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OPO THE COLLEGE OF OPTOMETRISTS

ORIGINAL ARTICLE

Prescribing patterns of myopia control contact lenses among optometrists in Ireland

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Abstract

Purpose: This retrospective analysis of electronic medical record (EMR) data investigated the prescribing patterns of soft myopia control contact lens (MCCL) treatments since their introduction in Ireland in 2017.

Methods: Anonymised EMR data were sourced from 33 optometry practices in Ireland from 2017 to 2021 to determine the number of practices prescribing MCCLs to myopic children 5–18 years old. In MCCL-prescribing practices, the proportion of contact lens wearing children fitted with MCCLs and the proportion of progressive (≤−0.25 D/year) myopic children fitted with MCCLs were determined. Logistic regression was used to determine which factors influenced the likelihood of being prescribed a MCCL.

Results: Overall, just 10 practices were found to prescribe MCCLs of any type. The Coopervision MiSight contact lens was used in 85% of all MCCL fittings with most other fits being off-label multifocals. The use of MCCLs rose from 3% of contact lens fits in 2017 to 27% in 2021. Children fitted with MCCLs were on average younger (12.2 ± 2.3 years vs. 15.4 ± 2.1 years) but more myopic (−3.46 ± 1.84 D vs. −3.03 ± 1.69 D) than those fitted with standard contact lenses. The most predictive factors for being fitted with MCCLs were year of examination (OR: 2.54, 95% CI: 2.13, 3.03), younger age (OR: 1.52, 95% CI: 1.39, 1.64) and greater myopia (OR: 1.25, 95% CI: 1.11, 1.39).

Conclusion: Clinician engagement in myopia management has increased in Ireland since the formal introduction of MCCLs, but more than two-thirds of practices included are yet to offer this form of myopia management. The proportion of children with progressive myopia that has been prescribed MCCLs has increased, but the majority of children are still managed for vision correction only. There is significant scope for improving the uptake of evidence-based myopia control treatments and for optimising the age and degree of myopia at which such interventions are initiated.

KEYWORDS
contact lenses, electronic medical records, myopia, myopia control

INTRODUCTION

The global prevalence of myopia has increased significantly in recent decades and is projected to continue this upward trend in the coming years.[1] These changes will likely lead to more myopia-related vision impairment due to the lack of availability of refractive correction[2,3] and ocular complications such as glaucoma,[4] retinal detachment[5] and myopic maculopathy.[6] Myopic maculopathy is of particular concern, having increased by 340% in China in the last 30 years,[2] and predicted to cause vision impairment in 56 million people by 2050.[7]

In the majority of cases, myopia develops through accelerated axial elongation of the eye during childhood.[8,9] This excessive eye growth combined with older age represents the best predictor of ocular disease development and associated vision loss in myopes.[6,10] Novel myopia management solutions intended to reduce myopic axial elongation in childhood have recently emerged. There is now an increasing body of evidence that contact lens,[11,12] spectacle lens[13,14] and pharmaceutical therapies[15] can effectively reduce myopia progression and axial elongation and, thereby potentially reduce the lifetime risk of vision impairment due to myopia.[16] This has led to the recent adoption of myopia management guidelines by the World Council of Optometry, which recommend that all optometrists should adopt comprehensive myopia management as the standard of care for myopic patients.[17]

Interventions to slow down myopia progression have long been available to optometrists (e.g., multifocal contact lenses and orthokeratology). However, myopia control is a relatively new therapeutic priority and the introduction of treatments specifically indicated for the reduction of myopia progression is a very recent phenomenon. Little is known about the adoption of these new treatments for the management of progressive myopia in children. Their penetration is critically reliant on clinician uptake but is also dependent on parental (and patient) acceptance of such treatments. The limited available evidence is derived from subjective survey data compiled from the responses of self-selected eye care practitioner respondents. This retrospective analysis of electronic medical record (EMR) data was designed, therefore, to provide a more objective evaluation of actual prescribing patterns and uptake of myopia control contact lens (MCCL) treatments since their introduction in Ireland in 2017.

Key points

- Although prescribing rates of myopia control contact lenses have increased in Ireland, the majority of myopic children are still optically managed for vision correction only.
- Most children prescribed myopia control contact lenses were fitted with the Coopervision MiSight soft contact lens, indicating a patient/practitioner preference for licenced soft lens options.
- Targeted engagement of practitioners and parents is required to optimise patient selection and overall uptake of myopia control contact lenses.

METHODS

Anonymised EMR data were sourced from 33 independent optometry practices in Ireland. The data were extracted remotely through the EMR provider (Ocuco Ltd., ocuco.com) following the provision of explicit consent from the data (practice) owners during February 2022 for all practices. The sampling of optometry practices was opportunistic and occurred as part of an ongoing optometric EMR epidemiology project.[18] The data extracted comprised all practice records since the first use up to the date of extraction for each practice. The EMR provider removed any personally identifying data and anonymised the findings prior to delivery so that the anonymisation could not be reversed by the researchers. The data were provided in multiple CSV files which were combined using the SQLite database engine V 3.30.00 (Hipp, Wyrick & Company, hwaci.com) with further analysis carried out using the R programming language (R Core Team [2020], R-project.org/). At the time of extraction, a new unique identifying number was generated within the EMR data allowing individual subject data to be tracked across multiple visits. The data available for each clinical practice patient included demographic, refractive, visual acuity, binocular vision, contact lens, ocular health and clinical management data. For this analysis, only demographic, refractive and visual acuity data were considered.

