Special Issue

IMI—Global Trends in Myopia Management Attitudes and Strategies in Clinical Practice—2022 Update

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Purpose. Surveys in 2015 and 2019 identified a high level of eye care practitioner concern/activity about myopia, but the majority still prescribed single vision interventions to young myopes. This research aimed to provide updated information.

Methods. A self-administered, internet-based questionnaire was distributed in 13 languages, through professional bodies to eye care practitioners globally. The questions examined awareness of increasing myopia prevalence, perceived efficacy and adoption of available strategies, and reasons for not adopting specific strategies.

Results. Of the 3195 respondents, practitioners' concern about the increasing frequency of pediatric myopia in their practices differed between continents ($P < 0.001$), being significantly higher in Asia (9.0 ± 1.5 of 10) than other continents (range 7.7–8.2; $P \leq 0.001$). Overall, combination therapy was perceived by practitioners to be the most effective method of myopia control, followed by orthokeratology and pharmaceutical approaches. The least effective perceived methods were single vision distance undercorrection, spectacles and contact lenses, as well as bifocal spectacles. Practitioners rated their activity in myopia control between (6.6 ± 2.9 in South America to 7.9 ± 1.2/2.2 in Australasia and Asia). Single-vision spectacles are still the most prescribed option for progressing young myopia (32.2%), but this has decreased since 2019, and myopia control spectacles (15.2%), myopia control contact lenses (8.7%) and combination therapy (4.0%) are growing in popularity.

Conclusions. More practitioners across the globe are practicing myopia control, but there are still significant differences between and within continents. Practitioners reported that embracing myopia control enhanced patient loyalty, increasing practice revenue and improving job satisfaction.

Keywords: myopia control, myopia progression, myopia management, orthokeratology, global attitudes

With the dramatically increasing global prevalence[1] and significant adverse effects[2] of myopia come the vital need for efficacious management in clinical practice. Now recognized as a major public health concern,[3] lack of intervention is predicted to see myopia affect nearly 50% of the entire world's population by the year 2050.[1] Due to the significant pathological and economic consequences of myopia,[2] as highlighted by the International Myopia Institute (IMI) white papers, methods to control the epidemic form a fundamental part of ophthalmic research. Behavioral, optical, and pharmacological approaches are being extensively researched and trialed across the world[4]; this has resulted in evidence-based interventions becoming available to many eye care practitioners to implement into their routine practice. At present, there is no standardized approach to the management of young premyopic[5] and myopic patients in clinical practice despite several position papers having been published[6,7]; furthermore, access to the various myopia control methods differs with location.[8]

Within this field of research, practitioner perception of myopia management (which includes myopia control as a subset) and worldwide prescribing trends are of interest. A survey published in 2020[9] explored the practice patterns of pediatric ophthalmologists across the world ($n = 794$), finding treatment rates varied significantly with location (mean 57%, range 39%–89%).[9] Encouragingly, of those respondents who practice myopia treatment, 98% used at least one type of effective controlling treatment, independent of location. Ninety-five percent of respondents used a combination of intervention modalities simultaneously; however, combination rates differed significantly among regions. Surveys conducted in 2015 and 2019 demonstrated the increasing myopia prevalence to cause a high level of concern among eye care practitioners and a self-reported high level of engagement in myopia control.[8,10] The reported level of concern and activity had increased over the four years between the two studies. Despite this, the vast majority of respondents across both surveys still prescribed single vision refractive correction to young myopes. Using the same

methodology as that used in 2015 and 2019, this article provides an update of the attitudes and myopia management strategies in clinical practice worldwide, allowing trends to be determined.

Methods

A self-administered, internet-based, cross-sectional survey in 13 languages (English, Spanish, Italian, Traditional and Simplified Chinese, Greek, Russian, Turkish, Danish, Vietnamese, Norwegian, Dutch, Hebrew, and Swedish) was distributed using software SurveyMonkey (Momentive Inc, Palo Alto, California, USA); the survey was distributed through various professional bodies (general, rather than specific to myopia) across the world to reach eye care practitioners (optometrists, ophthalmologists, dispensing opticians, and others) globally. The survey was live between March and November 2022. Ethics approval was received from the Aston University Research Ethics committee, and informed consent was received from all respondents. Several questions matched the 2015 and 2019 versions[8,10]; however, modifications and additions were made to the current survey, such as

- Adding myopia control spectacles and combination therapy (more than two treatments simultaneously) to the list of possible myopia approaches
- Only asking a general question about the minimum amount of myopia that would need to be present to consider myopia control options
- Adding accessibility of treatments to the list of possible factors preventing them from prescribing myopia control options
- New questions refined by the IMI advisory board, indicated by an asterisk

A total of 15 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, including

- 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 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)
- Frequency of prescribing different myopia correction 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:
  - They don't believe that these are any more effective
  - The outcome is not predictable
  - Safety concerns
  - Cost to the patient makes them uneconomical
  - Additional chair time required
  - Inadequate information/knowledge
  - Low benefit/risk ratio
  - Accessibility of treatment options
  - Other
- *Rank their criteria for starting myopia control in a young progressing myope (numbered 1 to 10); options consisted of the following:
  - Refractive error
  - Age
  - Myopic parent (one)
  - Myopic parents (two)
  - Axial length
  - Choroidal thickness
  - Choroidal thickness responsiveness to early treatment
  - Binocular vision status
  - AC/A ratio
  - Lifestyle
  - Patient pressure
  - Parent/guardian pressure
- *How they select which myopia management strategy to use first on a young progressing myope; options consisted of the following:
  - Only have one treatment available to me
  - Only comfortable/trained to use one treatment
  - Age
  - Refractive error (non-cycloplegic)
  - Cycloplegic refraction
  - Axial length
  - Choroidal thickness
  - Binocular vision status
  - Patient preference
  - Parent/guardian preference
  - Other
- *Triggers to adjust their myopia management strategy; options consisted of the following:
  - I don't
  - Progression of refractive error
  - Progression of axial length
  - Changes in choroidal thickness
  - A new treatment with a scientifically reported better efficacy
  - Poor compliance
  - Complications
  - 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")

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There was an option to add further comments to each of the questions and the topic as a whole. Voluntary participation in the survey, following an explanation of the research, was anonymous; however, respondents were asked to provide basic demographic information about themselves (years of being qualified and everyday working environment).

Statistical Analysis

The data was divided into the continents the eye care practitioner was based in. Where a sample from a country of ≥30 was received, the data was also analyzed comparing countries within a continent.[8,10] Statistical analyses were conducted with IBM SPSS (Statistics for Windows v28; IBM Corp., Armonk, NY, USA). Ordinal data are presented as medians and interquartiles range and continuous data as means and SD. 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 continents and regions. Statistical significance was set at $P < 0.05$. For conciseness, only significant comparisons have been reported.

Results

A total of 3195 complete survey responses were received, with the distribution by continent being: Africa 74, Asia 1396, Australasia 101 (Australia, New Zealand, and neighboring islands in the Pacific Ocean), Europe 931, North America 338, and South America 177. The remaining 178 respondents did not state their location. Country-specific responses could be extracted from the following:

- Africa: none
- Asia: China ($n = 1001$), India ($n = 65$), Israel ($n = 42$), Philippines ($n = 58$), Turkey ($n = 78$), and Vietnam ($n = 101$)
- Australasia: Australia ($n = 87$)—hence, no within-continent comparison was possible
- Europe: France ($n = 31$), Italy ($n = 202$), Norway ($n = 40$), Russia ($n = 80$), Spain ($n = 380$), and United Kingdom ($n = 67$)
- North America: Canada ($n = 107$), Mexico ($n = 86$), Puerto Rico ($n = 30$), and United States of America ($n = 77$)
- South America: Argentina ($n = 42$), Brazil ($n = 36$), Ecuador ($n = 40$), and Peru ($n = 37$)

Of the study participants, 68.4% ($n = 2185$) were optometrists, 23.0% ($n = 736$) were ophthalmologists, 6.1% ($n = 194$) were contact lens opticians, 2.4% ($n = 76$) were other types of eye care specialists, and 0.1% ($n = 4$) did not state their profession.

