Technoleg Iechyd Cymru
Health Technology Wales

# Topic Exploration Report

Topic explorations are designed to provide a high-level briefing on new topics submitted for consideration by Health Technology Wales. The main objectives of this report are to:

- Determine the quantity of evidence available for a technology of interest.
- Identify any gaps in the evidence.
- Inform decisions on topics that warrant fuller assessment by Health Technology Wales (HTW).

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| **Topic exploration report number:** | TER367 |
| **Topic:** | Control contact lenses and spectacles for the treatment of myopia in children |
| **Summary of findings:** | Myopia (short sightedness) is a common visual condition that usually develops in childhood and causes blurred distance vision. Myopia controls are interventions to slow the progression of myopia and can include specialised contact lenses and spectacles.<br><br>Health Technology Wales researchers searched for evidence on myopia control contact and spectacle lenses for children and identified a range of primary and secondary evidence. The evidence from five systematic reviews suggests that bifocal and multifocal spectacles and contact lenses may slow the progression of myopia in children.<br><br>Myopia control contact lenses and spectacles are only available privately in Wales currently and it is unclear how widespread their use is. Other interventions that can be used to slow myopia progression in children are also available and there is uncertainty as to the most effective methods to use and standard care in Wales. Increasing prevalence of myopia may be an economic concern, however economic evidence for UK costs were lacking. |

## Introduction and aims

Myopia (short sightedness) is a common visual condition that causes the person to see objects in the distance as blurred. The condition tends to develop in childhood, particularly after the age of six with the primary symptom being blurred distance vision. The condition is progressive and people with myopia are at increased risk of conditions that can threaten their sight including retinal detachment, glaucoma, and cataract.

Myopia controls are interventions to slow the progression of myopia. Various interventions have been investigated including orthokeratology, myopia control contact lenses, myopia control spectacles lenses, pharmacological interventions, and environmental interventions.

Standard care for the treatment of myopia is prescription single or mono vision spectacles or contact lenses. The topic proposer has reported that myopia control is only administered in the form of specialised spectacles or contact lenses in some private practices in Wales and in the UK. There are different types of myopia control contact lenses and spectacles that can contain more than one 'power zone', these are referred to in the literature as bifocal, multifocal, or progressive addition lenses.

Health Technology Wales researchers searched for evidence on myopia control contact and spectacle lenses for children.

## Evidence overview

This section summarises sources deemed to be most relevant; other sources of evidence identified are listed in the Brief Literature Search Results section for completeness.

We identified a range of primary and secondary evidence. We have summarised data from five systematic reviews, including one reporting on costs of myopia interventions.

Systematic Reviews

We identified a recent systematic review that evaluated the efficacy and safety of various soft contact lenses with different add power compared with controls (Yu et al. 2022). The review included seven randomised controlled trials involving a total of 805 children (aged 6-18 years). The interventions were soft contact lenses in a multifocal design with specific add powers and the controls were monovision soft contact lenses or glasses. The authors reported on the following outcomes: myopic progression, axial length, adverse effects, and dropout rates at one and two years follow up. Yu et al. (2022) found at 1-year, the weighted MD in myopia progression between intervention and control groups was -0.22 (95% CI: -0.56 to 0.12) for low add power contact lenses, 0.09 (95% CI: 0–0.19) for medium add power, and 0.2 (95% CI: 0.13, 0.27) for high add power contact lenses. At 2-years, the weighted MD for medium add power was 0.12 (95% CI: -0.03 to 0.27), and for high add power was 0.25 (95% CI: 0.14–0.35). No differences were detected for adverse effects (p = 0.2) and acceptability (p = 0.74) between different added powers. The authors concluded that high add power soft multifocal contact lenses are the most effective at controlling myopia progression.

Another systematic review conducted by Varnas et al. (2021) used a Bayesian meta-analysis to investigate the efficacy of specific interventions to slow down the progression of myopia in children. Multifocal spectacles and contact lenses were the interventions used in most of the RCTs. The

authors performed a meta-analysis that considered 10 RCTs involving a total of 1662 children using progressive addition spectacles. They also performed a separate meta-analysis with nine RCTs involving a total of 982 children using soft multifocal contact lenses. The highest efficacy in slowing progression was achieved after 1-year follow-up with the mean 28% reduction in progression and the 95% credibility interval between 21% and 35%. The 95% credibility interval for the mean efficacy of soft multifocal contact lenses at 1-year follow up was 21% to 37%. Varnas et al. (2021) concluded that both multifocal spectacle and contact lenses moderately slow down progression of myopia, relative to single-vision spectacle lenses in the first 12 months after intervention. The relative efficacy of progressive addition spectacles weakened after the first 12 months.

We also identified a Cochrane review that aimed to assess the effect of different interventions on slowing myopia progression in children. Walline et al. (2020) reported on spectacles, contact lenses and pharmaceutical agents as the interventions. The review is set to be superseded by a Cochrane living systematic review and network meta-analysis on interventions for myopia control in children, however only the protocol was available for this at the time of our report (Lawrenson et al. 2021). The original report included 41 RCTs with a total of 6772 participants, with most studies being conducted in Asia or the US. The authors separated the different interventions and reported that multifocal lenses (bifocal spectacles or progressive addition lenses) yielded a small effect in slowing myopia progression; children wearing multifocal lenses progressed on average 0.14 (95% CI 0.08 to 0.21, n = 1463) less than children wearing single vision lenses. Walline et al. (2020) reported that there may be little or no difference between vision of children wearing bifocal soft contact lenses and children wearing single vision contact lenses MD 0.20 (95% CI -0.06 to 0.47, n = 300). The authors concluded that multifocal lenses, either spectacles or contact lenses, may confer a small benefit.