The data were filtered to include only myopic children (≤−0.50 D spherical equivalent refractive error [SERE]) aged 5–18 years, inclusive. From these data, practices prescribing standard contact lenses to myopic children were identified, and the proportion of practices prescribing MCCLs was determined. The type of MCCL prescribed was ascertained for each fit. Data were analysed from 2017 to 2021 as this was when the first commercially available contact lens licenced for myopia control became available, and had minimal overlap with the introduction of commercially available myopia control spectacle lenses. The number of progressing myopic children was also determined by calculating the difference in SERE between consecutive visits that were at least 3 months apart. Annualised myopic progression rate was calculated using the difference in SERE as a function of time between visits. Children exhibiting myopic progression of −0.25 D/year or worse between consecutive visits were considered to be progressing myopes. Of those children found to be either myopic or progressing myopes, the proportion prescribed any type of contact lens and the proportion prescribed MCCLs after progression was established in progressing myopes were determined. For those children that were fitted with MCCLs, the period over which progression was assessed was limited to prior to MCCL fitting so that treatment efficacy was not a factor. Normality was assessed by the Kolmogorov–Smirnov test and differences in the samples were assessed using the Wilcoxon-Mann–Whitney test for non-normal data and the *t*-test for normal data.

Patterns in MCCL prescribing, such as age, degree of myopia and rate of progression among those fitted with MCCLs, were determined. Histograms were generated to

compare the distributions of age and SERE at the first fit of MCCLs and general contact lenses. Multiple logistic regression was used to determine which factors influenced the likelihood of being prescribed an MCCL. To evaluate myopic progression as a factor in being prescribed MCCLs, progression was considered at different levels between 0.25 and 1.00 D/year, increasing by 0.25 D/year steps.

RESULTS

The total dataset consisted of 402,294 unique patients and 1,066,366 patient visits, of which 12,484 myopic patients in the 5–18 year age range that attended between 2017 and 2021 were identified and included in the study (23,828 total visits). The mean age of those included was 13.2 ± 3.5 years and mean SERE was −1.86 ± 1.69 D at the first visit. Multiple-visit data were available for 5100 patients, of whom 2609 (51.16%) reached the threshold for classification as progressing myopes, with the remainder exhibiting ≥−0.24 D/year.

Overall, 2263 myopic children (18.12%) had been prescribed any type of contact lens, including 137 patients wearing MCCLs (Table 1). Of all 33 practices, 27 were found to fit contact lenses in children, of which 10 were found to prescribe MCCLs of any type. The number of practices initially prescribing MCCLs in 2017 was three, which increased to 10 by 2020 and remained static at this number in 2021. The proportion of progressing myopes between 5 and 18 years of age who were prescribed MCCLs during the study period was just 3.4% across all practices and 8.5% in MCCL-prescribing practices.

The overwhelming majority of MCCLs prescribed were soft peripheral defocus contact lenses (≈99%) with a minimal number of orthokeratology lenses prescribed. Figure 1 shows the breakdown of MCCL fits by lens type from 2017 to 2021. The prescribing pattern changed from predominantly off-label multifocal contact lenses (92%) in 2017 to predominantly MiSight MCCLs by 2021 (87%). Over the entire study period, 85% of all MCCL fits were using the Coopervision MiSight (coopervision.com) soft contact lens, followed by off-label multifocal contact lenses. All off-label multifocal lenses were a centre distance design and were prescribed with either a +2.00 D (21%) or a +2.50 D addition (79%).

There was a significant increase in the usage of MCCLs over the 5-year period assessed. The proportion of myopic children attending MCCL-prescribing practices that wore contact lenses and were fitted with MCCLs increased from just over 3% in 2017 to almost 27% in 2021. Of progressing myopic children that attended MCCL-prescribing practices that wore contact lenses, the proportion fitted with MCCLs for the first time increased from 1% in 2017 to 9% in 2021.

Figure 2 shows the percentage of progressive myopic children that were using MCCLs for each year from 2017 to 2021, including those that were first fitted in previous years and were attending for a follow-up appointment. In 2017, the highest proportion of MCCL fits was among faster progressors. This pattern was maintained in more recent years, but MCCL uptake increased steadily across all rates of progression from 2019 onwards. By 2021, however, 69% of those children progressing by ≤−1.00 D/year were still not using MCCLs to control their myopia progression.

The distribution of the age at which contact lenses were first prescribed was non-normal for MCCL wearers (KS test: D = 0.50, $p < 0.001$), MCCL practice attending standard contact lens wearers (KS test: D = 0.50, $p < 0.001$) and for non-MCCL practice attending contact lens wearers (KS test: D = 0.50, $p < 0.001$). The distribution of the first SERE at which contact lenses were fitted was also non-normal for MCCL wearers (KS test: D = 0.50, $p < 0.001$), MCCL practice attending standard contact lens wearers (KS test: D = 0.50, $p < 0.001$) and for non-MCCL practice attending contact lens wearers (KS test: D = 0.50, $p < 0.001$). The age at which children were first fitted with standard contact lenses was similar for non-MCCL-prescribing practices compared with MCCL-prescribing practices. (Figure 3). For children attending MCCL-prescribing practices, however, those fitted with MCCLs were significantly younger (Table 2 and Figure 3) than those fitted with standard contact lenses (mean age: 12.2 ± 2.3 years [MCCL wearers] vs. 15.4 ± 2.1 years [standard contact lens wearers], Wilcoxon–Mann–Whitney test; W = 20,234, $p < 0.001$). The mean SERE at which MCCLs were first prescribed was significantly more myopic than the mean SERE for those first prescribed standard contact lenses at the same practices (mean SERE: −3.46 ± 1.84 D, [MCCL wearers] vs. −3.03 ± 1.69 D [standard contact lens wearers], Wilcoxon-Mann–Whitney test; W = 51,254, $p = 0.004$). The mean progression rate at the time of first fit was significantly greater among children prescribed

TABLE 1 Breakdown of myopic paediatric patients between all practices and practices that prescribed myopia control contact lenses over the 2017–2021 period

	Number of practices	Total patients	Patients wearing any contact lens	Patients wearing MCCL	Patients progressing ≤−0.25 D/year	Patients progressing ≤−0.25 D/year wearing any contact lens	Patients progressing ≤−0.25 D/year wearing MCCL
All practices	33	12,484	2263	137	2609	945	90
MCCL practices	10	4759	1028	137	1060	513	90

Abbreviation: MCCL practices, Practices fitting myopia control contact lenses.