The principal working environment for 78.5% ($n = 2507$) was in clinical practice, 7.6% ($n = 244$) worked in academia, 5.2% ($n = 165$) worked within industry, 8.5% ($n = 272$) worked in other environments, and 0.2% ($n = 7$) did not state their working environment. However, all study participants were registered eye care practitioners with a median number of years qualified of 11 to 20 years (with a normal distribution).

Self-Reported Concern about the Increasing Frequency of Childhood Myopia

Practitioners' concern about the increasing frequency of childhood myopia in their practices differed between continents (Fig. 1), being significantly higher in Asia (9.0 ± 1.5) than all other continents; Africa (8.1 ± 2.4; $P = 0.001$), Australasia (7.7 ± 2.1; $P < 0.001$), Europe (8.0 ± 2.0; $P < 0.001$), North America (8.2 ± 1.9; $P < 0.001$), and South America (8.0 ± 2.3; $P < 0.001$).

The level of concern among practitioners in Australasia was significantly lower than in Africa ($P < 0.001$), Asia ($P < 0.001$), North America ($P = 0.018$), and South America ($P = 0.022$). There were no other significant differences between continents.

In Asia, Turkey showed the lowest level of concern (7.6 ± 2.1, all $P < 0.05$); followed by Israel (8.4 ± 2.1) and Vietnam (8.6 ± 1.9), which had a lower level of concern than China (9.1 ± 1.2; $P < 0.05$) and India (9.2 ± 1.5; $P < 0.05$), with Israel also having lower concern than the Philippines (9.1 ± 1.5; $P = 0.036$). In Europe, Norway showed the lowest level of concern (5.9 ± 2.4; all $P < 0.05$); Russia (8.7 ± 1.8) showed a higher level of concern than France (7.5 ± 2.4; $P = 0.002$), Italy (8.1 ± 1.9; $P = 0.004$), Norway (5.9 ± 2.4; $P < 0.001$) and Spain (8.3 ± 1.6; $P = 0.006$). In North America, Canada (7.8 ± 1.9) showed a significantly lower level of concern than the USA (8.5 ± 1.7; $P = 0.007$) and Mexico (8.6 ± 1.6; $P = 0.001$). There was no significant difference across countries within South America.

Practitioners' Perceived Effectiveness of Management Options for Myopia Control

Overall, combination therapy was perceived by practitioners to be the most effective method of myopia control, followed by orthokeratology and pharmaceutical approaches. The least effective methods were perceived to be single vision distance undercorrection and single vision spectacles, as well as single vision soft contact lenses and bifocal spectacles (Table 1). For undercorrection, the perceived effectiveness was highest in Africa (all $P < 0.05$) and lowest in Australasia (all $P \leq 0.001$), followed by Europe and North America (all $P < 0.05$). A similar pattern was seen for single vision and bifocal lens spectacles, single vision contact lenses and rigid contact lenses (RCLs). For progressive addition lens spectacles (PALS), the pattern was again similar, but there was no difference between Australasia, Europe, and North America. Myopia control spectacles were deemed as most effective in Africa (all $P < 0.01$), followed by Australasia and Europe (both $p < 0.01$). Multifocal contact lenses were through to be least effective by South American and European practitioners (all $P < 0.05$) and most effective in Africa (all $P < 0.01$). Myopia control spectacles were felt to be less effective in Asia and South America than on the other continents ($P < 0.05$). Orthokeratology was deemed most effective in Asia (all $P < 0.05$) and least effective in North and South America (all $P < 0.05$). Pharmaceuticals were considered more effective in Asia, Europe, and Australasia than in North or South America (all $P < 0.05$). However, combination therapy was felt to be most effective in Asia compared to all other continents (all $P < 0.05$). Time spent outdoors was rated as less effective in Australasia and North America (all $P \leq 0.001$), most so in Asia (all $P < 0.05$) followed by Africa and South America (all $P < 0.05$).

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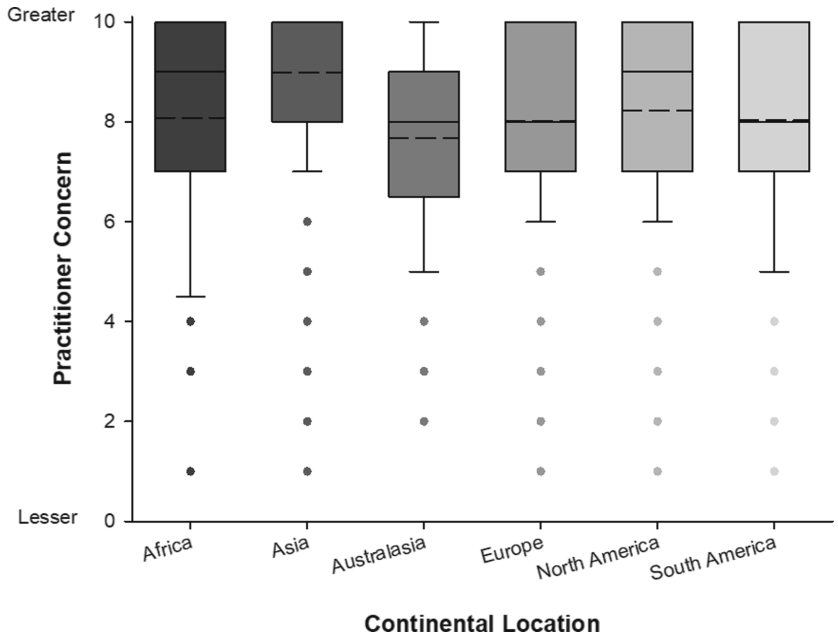

Figure 1. Level of concern (rated from 0 [low] to 10 [high]) regarding the perceived increasing frequency of pediatric myopia in their practice for practitioners located in different continents. $N = 3017$. *Box* = 1 SD; *solid line* = median; *dashed line* = mean; *whiskers* = 95% confidence interval.

Table 1. Perceived Effectiveness (Defined as the Expected Level of Reduction in Childhood Myopia Progression in Percent) of Myopia Control Options by Practitioners in Different Continents

Continent/Technique	Africa	Asia	Australasia	Europe	North America	South America
Spectacles						
Under-correction	17.3 ± 24.2	11.2 ± 19.6	−0.1 ± 1.8	4.6 ± 13.1	6.1 ± 14.5	14.4 ± 22.5
Single vision	41.4 ± 35.5	19.8 ± 22.2	2.2 ± 7.1	8.6 ± 17.3	12.3 ± 23.7	22.9 ± 29.2
Bifocals	40.3 ± 26.1	23.5 ± 20.4	21.8 ± 15.3	17.0 ± 18.0	20.3 ± 21.9	23.2 ± 25.1
PALS	40.9 ± 26.8	29.7 ± 23.0	19.6 ± 13.6	19.1 ± 18.7	20.9 ± 22.2	27.0 ± 27.0
Approved myopia control	59.8 ± 24.3	43.4 ± 23.9	50.0 ± 14.7	49.9 ± 21.1	46.0 ± 24.4	40.7 ± 29.4
Contact lenses						
RCL	43.9 ± 33.4	30.0 ± 26.6	8.4 ± 18.0	17.4 ± 23.1	18.6 ± 26.7	24.5 ± 28.3
Single vision soft	37.9 ± 34.1	21.1 ± 25.7	3.1 ± 8.4	11.3 ± 18.5	13.5 ± 24.5	24.6 ± 29.4
Multifocal soft	45.9 ± 27.2	34.6 ± 25.1	32.8 ± 14.7	26.7 ± 20.6	32.8 ± 21.9	26.6 ± 25.7
Approved myopia control soft	50.6 ± 27.0	43.1 ± 26.2	51.7 ± 14.9	51.1 ± 21.9	49.8 ± 23.6	43.1 ± 29.9
Orthokeratology	57.4 ± 23.5	60.4 ± 22.9	55.6 ± 15.9	54.4 ± 24.0	49.7 ± 24.3	45.6 ± 29.9
Pharmaceutical	47.7 ± 22.7	51.7 ± 24.7	49.2 ± 15.8	51.4 ± 24.2	43.7 ± 23.6	47.0 ± 25.8
Combination therapy	59.9 ± 24.9	66.4 ± 25.9	61.0 ± 16.1	61.1 ± 24.9	53.9 ± 27.3	54.1 ± 30.9
Increased time outdoors	46.9 ± 26.9	56.6 ± 28.4	27.1 ± 21.5	39.8 ± 27.2	28.5 ± 24.9	45.3 ± 30.7

Data are expressed as mean ± SD.

