Refractive error progression	84.4 %	80.3 %	<0.001
Axial length progression	60.6 %	50.9 %	<0.001
Choroidal thickness changes	12.9 %	7.3 %	<0.001
New treatment with scientifically better reported efficacy	44.8 %	43.3 %	0.164
Poor compliance	55.02 %	46.6 %	<0.001
Complications	41.9 %	38.7 %	0.004

Table 14
Impact of myopia management on practitioners' practice in 2024, rated from 'much less' to 'much more'. Data are expressed as percentage of practitioners from each continent. Green lines of significance plots = $p < 0.05$ and black lines = $p \geq 0.05$. Arrows direct practitioners who experienced more improvement overall to those who experienced lesser improvement of each factor. AS = Asia, AUS = Australasia, EU = Europe, NA = North America, SA = South America.

Factor	Impact	Asia	Australasia	Europe	North America	South America	Significance Plot
Patient loyalty	Much less	3.5	0.0	2.6	7.3	9.5	
	Less	6.3	2.1	2.1	0.4	1.4	
	No change	21.7	30.9	35.8	29.5	14.3	
	More	43.4	46.8	28.0	30.2	24.5	
	Much more	25.1	20.2	27.2	32.6	49.7	
Practice revenue	Much less	2.9	0.0	4.9	7.1	8.2	
	Less	5.0	1.1	1.8	0.8	0.7	
	No change	37.0	43.6	47.9	30.4	28.6	
	More	39.9	47.9	28.8	39.8	36.1	
	Much more	15.1	7.4	11.7	22.0	25.9	
Job satisfaction	Much less	1.3	0.0	2.0	5.4	2.7	
	Less	3.5	1.1	1.7	0.2	0.0	
	No change	19.2	17.0	22.6	20.6	16.3	
	More	48.9	54.3	32.1	28.9	27.9	
	Much more	27.1	27.7	38.5	44.8	52.4	

management across the world continues to benefit the children undergoing treatment, eyecare practices and individual practitioners; engaging in myopia management has been felt by practitioners to positively enhance job satisfaction and practice revenue in every continent, even more so than that reported in 2022. Perhaps this is a result of an increasing uptake of myopia management as the new standard of care in young myopic patients.

This survey is subject to the same limitations as the previous versions; an accurate response count is unknown due to maximizing exposure by involving professional bodies, whose members may not all be practicing eye care practitioners. The sampling methods were not randomized and hence may have attracted practitioners who were already heavily involved or interested in the topic, swaying the results to overstate the overall worldwide engagement in clinical myopia management. Further, eye care professions may differ in their scope of practice within each region, questioning the representativeness to the wider practitioner population in each continent. Similarly, practitioners in parts of the world have limited access to certain treatment options and equipment. Comparisons between years does not involve an identical group of practitioners and the proportion of practitioners between countries differs slightly, but the trends observed and their interrelation gives confidence that the results are robust.

In conclusion, the fourth global survey and nine-year review of attitudes of eye care practitioners towards myopia management and prescribing patterns in clinical practice identified a substantial increase in perceived practitioner concern about the myopia epidemic. With this, a rise in self-reported clinical activity in myopia management has been seen across the world, with practitioners becoming increasingly aware of safe and effective intervention techniques and evidence-based practices to manage and monitor their young myopic patients. This is reflected by a growing proportion of practitioners prescribing efficacious intervention methods to children with lower degrees and slower rates of myopia progression, however consistent hindrances to the practice of myopia management need addressing. As concluded in the former IMI white paper [7], this can only be addressed through a collaborative effort between eye care industry, health care regulatory bodies, and policy makers to improve education, increase affordability, and enhance accessibility of appropriate and effective control options [35]. Regardless of geographic location and financial status, inclusivity needs to be encouraged to aid individuals, healthcare systems, and economies burdened by the dramatically increasing prevalence of myopia across the world.

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