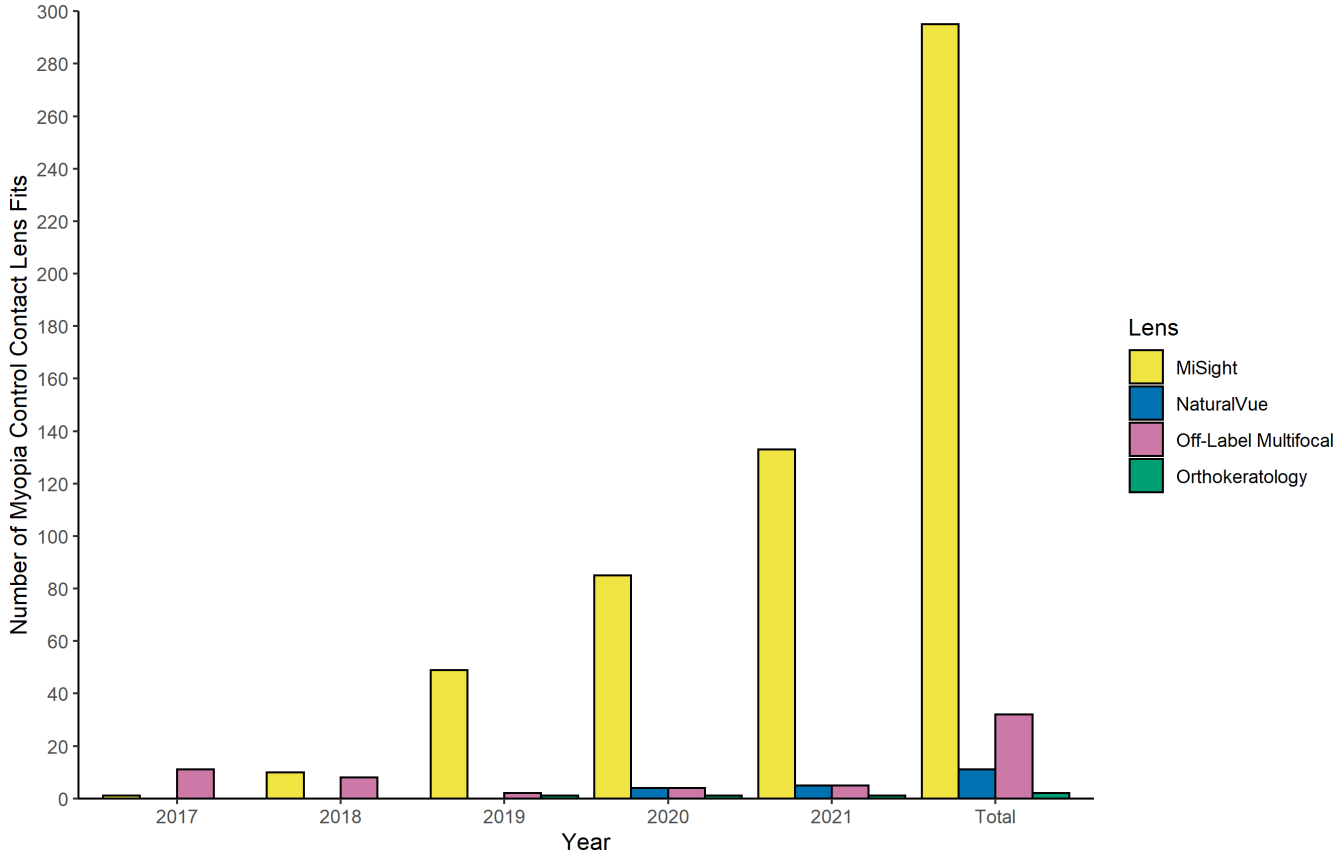

FIGURE 1 Numerical breakdown of the type of lenses used by optometrists in Ireland when fitting myopia control contact lenses for the years 2017–2021 (includes both new contact lens fits and patients attending for check-ups). The last column represents all years combined.

MCCLs than in non-MCCL contact lens-wearing children at the same MCCL-prescribing practices (mean progression: −0.40 ± 0.54 D, [MCCL wearers] vs. −0.21 ± −0.43 D [standard contact lens wearers], Wilcoxon-Mann–Whitney test; W = 12,432, $p = 0.006$).

The distribution for SERE skewed more myopic for those fitted with MCCL overall (Figure 4). By 2021, the mean age and SERE at which MCCL was first prescribed had shifted towards younger age and less myopic refraction relative to 2017, but the differences were not statistically significantly different (mean age: 12.3 ± 1.8 years [2017] vs. 11.9 ± 2.5 years [2021], *t*-test; $t = 0.66$, $p = 0.58$; mean SERE: −3.97 ± 3.07 D [2017] to −3.33 ± 1.71 D [2021], *t*-test; $t = -0.61$, $p = 0.64$).

When isolating MCCL-prescribing practice data, multivariate logistic regression showed that practice attended (OR range: 3.71–5.55, 95% CI: 0.75, 8.50), year of the examination (OR: 2.54, 95% CI: 2.13, 3.03), younger age (OR: 1.52, 95% CI: 1.39, 1.64) and higher myopia (OR: 1.25, 95% CI: 1.11, 1.39) were also predictive of being fitted with MCCLs. Figures 5–7 demonstrate the univariate probabilities of being fitted with MCCLs, with a positive relationship observed with year of examination (Figure 5) and negative relationships for SERE (Figure 6) and age (Figure 7). When myopic progression of −0.25 D/year or worse was included in the multivariate logistic regression model, it was not predictive of being fitted with MCCLs (estimate: 19.45, $p = 0.17$) when attending the MCCL practices. When the interaction between myopic progression and practice attended was assessed as part of the multivariate logistic regression model, four practices were identified where having a myopic progression of −0.50 D/year or worse was predictive of being fitted with MCCLs (*p* value range: 0.01–0.04), but this was not predictive in the remaining six MCCL-prescribing practices (*p* value range: 0.08–0.15).