In Asia, compared to other regional countries ($P < 0.05$): myopia control spectacles were believed to be less effective, and orthokeratology and outdoors more effective in China; undercorrection, single vision spectacles and contact lenses, and RCLs were considered less effective in Israel; bifocal and PALs spectacles, single vision contact lenses and time outdoors were felt to be more effective in the Philippines; single vision and myopia control spectacles, RCLs, multifocal and myopia control contact lenses, orthokeratology, pharmaceuticals, and combination therapies were rated less effective in Turkey; and bifocal and PALS, single vision contact lenses, and orthokeratology were considered more effective in Vietnam. In Europe, compared to other regional countries ($P < 0.05$): PALS, RCLs, myopia control contact lenses and orthokeratology was felt to be less effective in France; myopia control spectacles and single vision and multifocal contact lenses were considered more effective in Italy; undercorrection and RCLs were scored as less effective in Norway; single vision spectacles and contact lenses, bifocal and PALS, multifocal contact lenses, orthokeratology, pharmaceuticals, and combination therapies were considered more effective in Russia; orthokeratology, pharmaceuticals, and combination therapies were considered more effective in Spain; and undercorrection, RCLs, and time outdoors was felt to be less effective and myopia control spectacles, multifocal contact lenses, pharmaceuticals and combination therapies more effective in the United Kingdom. In North America, compared to other regional countries ($P < 0.05$): Canada

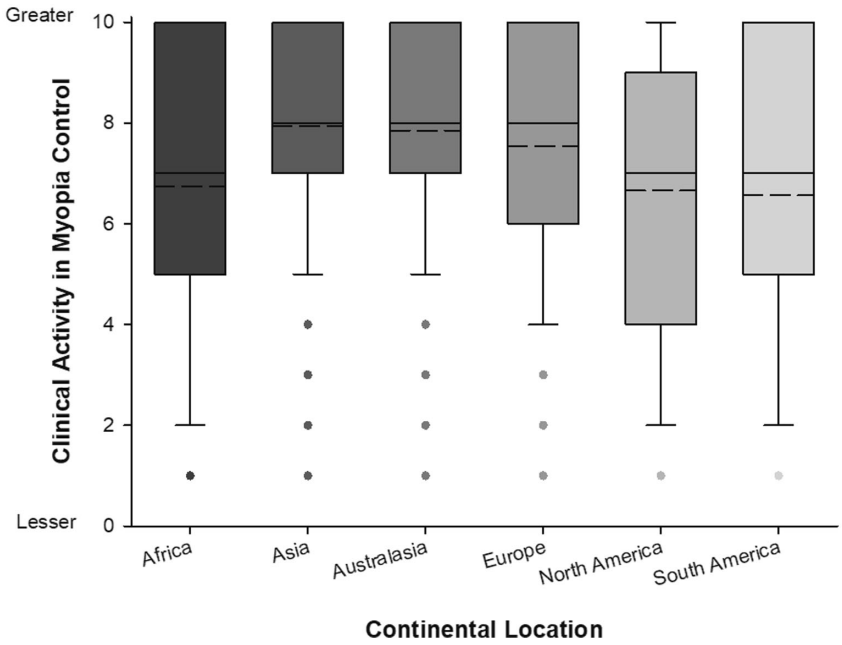

Figure 2. Perceived level of clinical activity in myopia control (rated from 0 [low] to 10 [high]) for practitioners located in different continents. $N = 3017$. *Box* = 1 SD; *solid line* = median; *dashed line* = mean; *whiskers* = 95% confidence interval.

and the USA considered undercorrection, single vision spectacles and contact lenses, and time outdoors as less effective and combination therapy as more effective than Mexico or Puerto Rico; myopia control spectacles were considered more effective in Canada and Mexico; multifocal and myopia control contact lenses were felt to be less effective in Puerto Rico; and PALS and pharmaceuticals were rated as less effective and RCLs and single vision contact lenses more effective in Mexico. In South America, compared to other regional countries ($P < 0.05$): undercorrection, single vision, bifocal, PALS and myopia control lens spectacles, RCLs, single vision and myopia control contact lenses were considered less effective in Argentina and Brazil, whereas multifocal contact lenses were considered more effective in Ecuador.

Practitioners Perceived Level of Clinical Activity in Myopia Control

South American practitioners rated themselves less active ($P < 0.05$) in myopia control (6.6 ± 2.9) followed by North American (6.7 ± 2.9) and African (6.7 ± 2.8) compared to European (7.5 ± 2.4), Australasian (7.9 ± 1.2), and Asian (7.9 ± 2.2) practitioners (Fig. 2). The most active rating was from Asian practitioners, which was also higher than those from Europe ($P < 0.001$).

In Asia, practitioners from Vietnam rated their activity as the lowest (4.7 ± 2.8, all $P < 0.05$) followed by Turkey (6.4 ± 2.6), which was lower than India (7.0 ± 3.0) and the Philippines (7.4 ± 2.4), with Chinese practitioners rating themselves the most active (8.5 ± 1.6, all $P < 0.001$). In Europe, French practitioners rated their activity lowest (5.7 ± 2.5 vs. 7.4 to 7.9 in all other European counties, $P < 0.05$). In North America, USA (7.4 ± 2.7) and (7.5 ± 2.5) Canadian practitioners rated themselves as more active ($P < 0.05$) than those in Puerto Rico (5.1 ± 2.8) and Mexico (5.9 ± 2.9). There was no significant differences among countries within South America ($P > 0.05$).

Frequency of Prescribing Different Myopia Control Methods by Practitioners

Single-vision spectacles are still the most prescribed options for young progressing myopes, being highest in Africa ($P < 0.05$) followed by South America (all $P < 0.05$) and lowest in Australasia (all $P < 0.001$; Table 2). Bifocal spectacles were prescribed least in Australasia ($P < 0.05$ except for Europe), followed by Asia, North America, and South America (all $P < 0.05$) and were prescribed most in Africa (all $P < 0.001$). PALS were prescribed least in Europe (all $P < 0.001$ except for South America), with North America prescribing fewer than Africa or Asia (both $P < 0.05$). Myopia control spectacles are prescribed least in South America (all $P < 0.05$) except for Africa, with North America prescribing fewer than Europe ($P < 0.001$), who prescribed fewer than Asia ($P = 0.020$), and Australasia prescribing the most (all $P < 0.05$). RCLs were prescribed least in Australasia (all $P < 0.05$), followed by Europe and Africa, with North America prescribing fewer than Asia ($P < 0.001$), which had the highest prescribing rate (all $P < 0.001$). Single-vision contact lenses were prescribed least in Asia and Australasia ($P < 0.05$) followed by Africa (all $P < 0.05$), with Europe and South America prescribing more than North America ($P < 0.05$). Multifocal contact lenses were prescribed more in Australasia and North America than in Asia or Europe ($P < 0.05$), with North American practitioners prescribing more multifocal contact lenses than African and South American practitioners ($P < 0.05$). Australasia prescribed myopia control contact lenses the most, followed by Europe ($P = 0.037$), with all other continents prescribing fewer (all $P < 0.001$). Orthokeratology is prescribed most in Asia, followed by Europe, Australasia,

Table 2. Frequency of Prescribing Myopia Correction Options (in Percent) for Progressing/Young Myopes by Practitioners in Different Continents for Progressing/Young Myopes