We identified a systematic review and meta-analysis that aimed to evaluate the effect of soft contact lenses with concentric ring bifocal and peripheral add multifocal designs on slowing myopia progression in children. The authors included five RCTs and three cohort studies with a total of 587 children. Li et al. (2017) reported that compared with the control group, concentric ring bifocal soft contact lenses showed less myopia progression with a weighted mean difference of 0.31 (95% CI, 0.05-0.57, p = 0.02) and less axial elongation with a WMD of -0.12 mm (95% CI, -0.18 to -0.07 mm, p < 0.0001) at 12 months. Relative to the control group, peripheral add multifocal soft contact lenses showed less myopia progression with a WMD of 0.22 (95% CI 0.14- 0.31, p < 0.0001) and less axial elongation of -0.10 mm (95% CI -0.13-0.07 mm, p < 0.0001) at 12 months, respectively. The soft contact lenses with concentric ring bifocal and peripheral add multifocal designs produced additional myopia control rates of 30-38% for slowing myopia progression and 31-51% for lessening axial elongation within 24 months. The authors concluded that both contact lenses are clinically effective for controlling myopia progression.

## Areas of uncertainty

Myopia controls are only available privately in Wales at the moment, in the form of spectacles and contact lenses. There are a number of interventions that can be used to slow myopia progression in children, and the topic proposer has stated there is uncertainty as to the most effective methods of

myopia controls. Increasing prevalence of myopia may be an economic concern, however economic evidence for UK costs were lacking.

## Literature search results

### Health technology assessments and guidance

No evidence found.

### Evidence reviews and economic evaluations


Lawrenson JG, Dhakal R, Verkicharla PK, et al. (2021). Interventions for myopia control in children: a living systematic review and network meta-analysis. Cochrane Database of Systematic Reviews. (4). doi: 10.1002/14651858.CD014758

Li S-M, Kang M-T, Wu S-S, et al. (2017). Studies using concentric ring bifocal and peripheral add multifocal contact lenses to slow myopia progression in school-aged children: a meta-analysis. Ophthalmic and Physiological Optics. 37(1): 51-9. doi: https://doi.org/10.1111/opo.12332

Varnas S, Gu X, Metcalfe A. (2021). Bayesian meta-analysis of myopia control with multifocal lenses. J. Clin. Med. 10(4): 1-22. doi: 10.3390/jcm10040730

Walline JJ, Lindsley KB, Vedula SS, et al. (2020). Interventions to slow progression of myopia in children. Cochrane Database of Systematic Reviews. (1). doi: 10.1002/14651858.CD004916.pub4

Yu Z, Zhong A, Zhao X, et al. (2022). Efficacy and Safety of Different Add Power Soft Contact Lenses on Myopia Progression in Children: A Systematic Review and Meta-Analysis. Ophthalmic Research. doi: 10.1159/000523675


### Individual studies


Jakobsen TM, Møller F. (2022). Control of myopia using orthokeratology lenses in Scandinavian children aged 6 to 12 years. Eighteen-month data from the Danish Randomized Study: Clinical study Of Near-sightedness; TReatment with Orthokeratology Lenses (CONTROL study). Acta Ophthalmologica. 100(2): 175-82. doi: 10.1111/aos.14911

Cheng X, Brennan NA, Toubouti Y, et al. (2020). Safety of soft contact lenses in children: retrospective review of six randomized controlled trials of myopia control. Acta Ophthalmologica. 98(3): e346-e51. doi: https://doi.org/10.1111/aos.14283

Sankaridurg P, Bakaraju RC, Naduvilath T, et al. (2019). Myopia control with novel central and peripheral plus contact lenses and extended depth of focus contact lenses: 2 year results from a randomised clinical trial. Ophthalmic & physiological optics : the journal of the British College of Ophthalmic Opticians (Optometrists). 39(4): 294-307. doi: 10.1111/opo.12621

Chamberlain P, Peixoto-de-Matos SC, Logan NS, et al. (2019). A 3-year Randomized Clinical Trial of MiSight Lenses for Myopia Control. Optometry and vision science : official publication of the American Academy of Optometry. 96(8): 556-67. doi: 10.1097/OPX.0000000000001410

Kanda H, Oshika T, Hiraoka T, et al. (2018). Effect of spectacle lenses designed to reduce relative peripheral hyperopia on myopia progression in Japanese children: a 2-year multicenter randomized controlled trial. Japanese journal of ophthalmology. 62(5): 537-43. doi: 10.1007/s10384-018-0616-3

Walline JJ, Gaume Giannoni A, Sinnott LT, et al. (2017). A Randomized Trial of Soft Multifocal Contact Lenses for Myopia Control: Baseline Data and Methods. Optometry and vision science : official

publication of the American Academy of Optometry. 94(9): 856-66. doi: 10.1097/OPX.0000000000001106

Aller TA, Liu M, Wildsoet CF. (2016). Myopia Control with Bifocal Contact Lenses: A Randomized Clinical Trial. Optometry and vision science : official publication of the American Academy of Optometry. 93(4): 344-52. doi: 10.1097/OPX.0000000000000808

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| **Date of search:** | June 2022 |
| **Concepts used:** | Myopia, contact lenses and spectacles, myopia interventions, myopia controls |