DISCUSSION

This retrospective EMR data analysis provides objective evidence that the adoption of MCCLs by clinicians for myopia management in children remains limited in Ireland. Although the number of practices engaged in prescribing MCCLs has increased threefold since 2017, overall uptake remains low among independent practitioners. More than two-thirds of practices are yet to offer this form of evidence-based myopia management. Almost 60% of the children with progressive myopia identified in this comprehensive dataset attended a practice that appeared to provide optical interventions for vision correction purposes only. Clinical practice attended, therefore, was the single strongest influence on whether a child was prescribed

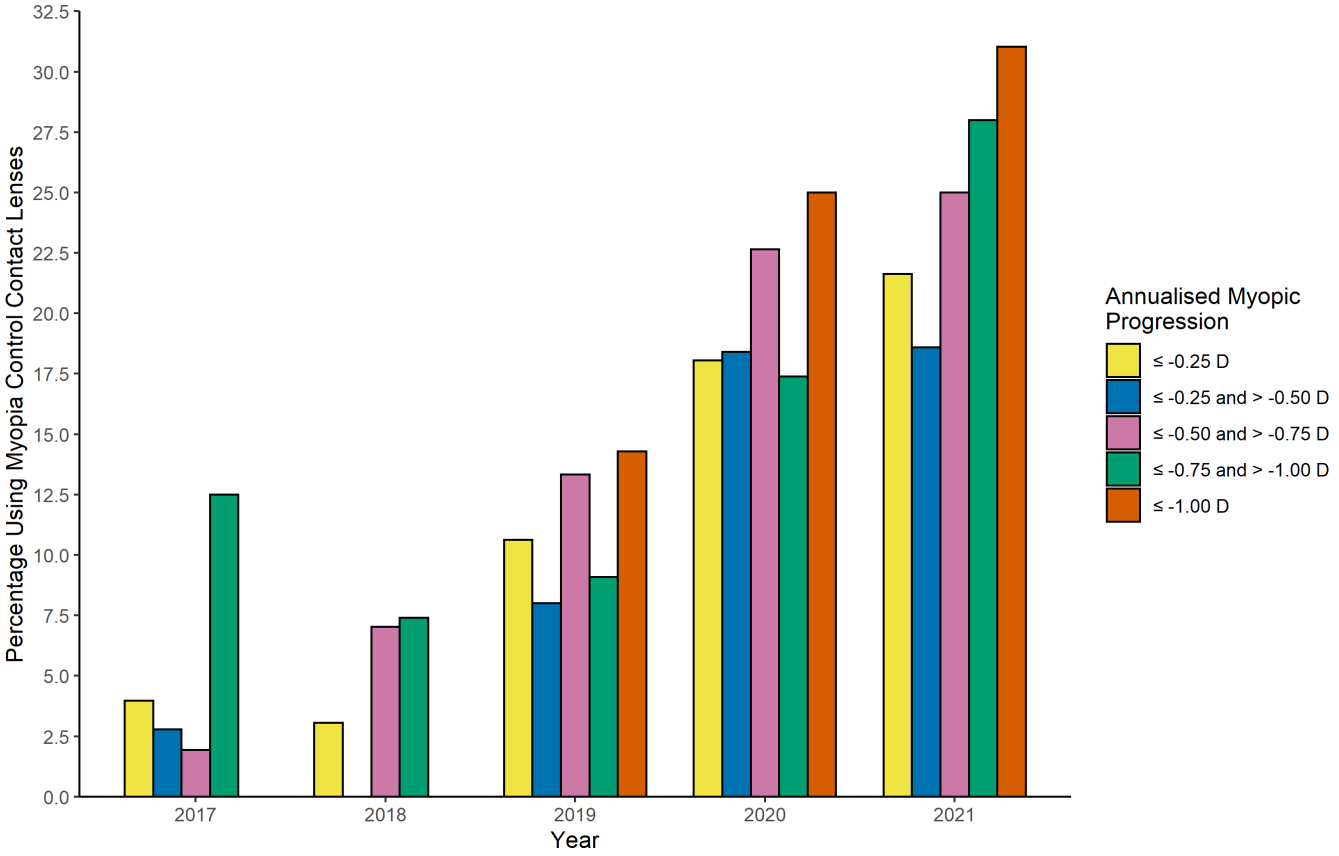

FIGURE 2 The percentage of progressive myopic children that attended a myopia control contact lens (MCCL)-prescribing practice and were fitted with MCCLs as a function of the annualised myopic progression rate. Yellow bars show the total percentage of progressive myopic children fitted with MCCLs.

MCCLs. The reasons for poor engagement by independent practices are unclear and may include business models that prioritise product sales over revenue generated by services, but multiple barriers to optometrists engaging in myopia control practice in Ireland have previously been reported.[19] Most notably, the clinical environment, chair time concerns, inadequate training and lack of equipment have all been identified as significant factors.[19]

The proportion of progressive myopes dispensed MCCLs from those practices actively engaged in myopia management was low. The precise reasons for this low uptake cannot be elucidated from the retrospective data available in this study but likely relate to several parent/patient-related and practitioner-related factors. Cost, for example, might represent a barrier to some candidates for treatment. MCCLs are more expensive than spectacles or standard contact lenses and are indicated for full-time use in children, which can drive up costs relative to standard lenses which offer flexibility with regard to the frequency of wear. Patient or parent preference is another possible explanation for low uptake of MCCLs as it has been observed that parental awareness of myopia management is low and that parental attitudes in Ireland are somewhat nonchalant in relation to the potential health implications of myopia.[20] Among practitioners, the decision to treat might be influenced by the patient's prescription. MiSight was the predominant treatment used, but had a limited fitting range of up to −6.00 D during the study period, and does not have a toric option for the correction of clinically meaningful levels of astigmatism. In this study, 14.6% of myopes presented at their first visit having a prescription outside this range, including 1.4% having an SER ≤−6.50 D and 13.2% requiring a cylindrical correction greater than 1 D. None of these children were prescribed MCCLs of any type, which may indicate an over-reliance on a single treatment option during the study period. It is also possible that prescribing habits may differ between practitioners within an MCCL-prescribing practice, due to the multiple barriers known to affect individual clinician engagement in myopia management.[19]