Continent/Technique	Africa	Asia	Australasia	Europe	North America	South America
Spectacles						
Single vision	53.7 ± 35.1	32.3 ± 29.3	16.4 ± 24.3	30.1 ± 28.1	32.8 ± 32.6	42.2 ± 33.8
Bifocals	7.5 ± 11.6	3.2 ± 8.5	1.0 ± 3.8	1.3 ± 5.0	3.9 ± 9.2	3.1 ± 10.9
PALS	8.7 ± 16.9	6.5 ± 12.8	7.0 ± 12.9	2.7 ± 8.0	4.9 ± 11.9	3.7 ± 10.5
Approved myopia control	11.1 ± 20.0	16.8 ± 19.6	22.0 ± 21.7	15.0 ± 20.2	12.6 ± 19.5	6.6 ± 14.7
Contact lenses						
RCL	0.9 ± 2.7	3.8 ± 9.7	0.2 ± 1.4	1.1 ± 5.4	2.1 ± 9.0	3.6 ± 10.4
Single vision soft	7.0 ± 12.6	3.2 ± 9.8	3.5 ± 7.2	12.7 ± 15.2	10.3 ± 14.9	13.0 ± 18.3
Multifocal soft	3.4 ± 8.2	2.2 ± 7.3	4.7 ± 8.8	3.0 ± 7.9	5.7 ± 10.7	4.1 ± 11.0
Approved myopia control soft	1.7 ± 4.4	3.5 ± 10.3	18.2 ± 15.9	16.1 ± 18.9	9.3 ± 14.8	5.1 ± 12.9
Orthokeratology	0.9 ± 3.1	14.6 ± 18.1	9.9 ± 16.5	11.5 ± 17.8	7.5 ± 16.2	4.6 ± 13.9
Pharmaceutical	3.1 ± 7.8	8.7 ± 15.3	13.1 ± 16.6	3.3 ± 9.9	8.4 ± 14.3	11.1 ± 21.4
Combination therapy	1.8 ± 5.7	5.3 ± 9.4	4.1 ± 8.1	3.0 ± 8.2	2.6 ± 6.3	3.0 ± 7.8

Data are expressed as mean ± S.D.

North America, South America, and Africa (each significantly different $P < 0.05$). Australia prescribed the most pharmaceuticals (all $P < 0.05$), followed by South America, which prescribed more than North America and Asia (both $P < 0.05$), followed by Europe and Africa (both $P \leq 0.001$). Asian practitioners are most likely to use combined therapies (all $P < 0.05$), with Australasia prescribing more than Europe or Africa (both $P < 0.05$).

In Asia, compared to other regional countries ($P < 0.05$): Vietnam prescribed more single vision spectacles and pharmaceuticals, while adopting other myopic control options less; Turkey prescribed more single vision contact lenses and myopia control spectacles while prescribing fewer bifocals spectacles, PALS, RCL, and combination therapies; the Philippines prescribed more PALS and fewer RCL, orthokeratology, pharmaceuticals, and combination therapies; Israel prescribed more multifocal and myopia control contact lenses and fewer bifocal lens spectacles and combination therapies; China prescribed more myopia control spectacles, orthokeratology, and combination therapy and fewer single vision contact lenses; and India prescribed less orthokeratology. In Europe, compared to other regional countries ($P < 0.05$): more myopia control spectacles and pharmaceuticals, and fewer single vision and myopia control contact lenses were prescribed in France; fewer myopia control contact lenses and combination therapies in Italy; more myopia control contact lenses and fewer single vision spectacles, myopia control spectacles, RCLs, and combination therapies in Norway; more bifocal spectacles, multifocal contact lenses, orthokeratology pharmaceuticals, and combination therapies, and fewer single vision and myopia control spectacles in Russia; fewer PALS and pharmaceuticals in Spain; and more single vision spectacles and fewer PALS, RCLs, single vision contact lenses, pharmaceuticals, and combination therapies in the UK. In North America, compared to other regional countries ($P < 0.05$): more myopia control spectacles and fewer bifocal spectacles, PALS and myopia control contact lenses in Canada; more single vision spectacles, RCL, and fewer myopia control contact lenses, pharmaceuticals, and combination therapies in Mexico; more PALS and fewer myopia control spectacles, pharmaceuticals, and combination therapies in Puerto Rico; and more multifocal spectacles, myopia control contact lenses, orthokeratology, pharmaceuticals, and combination therapy in the USA. In South America, compared to other regional countries ($P < 0.05$): more pharmaceuticals and fewer PALS and RCL in Argentina; more pharmaceuticals and fewer myopia control spectacles and multifocal contact lenses in Brazil; more orthokeratology in Ecuador; and more bifocal and PALS and fewer combination therapies in Peru.

Minimum Age of Prescribing Myopia Management Options by Practitioners

The minimum average ages of prescribing the various corrections for myopia are presented in Table 3. For single vision spectacles this was higher in Asia (all $P < 0.05$ except Africa) and was lowest in Australasia, Europe, and North America (all $P < 0.05$). For bifocal spectacles this was highest in Africa and lowest in Europe, followed by North America (all $P < 0.05$). For prescribing PALS this was lowest in Australasia (all $P < 0.01$) and highest in South America (all $P < 0.05$) and Africa (all $P < 0.001$). For myopia control spectacles this was lowest in Australasia (all $P < 0.05$) and higher in Africa ($P < 0.001$), Asia (all $P < 0.001$), and South America (all $P < 0.01$). For corneally aligned RCLs this was lower in Asia (all $P < 0.001$ except Australasia). For single vision soft contact lenses, this was higher in Africa (all $P < 0.05$) and South America (all $P \leq 0.001$). For multifocal contact lenses this was highest in Africa (all $P < 0.05$ except South America). For myopia control contact lenses this was highest in Africa (all $P < 0.001$) and lowest in Europe (all $P < 0.05$ except Australasia and North America). For orthokeratology this was lowest in Australasia (all $P < 0.05$ except for North America), and highest in South America (all $P < 0.01$) and Africa (all $P < 0.001$). There was no difference in the minimum age for pharmaceuticals across continents. For combination therapies, the minimum age for prescribing myopia control options was highest in South America (all $P < 0.01$) and Africa ($P < 0.001$).

In Asia, compared to other regional countries ($P < 0.05$), the age of prescribing was: higher for myopia control spectacles in Vietnam; lower for RCLs, single vision, multifocal and myopia control contact lenses in China (compared to Vietnam, the Philippines, and Turkey). In Europe, compared to other regional countries ($P < 0.05$), the age of prescribing was lower for single vision spectacles and RCLs in the UK than in Spain and Italy; lower for orthokeratology in the UK and Russia than in Spain and Italy; higher for

Table 3. Minimum Patient Age Considered Necessary by Practitioners (From Different Continents) Who Prescribed these Options for Different Myopia Correction Options

Continent/Technique	Africa	Asia	Australasia	Europe	North America	South America
Spectacles						
Single vision	6.7 ± 3.4 (8)	6.9 ± 3.4 (3)	6.7 ± 4.2 (26)	6.0 ± 3.0 (18)	5.8 ± 2.5 (16)	6.2 ± 2.7 (12)
Bifocals	9.0 ± 3.9 (34)	7.1 ± 2.9 (12)	5.2 ± 0.8 (53)	6.3 ± 2.3 (55)	6.4 ± 2.7 (37)	7.9 ± 3.6 (53)
PALS	9.9 ± 4.0 (34)	7.6 ± 3.1 (12)	5.9 ± 1.5 (32)	7.2 ± 2.9 (50)	7.6 ± 3.4 (38)	8.7 ± 3.8 (42)
Approved myopia control	7.7 ± 3.5 (14)	6.8 ± 2.6 (7)	5.2 ± 0.6 (6)	5.8 ± 1.5 (6)	6.1 ± 2.3 (8)	6.6 ± 2.6 (17)
Contact lenses						
RCL	12.4 ± 3.3 (43)	8.3 ± 3.5 (14)	9.6 ± 3.4 (67)	9.8 ± 3.1 (53)	10.1 ± 3.5 (49)	11.0 ± 3.9 (33)
Single vision soft	11.8 ± 4.6 (20)	9.3 ± 4.1 (10)	9.1 ± 3.4 (33)	9.0 ± 3.4 (21)	9.0 ± 3.3 (20)	10.3 ± 3.6 (18)
Multifocal soft	11.2 ± 4.5 (31)	8.4 ± 3.5 (14)	7.9 ± 2.0 (25)	8.6 ± 2.9 (44)	8.8 ± 3.0 (25)	9.8 ± 3.9 (41)
Specific myopia control soft	11.1 ± 4.6 (15)	8.3 ± 3.3 (9)	7.5 ± 1.7 (2)	7.5 ± 2.4 (7)	7.8 ± 2.8 (5)	9.2 ± 3.6 (16)
Orthokeratology	12.3 ± 4.4 (27)	8.5 ± 2.7 (7)	7.5 ± 1.9 (23)	8.4 ± 2.7 (18)	8.6 ± 3.5 (24)	9.9 ± 3.8 (23)
Pharmaceutical	7.7 ± 3.6 (31)	6.6 ± 2.5 (7)	5.9 ± 1.2 (14)	6.2 ± 2.0 (47)	6.8 ± 3.1 (22)	6.8 ± 2.6 (21)
Combination therapy	10.5 ± 4.4 (32)	7.9 ± 2.6 (10)	7.1 ± 1.8 (26)	7.6 ± 2.5 (44)	8.0 ± 3.3 (29)	8.8 ± 3.1 (31)