Offering MCCLs to younger myopic children is considered a good practice as it has been demonstrated that greater axial elongation is likely to occur at a younger age. Hence, starting treatment earlier may convey a greater treatment effect.[21] The much younger age at which patients were fitted with MCCLs indicates optometrists in Ireland are likely aware of the need to target younger myopic children for intervention. However, it is noteworthy that MCCL wearers were more myopic on average than standard lens wearers at the time of the first lens prescription. Ideally, progressive myopic children would be offered a myopia management intervention such as MCCLs

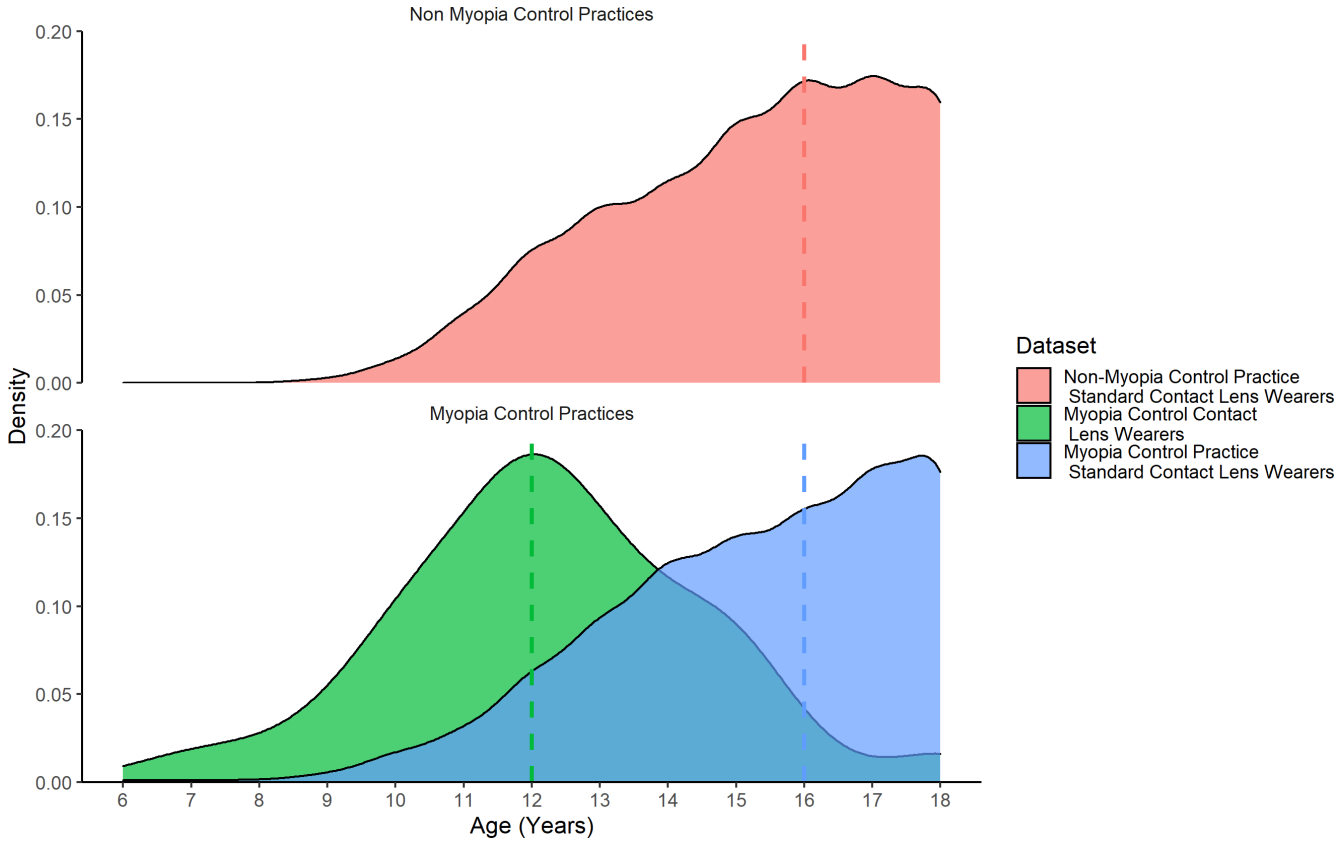

FIGURE 3 Density plots showing the age at which contact lenses were first prescribed for contact lens wearers attending non-MCCL practices (red), those attending MCCL-prescribing practices but wearing standard contact lenses (blue) and MCCL wearers (green). Dashed lines represent the median age at which contact lenses were first fitted for each group. MCCL, myopia control contact lens.

TABLE 2 Contact lens prescribing patterns for all practices and practices prescribing myopia control contact lenses

	Mean ± SD (median) age first getting contact lenses (years)	Mean ± SD (median) Rx first getting contact lenses (D)	Mean ± SD (median) progression (D/year)
All practices	15.1 ± 2.3 (15)	−3.03 ± 1.69 (−2.75)	−0.24 ± 0.43 (−0.17)
Non-MCCL practices	15.3 ± 2.1 (16)	−2.95 ± 1.65 (−2.63)	−0.27 ± 0.42 (−0.20)
MCCL practices	14.9 ± 2.5 (15)	−3.10 ± 1.73 (−2.75)	−0.21 ± 0.43 (−0.14)
MCCL practices (non-MCCL wearers)	15.4 ± 2.1 (16)	−3.05 ± 1.71 (−2.75)	−0.21 ± 0.43 (−0.13)
MCCL wearers	12.2 ± 2.3 (12)	−3.46 ± 1.84 (−3.06)	−0.40 ± 0.54 (−0.26)

Abbreviation: MCCL, myopia control contact lens.

at the earliest possible opportunity. Delayed initiation of treatment may increase the lifetime risk of vision impairment which is dose-dependent.[16] From a long-term preventive eye health perspective, there is significant scope for overall improvement to maximise uptake of evidence-based myopia control treatments and to optimise both the age and degree of myopia at which such interventions are initiated.

When prescribing MCCLs, optometrists in Ireland overwhelmingly appear to favour soft multifocal lens designs, with MiSight by far the most widely prescribed option. This is unsurprising as this was the first contact lens licensed for myopia control in Europe. The use of orthokeratology as a management strategy observed in this study was much lower than that reported in global survey data.[22] There are limited data available on the prescribing patterns of contact lenses in Ireland. However, the scope of practice and education of optometrists in Ireland is very similar to that of the United Kingdom, which has seen a significant decrease in rigid contact lens prescribing and increase in soft contact lens wear over the last 20 years,[23] which might explain the relative lack of use of orthokeratology lenses. There is also a need for more advanced equipment and contact lens fitting skills to fit orthokeratology lenses,[24] which may lead some practitioners to have a preference for soft lenses.

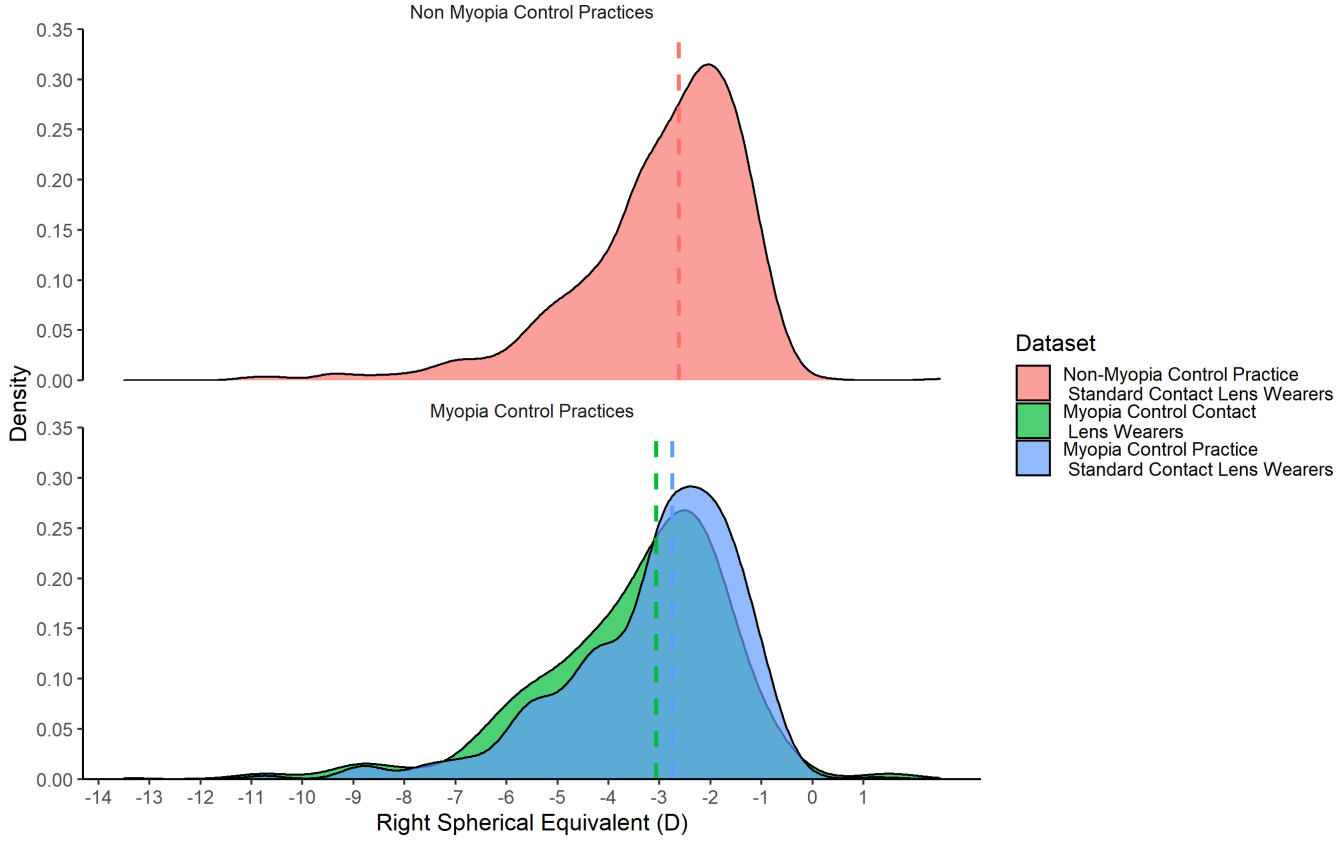

FIGURE 4 Density plots showing the right eye spherical equivalent refractive error (SERE) at which contact lenses were first prescribed for contact lens wearers attending non-MCCL prescribing practices (red), those attending MCCL-prescribing practices but wearing standard contact lenses (blue) and MCCL wearers (green). Dashed lines represent the median SERE at which contact lenses were first fitted for each group. MCCL, myopia control contact lens.