Data are expressed as mean ± SD years (% that would not prescribe this refractive modality).

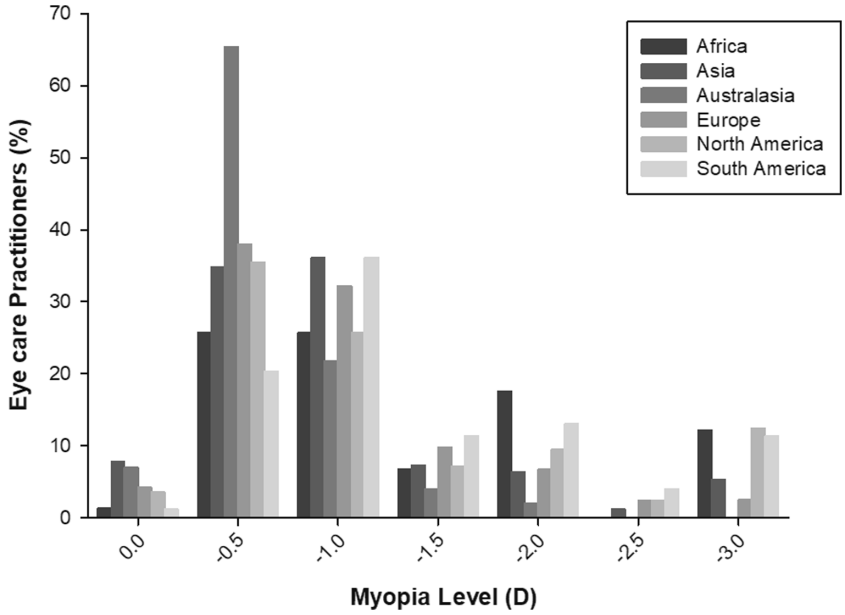

Figure 3. The minimum degree of myopia present in a child to warrant adoption of myopia management varied between continents. $N = 3017$.

bifocal, PALS, and myopia control spectacles, as well as pharmaceuticals, in Russia; higher for single vision, multifocal, and myopia control contact lenses, pharmaceuticals in France and combination therapies (except compared to Norway and Italy). In North America, compared to other regional countries ($P < 0.05$), the age of prescribing was higher for single vision spectacles in Mexico compared to in the USA and Canada; lower for bifocal, PALS, and myopia control spectacles in Canada and the USA; higher for single vision contact lenses in Puerto Rico; lower for multifocal contact lenses in the USA; lower for myopia control contact lenses in Mexico (except compared to the USA) and higher for combination therapies in Mexico (except compared to Puerto Rico). In South America, compared to other regional countries ($P < 0.05$), the age of prescribing was lower for single vision contact lenses in Peru than Argentina and higher for pharmaceuticals in Ecuador and Peru.

Minimum Degree of Myopia to Begin Myopia Management

The minimum degree of myopia presenting in a child to warrant adoption of myopia management varied among continents (Fig. 3), being lowest in Australasia (−0.64 ± 0.37 D, all $P \leq 0.001$), being similar in Asia (−0.97 ± 0.70 D) and Europe (−0.97 ± 0.63 D) and highest in North America (−1.21 ± 0.81 D), Africa (−1.35 ± 0.86 D), and South America (−1.37 ± 0.81 D, all $P < 0.01$).

Within Asia, China reported the lowest level (−0.75 ± 0.46 D) compared to regional countries (all −1.4 to −1.7 D, $P \leq 0.001$). In Europe, Russia (−0.59 ± 0.24 D) and Norway (−0.63 ± 0.43 D) reported the lowest level (all $P < 0.01$ except the UK −0.80 ± 0.43 D), with France, Italy, and Spain between −1.0 and −1.1 D. In North America, Canada (−0.87 ± 0.58 D) and the USA (−0.90 ± 0.65 D) were lower ($P < 0.001$) than

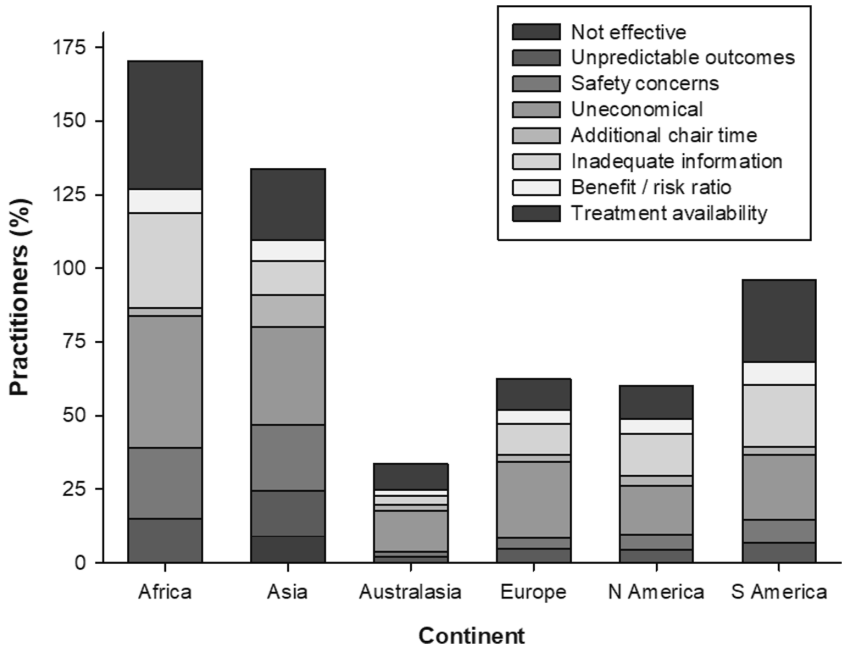

Figure 4. Factors cited by practitioners in different continents for not adopting myopia control approaches. $N = 3017$.

Mexico (−1.61 ± 1.00 D) and Puerto Rico (−1.62 ± 0.96 D). In South America, all countries reported a similar level ($P > 0.05$).

Minimum Level of Myopia Progression That Necessitates Myopia Control

The median level of progression that warranted myopia control varied between continents, being −0.26 to −0.50 D in Australasia and Europe and −0.51 to −0.75 D in the other continents (all $P \leq 0.001$). It was lower in China than in the rest of Asia, lower in the USA compared to in the rest of North America, and higher in Spain than in the rest of Europe (all $P < 0.05$).

Using Undercorrection as Strategy to Control Myopia

Undercorrection is now rarely used as a myopia control strategy (never used 83.1%, sometimes used 14.4%). It is used less (1% sometimes) in Australasia (all $P \leq 0.001$) compared to in Africa (29.7% sometimes, 5.4% always; $P < 0.001$) and South America (23.7% sometimes, 7.3% always; $P < 0.001$).

In Asia it is used less in China and Israel than in other regional countries (all $P < 0.05$). In Europe it is used less in the UK than in France ($P = 0.002$), Italy ($P < 0.001$), and Spain ($P = 0.014$). In North America it is used less in Canada, and in South America, it is used less in Brazil (all $P < 0.05$).