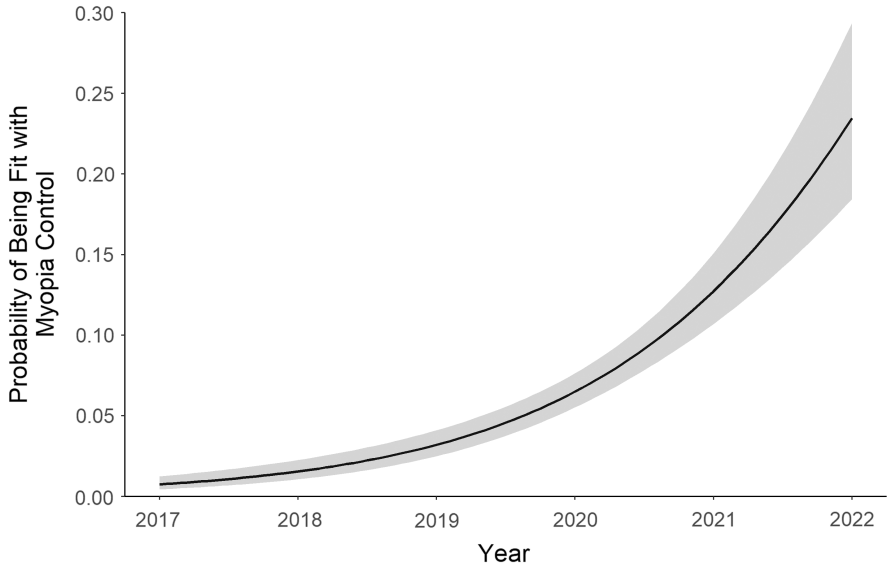

FIGURE 5 Logistic regression curve showing increased likelihood of being fitted with myopia control contact lenses (MCCL) each year since 2017 in MCCL-prescribing practices. Shaded areas represent 95% confidence intervals.

For a variety of reasons such as ethnicity,[25] parental myopia[26,27] and near activities,[28] not all myopic children will progress at the same rate. It is therefore important to identify children with progressive myopia and ensure that they have an adequate myopia management strategy. In this analysis, higher progression rates were only predictive

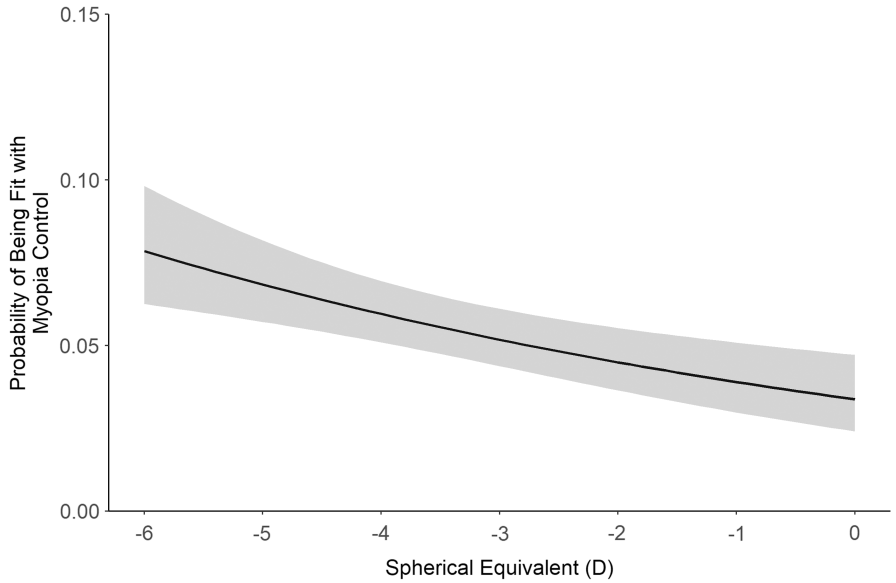

FIGURE 6 Logistic regression curve showing increased likelihood of being fitted with myopia control contact lenses (MCCL) with worsening myopia in MCCL-prescribing practices. Shaded areas represent 95% confidence intervals.

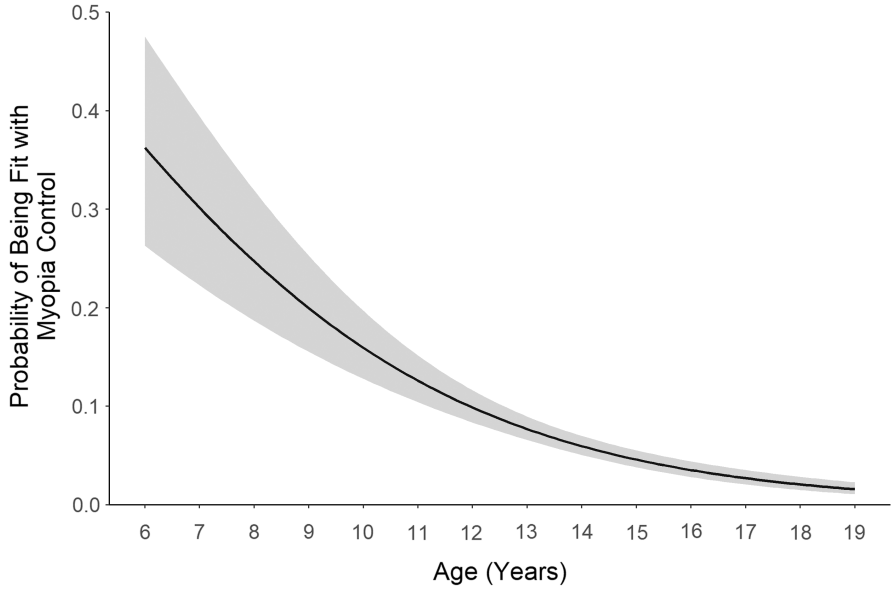

FIGURE 7 Logistic regression curve showing increased likelihood of being fitted with myopia control contact lenses (MCCL) at younger ages in MCCL-prescribing practices. Shaded areas represent 95% confidence intervals.

of being fitted with MCCLs if attending a minority of the practices offering this treatment paradigm. Although the proportion of progressing myopes fitted with MCCLs has increased each year, the majority of fast-progressing children were still wearing single-vision lenses. It is possible that not all optometrists were appropriately weighing this factor when deciding on which patients to fit with MCCLs. Even in those practices where higher progression was predictive, it was at a level that was higher than might be considered ideal in a Western European population where myopia progression is slow relative to regions such as South and East Asia.[29] A similar finding was reported among paediatric ophthalmologists, the majority of whom considered a myopic progression of 1 D/year or more as the point at which to initiate treatment.[30] There is no current consensus on the level of myopia progression that should require intervention and each child's individual risk factors for progression should be considered.[24] The control group of the MiSight trial, the most frequently prescribed MCCLs in this analysis, progressed by an average of 0.42 D/year over a 3-year period.[11] Given the treatment benefit observed in the intervention group in the MiSight trial, more modest progression levels would likely benefit from treatment.