Reasons for Not Prescribing an Alternative Method to Single Vision Correction

Reasons hindering prescribing of myopia control methods are presented in Figure 4. Less than 10% of practitioner thought myopia control options were not effective, ranging from no practitioners from Australasia to 9.2% in Asia ($P < 0.01$). Around 10% of practitioners felt the outcomes were unpredictable, being higher in Africa (13.5%) and Asia (15.2%) than in the other continents (1.0 to 6.2%, $P < 0.05$). Similarly, safety concerns were highest in Africa (23.0%) and Asia (22.2%) compared to other continents (1.0 to 7.3%, $P \leq 0.001$). Cost to the patient was of greater concern in Africa (43.2%), Asia (33.2%) and Europe (25.7%), than Australasia (12.9%, $P < 0.01$) and North America (16.6%, $P \leq 0.001$), with the concern being similar between South America (21.5%) and Europe. Additional chair time was only of concern in Asia (10.9%) compared to other continents (1.0 to 3.0%, $P \leq 0.001$). Inadequate information was of little concern in Australasia (2.0%, all $P < 0.05$) and of highest concern in Africa (31.1%, all $P < 0.001$) and South America (20.3%, all $P < 0.05$). Concern about the risk-benefit ratio was low across continents (1.0% to 7.3%). Treatment availability was of significant concern in Africa (41.9%), Asia (24.1%), and South America (27.1%; all $P < 0.001$) compared to Australasia (7.9%), Europe (10.5%), and North America (11.0%).

In Asia, compared to other regional countries ($P < 0.05$), the reason for not prescribing myopia control treatments was lower for effectiveness or risk-benefit ratio concerns in the Philippines; higher for effectiveness, predictability, and chair time concerns but lower for availability issues in Turkey; higher for safety and lower for information availability concerns in China; and lower for availability issues in Israel. In Europe, compared to other regional countries ($P < 0.05$), the reason for not prescribing myopia control treatments was higher for lack of information in France; lower for effectiveness and predictability concerns in Italy; higher for treatment availability in Russia; and lower for cost issues in the UK. In North America, compared to other regional countries ($P < 0.05$), the reason for not prescribing myopia control treatments was lower for availability issues in Canada; higher for information availability in Mexico; higher for predictability and safety concerns in Puerto Rico; and higher for chair time in the USA. In South America, the

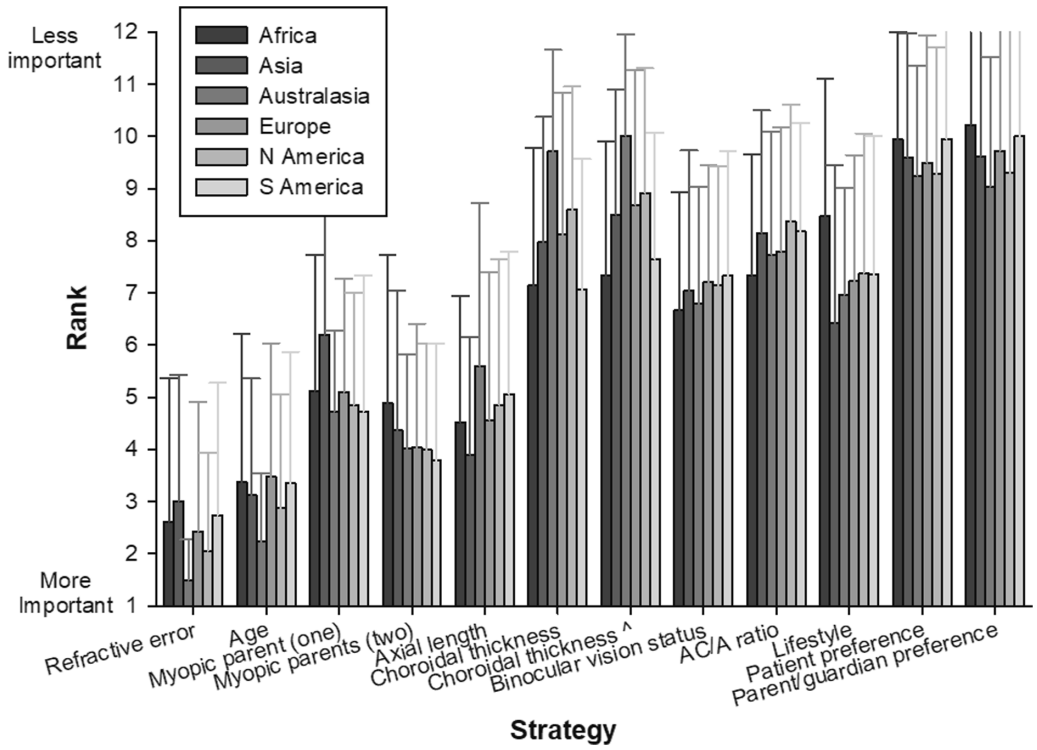

Figure 5. Ranked criteria for starting myopia control in young progressing myopes. $N = 3017$. AC/A = accommodative-convergence to accommodation ratio; choroidal thickness ^ = choroidal thickness change.

reason for not prescribing myopia control treatments was lower for cost and availability concerns in Brazil compared to other regional countries ($P < 0.05$).

Ranked Criteria for Starting Myopia Control in a Young Progressing Myope

Refractive error and patient age were the most highly ranked criteria for starting myopia control, followed by having myopic parents and axial length, then binocular vision status, accommodative-convergence to accommodation ratio (AC/A) and lifestyle, then choroidal thickness assessment and finally patient or parent/guardian pressure (Fig. 5). Refractive error was more highly ranked (a lower number) in Australasia (all $P < 0.05$) and lower ranked in Asia compared to other continents (all $P < 0.05$). Age was more highly ranked in Australasia (all $P < 0.05$); having one myopic parent was lower ranked in Asia ($P < 0.05$), and having two myopic parents was ranked higher in South America than Asia or Africa ($P < 0.005$). Axial length was ranked higher in Asia (all $P < 0.05$). Choroidal thickness and its variability differed most in ranking between continents (all $P < 0.05$ except between Africa and South America). Binocular vision was ranked similarly between continents. AC/A was more highly ranked in Africa followed by Europe and Australasia (all $P < 0.05$). Lifestyle was higher ranked in Asia and lowest ranked in Africa (all $P < 0.05$). Patient and parent/guardian pressure was more of a factor in Australasia and North America (all $P < 0.05$) and less of a factor in South America (some $P < 0.05$).

In Asia, compared to other regional countries ($P < 0.05$), the ranking for myopia control starting criteria was higher for prescription, age, and one parent with myopia and lower for axial length and lifestyle in China; lower for patient pressure in India; lower for axial length and higher for two parents with myopia in Israel; lower for patient and parent/guardian pressure and higher for binocular vision and AC/A in the Philippines; lower for two parents with myopia in Turkey; and lower for one or two parents with myopia, patient and parent/guardian pressure and higher for choroidal thickness/change and binocular vision in Vietnam. In Europe, compared to other regional countries ($P < 0.05$), the ranking for myopia control starting criteria was: lower for two parent with myopia and higher for axial length in France; higher for AC/A in Italy; lower for choroidal thickness/change and higher for patient and parent/guardian pressure in Norway; lower for age, one or two parents with myopia and AC/A, and higher for prescription and axial length in Russia; lower for one parent with myopia and choroidal thickness/change and higher for AC/A in Spain; and lower for choroidal thickness/change and higher for prescription, and patient and parent/guardian pressure in the UK. In North America, compared to other regional countries ($P < 0.05$), the ranking for myopia control starting criteria was higher for prescription, two parents with myopia, lifestyle and parent/guardian pressure in Canada; higher for choroidal thickness/change, binocular vision and AC/A in Mexico; higher for choroidal thickness/change in Puerto Rico; and higher for prescription, lifestyle, and parent/guardian pressure in the USA. In South America, compared to other regional countries ($P < 0.05$), the ranking for myopia control starting criteria was lower for two parents with myopia and parent/guardian pressure and higher for age and axial length in Brazil; and lower for prescription in Peru.