The strengths and limitations of this study merit brief consideration here as this is the first study of its type. The most common methodology by which the prescribing

patterns of myopia management strategies have been ascertained is the use of practitioner surveys.[22,30–32] The overall rate of prescribing MCCLs to contact lens–wearing myopic children observed in this study (6% for all myopic children, 9.5% for myopic children progressing ≤−0.25 D/year) is similar to rates reported through survey results. Such surveys have also reported an increasing rate of MCCL prescribing in recent years.[31] However, the average level of SERE at which myopia control was initiated in this study was much higher than that quoted in survey results (−3.46 D vs. −1.50 D).[22] This discrepancy might be explained by the potential biases inherent in the use of practitioner survey data. There is also a significant risk that those who respond to such surveys may have a particular interest in the area of practice under consideration, and as such may not represent general practice.[31] This may explain the difference in orthokeratology prescribing found in such surveys, which is much higher than the numbers observed in this study.[22] The results presented herein are reflective of actual prescribing of contact lenses that has taken place, and therefore provide a more robust and objective measure of practitioner prescribing patterns as influenced by all factors which affect MCCL treatment uptake. The results can also be considered reasonably reflective of the status of myopia management in general in Ireland, as myopia control spectacle lenses such as the DIMS lens[13] were not commercially available for most of the time course analysed, and pharmaceutical treatments such as low-dose atropine[15] are still not available to optometrists in Europe. The 33 practices included in this dataset were spread across the Republic of Ireland and represent approximately 10% of optometry practices currently active in Ireland. The data collected from these practices are part of an ongoing ocular epidemiology study and were not collected specifically to monitor uptake of MCCLs. The large numbers of patients from both urban and rural environments and lack of bias are significant strengths of this study.

Key study limitations should also be acknowledged. The sampling of practices included in the study was opportunistic. Although there is good regional representation from all across the Republic of Ireland, the large dataset cannot be considered nationally representative. Additionally, only independent practices participated in the data extraction. Differences have been reported in the outcome of the sight testing process between independent and multiple chain practices,[33] and also in relation to the chair time afforded to the eye examination for young children.[34] It is unclear, therefore, how the inclusion of data from multiples might have influenced the outcomes reported herein. The study was also retrospective, and therefore limited in terms of scope to explain fully some of the key findings reported. It is also unknown whether refractive error in this study was measured under cycloplegic conditions which may introduce some uncertainty over lower levels of myopic progression due to the potential for overcorrection[35]; however, this should have minimal effect on practitioner and parental decision to commence myopia control. The results are specific to Ireland and not directly extrapolatable to other countries. Optometrists in Ireland are highly trained, however, with very few countries having a higher scope of practice. The trends observed herein are also in line with those observed in survey data, which suggests that our findings may have broader relevance.

Clinician engagement in myopia management has increased steadily in Ireland since the formal introduction of MCCLs, but more than two-thirds of practices included are yet to offer this form of myopia management. There has been a marked shift away from off-label multifocal options to contact lenses market-authorised specifically for myopia management. The proportion of children with progressive myopia that has been prescribed MCCLs has also increased, but the majority of children are still optically managed for vision correction only. The very recent introduction of myopia control spectacle lenses and the continued expansion of the range and type of treatments available to practitioners may help address the deficiencies highlighted in this study, and reduce an apparent over-reliance on a single treatment modality. Irrespective of the reasons for low uptake to date, there is a clear need for targeted engagement of practitioners and parents to enhance the penetration and uptake of myopia management interventions.

AUTHOR CONTRIBUTIONS

Michael Moore: Conceptualization (lead); data curation (lead); formal analysis (lead); investigation (lead); methodology (lead); visualization (lead); writing – original draft (lead). **Daniel Ian Flitcroft:** Formal analysis (supporting); methodology (supporting); validation (equal); visualization (supporting); writing – review and editing (supporting). **James Loughman:** Formal analysis (supporting); investigation (supporting); methodology (supporting); project administration (lead); validation (equal); visualization (supporting); writing – review and editing (lead).

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None.

CONFLICT OF INTEREST

MM has a consultancy relationship with Alcon Eye Care. DIF has received research grant funding support from Health Research Board (Ireland), Vyluma, Dopavision, Ocumension and CooperVision; has consultancy or other relationships with Dopavision, Essilor, Johnson & Johnson, Thea Pharmaceuticals and Vivior; has received equipment on loan from Topcon, Ocumension and CooperVision; has two patents pending (one in myopia management data analytics and one in biomonitoring for low-dose atropine treatment in myopia) and is Founding Director of Ocumetra, all in the field of myopia management. JL has received research grant funding support from Health Research Board (Ireland), Vyluma,

Dopavision, Ocumension and CooperVision; has consultancy relationships with Dopavision and Ebiga Vision; is clinical research director with Ocuco; has received honoraria from Thea Pharmaceuticals and Ocuco for lectures; has received equipment on loan from Topcon, Ocumension and CooperVision; has two patents pending (one in myopia management data analytics and one in biomonitoring for low-dose atropine treatment in myopia) and is Founding Director of Ocumetra, all in the field of myopia management.

DATA AVAILABILITY STATEMENT

The data from this study are available on request. These data contain potentially identifying and sensitive patient data such as date of birth, date of examination and county of residence. The TU Dublin Research and Ethics Committee has placed restrictions on disseminating these data. Data access requests can be sent to researchethics@tudublin.ie quoting ethics approval REC-18-124.

PATIENT CONSENT

Patient-level consent was not required due to the nature of data anonymisation.

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