Factors Considered When Choosing Which Myopia Management Strategy to Use First

The key factors for choosing the initial myopia management strategy in order were: patient age (75.5%), non-cycloplegic refraction (55.0%), cycloplegic refraction (52.4%), axial length (51.3%), parent/guardian preferences (48.4%), binocular vision (39.8%), patient preference (38.4%, only one treatment available (18.5%), only comfortable/trained in one treatment (15.8%) and choroidal thickness (9.8%). Only one treatment available was more common in Asia (all $P < 0.05$). Africa (21.6%), Asia (17.3%), and Europe (19.3%) were more likely (all $P < 0.05$) to be only comfortable using one treatment than Australasia (4.0%), North America (6.5%), and South America (10.2%). Fewer practitioners in Asia (74.4%) and Africa (66.2%) used age as a factor than those in Europe (78.3%) or Australasia 85.2%). Practitioners in South America (40.7%) used non-cycloplegic refraction less as a factor (all $P < 0.05$ except for Africa at 50.0%) with Australia using this more (68.3%, $P < 0.05$ versus Africa and Asia). Africa (63.5%), Asia (57.0%), and South America (62.7%) were more likely to use cycloplegic refraction as a factor (all $P < 0.05$) than Australasia (46.5%), Europe (45.1%), and North America (45.9%). Axial length findings were used more in Asia (62.2%), followed by Europe (46.3%) and South America (46.9%) (both $P < 0.05$). Choroidal thickness was used more in Asia (14.2%) and Africa (13.5%, all $P < 0.05$ except South America with 9.6%). Binocular vision use ranged from Australasia (49.5%) to Europe (35.3%, $P < 0.01$). Patient and parent/guardian preference followed the same pattern and varied among all continents ($P < 0.05$), being highest in Australasia (71.3%/78.2%, respectively) and lowest in South America (14.7%/17.0%).

Triggers to Adjust Myopia Management Strategy

On average, 4.0% of practitioners reported that they didn't adjust their myopia strategy, being lower in Australasia (0.0%) and Asia (2.1%, all $P < 0.05$) than other continents (5.4 to 7.4%). Progression of refractive error was used by 84.4% of practitioners, being highest in Australasia (95.1%, all $P < 0.05$) followed by Asia (87.5%, all $P < 0.05$) compared to other continents (77.0 to 81.7%). Progression of axial length was more important to practitioners in Asia (79.4%, all $P \leq 0.001$) than those in other continents (37.8% to 49.7%). More practitioners from Asia (20.0%) followed by Africa (14.9%) and South America (12.4%) placed emphasis on changes in choroidal thickness than those in other continents (1.0 to 7.1%, all $P < 0.05$). New treatments with better reported efficacy influenced more practitioners in Australasia (63.4%) and Europe (51.6%, all $P < 0.05$) than other continents (34.5% to 42.6%). Poor compliance was least considered in South America (28.8%, all $P \leq 0.001$) and most important to Australasian (78.2%, all $P < 0.001$) followed by Asian (63.4%) practitioners ($P = 0.004$). Compliance was a factor for more Australasian (60.4%, all $P < 0.001$) followed by Asian ($P = 0.009$) practitioners and fewer in South American (22.6%, all $P \leq 0.001$) and African practitioners (27.0%, all $P < 0.05$).

Impact of Myopia Management on Your Practice

Embracing myopia control was felt to enhance patient loyalty (much more, 23.8%; more, 45.3%; and no change, 26.3%), increase practice revenue (much more, 10.6%; more, 38.5%; and no change, 39.3%), and increase job satisfaction (much more, 32.6%; more, 43.8%; and no change, 19.9%). Patient loyalty was felt to be lower in South America, followed by North America (all $P < 0.05$), practice revenue to be lower in Europe and South America ($P < 0.05$ with Asia and North America), and job satisfaction to be higher in Australasia and Europe (all $P < 0.05$).

In Asia, resulting patient loyalty was felt to be higher in China and the Philippines (all $P < 0.01$), additional practice revenue was felt to be lower in Turkey and Vietnam and higher in the Philippines, and resulting job satisfaction was higher in India and the Philippines (all $P < 0.05$). In Europe, resulting patient loyalty was felt to be lower in France and Russia (all $P < 0.05$), additional practice revenue was felt to be higher in the UK and resulting job satisfaction was generally higher in Italy, Spain, and the UK (all $P < 0.05$). In North America, resulting patient loyalty and practice revenue were felt to be lower in Puerto Rico and Mexico than in Canada and the USA (all $P < 0.05$).

Discussion

This report examines the self-reported attitudes and practices of eye care practitioners toward myopia management across the globe and forms the third contribution to a study beginning in 2015.[10] More than 3000 practitioners participated in this survey, nearly tripling the number of responses received in the previous report conducted in 2019.[8] For the first time, the number of responses from Africa was sufficient to be included in this continent-wide analysis, providing coverage across six continents. A similar proportion of respondents whose professions can legally prescribe vision correction and pharmaceuticals (depending on the region) were received: the vast majority of respondents were optometrists and ophthalmologists across 2022, 2019, and 2015 surveys (91.4%, 92.1%, and 91.0%, respectively).

The self-reported level of concern about the increasing frequency of pediatric myopia was generally high across all six continents. Reflective of the high prevalence rate of pediatric myopia in Asia,[11] practitioners in this part of the world once again showed the greatest level of concern compared with all other continents. The perceived level of clinical activity in myopia control was also highest in Asia; however, large differences were reported within the continent: practitioners in Vietnam reported just over half the activity level to that of practitioners in China. Similarly, significant country-wide differences in activity level were found in all continents besides South America. Despite this, all continents show an increase in the reported clinical activity level in myopia control compared with that reported in 2019.[8]

Young children with levels of hyperopia lower than age-normal (or are even emmetropic) are considered to be at significant risk of becoming myopic.[12,13] In 2019, practitioners considered a refractive error of approximately −1.50 D to be the minimum degree of myopia to begin management, which was argued to be an overly conservative approach.[8] Despite some regional differences, a shift toward a lower degree of myopia seems to have occurred since then, where, on average, practitioners felt a refractive error between −0.50 to −1.0 D still necessitates intervention. The latter might be attributed to significant advancements and developments in the field of myopia control together with an increased adoption of myopia control strategies by eye care practitioners worldwide. Considering the significant risk factors associated with mild-to-moderate levels of

myopia,[14,15] it appears clinicians now adopt a more proactive response to incident myopia.

In the 2015[10] and 2019[8] surveys, orthokeratology was perceived to be the most efficacious intervention method. For the first time in this series of surveys, combination therapy was included as a control option, and practitioners from all six continents perceived this to be a more effective method of myopia control. Although clinical trials exploring specific approaches to combination therapy are relatively sparse, practitioner attitude reflects existing research showing a combination of pharmaceutical intervention (low-dose atropine) and orthokeratology to have an improved effect compared to orthokeratology alone (detailed in a comprehensive IMI white paper).[16–19] Although considered to be the most efficacious, combination therapy was one of the least prescribed myopia control techniques across all continents, ranging from 2% in Africa to 5% in Asia. The latter might be attributed to poor access to low dose atropine preparations and optometrists in many parts of the world not being licensed to prescribe atropine. In contrast, a recent article exploring practice patterns of myopia management among pediatric ophthalmologists across the globe (n = 794) reported nearly all respondents (95%) adopted a combination approach; however, this questionnaire offered behavioral advice to be included as a specific intervention technique.[9]

Despite the self-reported increasing levels of clinical activity in the area of myopia control across the globe, single vision spectacles and soft contact lenses were still the most prescribed vision correction across all continents, averaging 43% overall. However, this is notably lower than what was reported in 2019[8] (52%) and 2015[10] (68%). Whether this lessening tendency to prescribe single vision correction to young myopes comes from an increase in practitioner's ability and resolve to practice myopia control, greater patient interest and uptake, or, most likely, a combination of the two; these results show an encouraging trend over the past seven years.

Specific myopia control spectacles (a new category since 2019) were considered to be nearly equal in efficacy as specific myopia control soft contact lenses; however, respondents showed a greater frequency of prescribing myopia control spectacles than myopia control soft contact lenses to young myopes (overall 14.0% and 9.0%, respectively). The greater frequency of prescribing myopia control spectacles might be attributed to an increasing number of studies supporting the efficacy of this myopia management intervention together with issues related to the fact that no additional practice equipment is needed for their prescription, and that spectacle lenses present no risk with regards to infection. The preference to prescribe myopia control spectacles was consistent across all continents besides Europe. Interestingly, the overall frequency of prescribing single vision spectacles to young myopes was over four times that of single vision soft contact lenses (34.6% and 8.3%, respectively), despite the use of contact lenses having been shown to improve how children and teenagers feel about their appearance and participation in activities.[20] A clear disparity between spectacle lenses and soft contact lenses was present among the six continents. Whether there is hesitancy to prescribe soft contact lenses to young myopes because of cost, safety concerns, patient/parent preference, or other reasons, the preference to prescribe spectacles over soft contact lenses appears to markedly reduce when prescribing those lens types marketed for myopia control; this may be due to compliance with contact lens wear during the day being better than with spectacles, and myopia control contact lenses being more established with long-term efficacy and safety data.[21]

The minimum age (between 5 to 18 years) to prescribe myopia management or control interventions varied depending on modality. Overall, practitioners were happy to prescribe single vision spectacles and myopia control spectacles to children of similar ages, with the mean age of 6.4 years for both lens types separately. Interestingly, a significantly greater proportion of practitioners from Australia (26%), Europe (18%), and North America (16%) would not prescribe single vision spectacles to young myopes compared to prescribing approved myopia control spectacles (6%, 6%, and 8%, respectively). The opposite was true for Africa, Asia, and South America. In contrast, a greater proportion of practitioners from all six continents would not prescribe single vision soft contact lenses compared to myopia control soft contact lenses. However, the minimum age practitioners would fit young myopes with soft contact lenses (both single vision and those approved for myopia control) was greater than all spectacle lens types, averaging 9.8 years for single vision soft contact lenses and 8.6 years for soft contact lenses approved for myopia control. Country-wide comparisons showed no exception to this trend, where every region considered the minimum age necessary to prescribe soft contact lenses (single vision and myopia control) to be older than that for spectacle lenses (single vision and myopia control). The minimum age to prescribe orthokeratology was similar to that of soft contact lens types (on average 9.2 years). Hesitancy to prescribe contact lenses to young children often stems from safety concerns because of the necessary compliance required to minimize the risk of contact lens–related ocular adverse events. The risk of ocular complications has been found to be very low across different lens modalities, particularly daily disposables, and research has shown children and adolescents to be as safe as adults in contact lens wear.[22–24] Attitudes to soft contact lens modalities were not examined separately in the survey, so it may be useful to explore whether the minimum age to which practitioners fit soft contact lenses is consistent for daily disposable and reusable modalities. The average minimum age practitioners prescribe pharmaceuticals was similar to that of spectacle lenses; as expected, because of differing access across the globe, those who would not prescribe pharmaceutical intervention varied greatly among continents, with the highest percentage in Europe (47%) and lowest in Asia (7%), with the latter possibility related to differences among continents in practitioners' scope of practice and access. The frequency of prescribing pharmaceuticals for myopia control appears to have more than doubled in Asia since 2019 (previously 4.1%, now 8.7%), primarily within China, India, and Israel. Besides from Europe, practitioners from all other continents appear to be prescribing pharmaceutical intervention more often.

Research has shown single vision distance undercorrection to be ineffective at best or to increase, rather than decrease, the rate of myopia progression in children,[25–27] yet some practitioners across the world still practice undercorrection as a method of "myopia control." The majority of respondents never use undercorrection as a control method (83.1%); however, more than one in 10 eye care practitioners at least "sometimes" use undercorrection across all continents besides Australasia. This was most evident in Africa

(35.1%) and South America (31.1%). A recent publication exploring management attitudes and strategies to myopia management specifically in Africa found that a markedly higher percentage of African practitioners use undercorrection compared to this survey, where 52% of those surveyed at least sometimes used undercorrection in practice[28]; this may be due to their wider coverage of practitioners, which it is hoped can be encompassed in future surveys in this series. Fortunately, the overall percentage of practitioners who undercorrect young myopic patients at least some of the time has consistently declined over recent years (27.3% in 2015,[10] 20.4% in 2019,[8] and 16.9% in 2022).

Compared to conventional correction, practitioners across all continents felt the higher cost to the patient to be the primary hindrance to prescribe myopia interventions. In Africa, concerns about cost were closely followed by limited availability to myopia treatments, with more than 40% of practitioners reporting this as a significant obstacle. Other research in Africa has found similar reasons for why practitioners may not prescribe myopia control interventions there, where cost to the patient and safety concerns were the two reasons most commonly reported.[28] Treatment availability also appears to be an issue for practitioners in Asia and South America, whereas practitioners in Australasia, Europe, and North America appear to be much less affected. This highlights the vital need for a collaborative effort across the eye care industry and clinical practice to increase accessibility, both financially and geographically.

In an additional question asked for the first time, respondents across all six continents ranked patient age and refractive error to be the two primary criteria for starting myopia control, followed by parental myopia, and patient axial length. The latter suggests a consistent approach to identifying a child's risk of myopia progression independent of location, and extensive evidence supports these four criteria to be considered as significant risk factors.[12,29] Interestingly, patient and parent/guardian pressure were the lowest ranked criteria for beginning myopia control across all continents besides Australasia. This could indicate a lack of information promoting the need for myopia control accessible to parents and patients/guardians or simply demonstrate the trust patients and parents/guardians have for practitioners to decide the correct management approach on their behalf.

Once a young patient starts using a myopia control method, the great majority of practitioners mostly used progression of refractive error as the key trigger to adjust their myopia management strategy, although other factors might also play a role (such as contact lens discomfort). The latter finding was fairly consistent across all continents, averaging 84.3% overall. Using progression of axial length as a trigger was much more varied between continents, ranging from 39% in Africa to 79.4% in Asia, and the remainder between 45% to 50%. Considering patient axial length was ranked highly as a criterion to begin myopia control, it seems curious that few practitioners use progression of axial length as an indicator to adjust the management strategy in poor-responders. One potential explanation may be limited access to the instrumentation required to monitor axial length progression as a part of routine clinical practice.

The practice of myopia control appears to positively impact clinicians and their practice, with the majority of practitioners reporting increased patient loyalty and enhanced job satisfaction. Practice revenue showed more mixed results, where similar percentages of practitioners reported either no change or an increase in revenue. The encouraging response promotes a strong foundation to pursue myopia management for the benefit of the eye care practice, the individual practitioner, and, of course, the patient.

Much like the previous two surveys in this study,[8,10] the exact response rate is not known, because maximum coverage was promoted by involving professional bodies whose members may not all be practicing eye care practitioners. It is unclear how representative the respondents are to the broader practitioner population in each region, with different eye care professions differing in their scope of practice. Access to equipment and treatment options are also dependent on regulatory approvals and health-care reimbursement. For example, the USA is one of few countries where optometrists can prescribe atropine, but only one soft lens is approved for myopia control, and myopia control spectacles are not yet available. The survey avoided being specific on myopia device brands and pharmaceutical concentrations, which would lead to a further layer of complexity.

In conclusion, the third global survey of current trends in eye care practitioner myopia management attitudes and strategies in clinical practice has identified that, with growing evidence of the negative impact of even low levels of myopia on health economics, practitioner concern and perceived activity is increasing. This is translating into the uptake of appropriate, proven, myopia control techniques at lower levels of myopia; however, there is still plenty of scope for this to be accelerated, so proven myopia control treatments are applied to all children at high risk of developing myopia early enough in a child's ocular development to elicit an optimum effect. Adequate, evidence-based education of practitioners has improved, but further advocacy and collaboration with policy makers, health regulatory bodies, and industry is needed to enhance accessibility and affordability of treatment options to address the growing health burden of the myopia epidemic.

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