THE AUSTRALIA AND NEW ZEALAND CHILD MYOPIA REPORT

A FOCUS ON FUTURE MANAGEMENT

Contents

Foreword

The Australia and New Zealand Child Myopia Report – A Focus on Future Management is a timely collation of information about this emerging global public health crisis. It draws much-needed attention to the growing prevalence and issues associated with child myopia globally, with a spotlight on Australia and New Zealand.

Child myopia is truly a global issue. For too long we have viewed myopia as only being a significant problem in east Asian populations. However, this report highlights the fact that child myopia rates are increasing globally, and nothing short of a global, coordinated approach to addressing child myopia and its associated long-term effects will change this trajectory.

I applaud the initiative of the Australia and New Zealand Child Myopia Working Group. Highlighting the rise of child myopia is an important step in reducing its prevalence and impact, as is recognising the need for a new recommended standard of care. I wish the Working Group every success in establishing a new recommended standard of care and sincerely hope that this foresight will be mirrored in other regions.

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Note: Geographic and racial references used in this report reflect those used in the research studies referenced.

Background

The Australia and New Zealand Child Myopia Report – A Focus on Future Management brings together pertinent, evidence-based data around child myopia in Australia, New Zealand and the world. By highlighting the increasing prevalence and lifelong impact of child myopia, the aim of this report is to draw focus to the need for a united, global commitment to raising awareness about child myopia and its management, thereby reducing the growing prevalence of high myopia (a condition in which the spherical equivalent objective refractive error is at least -5.00D in either eye)[1] and its comorbidities.

What is myopia?

Myopia, also known as short-sightedness or near-sightedness, is a common condition that causes blurred distance vision. For the purpose of this report, child myopia refers to myopia in children up to the age of 17 years, unless otherwise specified.

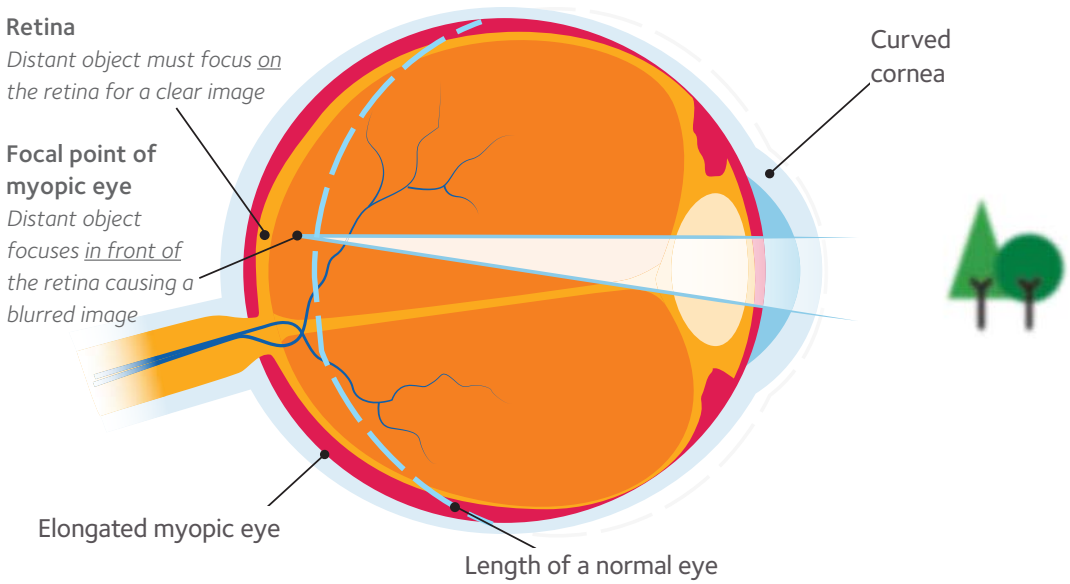
Myopia is a condition in which light is focused in front of the retina, resulting in blurred vision. Short-sighted people can often see reasonably clearly at short distances, but will not be able to see distant objects clearly.[2]

The myopic eye

Blurred vision due to myopia is the result of light rays focusing at a point in front of the retina, instead of directly on its surface. This is caused by one or both of the following factors:[3]

1 The eyeball being too long

2 The cornea being too curved for the length of the eyeball



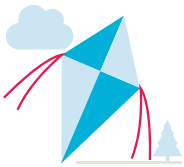
There are two main risk factors for a child developing myopia: lifestyle and family history.

Lifestyle: modern lifestyles may influence the development of myopia. These include:

- Low levels of outdoor activity[4] and associated factors including:
- Low levels of light exposure[5]
- Prolonged near tasks[6] such as reading and gaming on portable devices.

Family history: the likelihood of developing myopia, particularly high myopia, increases when one or both parents are myopic.[7] However, the exact link between a family history of myopia and the development of childhood myopia remains uncertain.[8]

Lifestyle: Modern lifestyles may influence the development of myopia.



Low levels of outdoor activity.

Low levels of light exposure.

Performing prolonged near tasks, such as reading and gaming on portable devices.

Evidence is mounting that myopia is growing around the world.[9] Alarmingly, if current prevalence rates don't change, it is estimated that by 2020, 2.56 billion people will be affected.[10] By 2050, it is estimated that more than 50% of the world's population will have myopia and 10% will have high myopia.[11] That is an increase from 2010, when 27% of the world's population were estimated to have myopia, and 2.8% had high myopia.[12]

This is of significant concern given that high myopia is also associated with comorbidities including retinal detachment, glaucoma, cataracts and myopic macular degeneration. The risk of developing any of these conditions increases along with any increase in myopia.[13]

Child myopia: An emerging public health issue

The predicted increase in the number of people with vision loss by 2050 means that myopia is set to become a leading cause of permanent blindness worldwide.[14]

It has been established that treating myopia in its early stages can slow its progression, reducing the potential risk of developing high myopia and its associated conditions later in life.[15] This not only involves correcting the blurred distance vision associated with myopia but also employing treatments and strategies proven to reduce the amount of eyeball growth.

Child myopia: An emerging public health issue

One reason for the increase in prevalence of high myopia is that the onset of myopia is occurring earlier in life. In 1983, the typical onset of myopia was at around 11 years of age. However, in 2000, the average onset of myopia was just 8 years of age.[16]

While the lifestyle and family history factors mentioned previously play a role in the development and progression of myopia, understanding of exactly how and why remains limited.

Myopia is perhaps most commonly associated with people of east Asian ethnicity. While it is already highly prevalent in this part of the world, evidence indicates that myopia is on the rise globally.

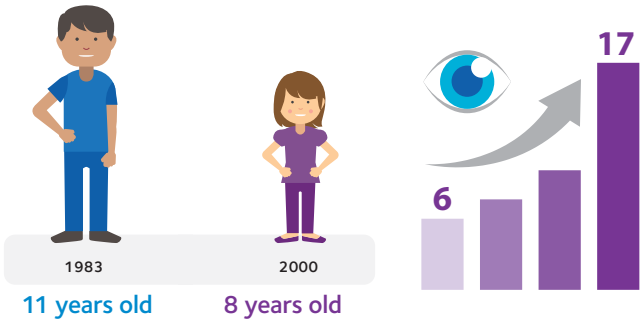
It is not only eyesight that suffers. It is important to remember that the impact of myopia is very personal and can potentially affect an individual's quality of life. Higher degrees of myopia can not only be visually disabling, but also have financial, social and personal consequences.[17]

Unless a global approach is undertaken at once to raising the awareness of child myopia and its consequences, this emerging epidemic will only continue to develop. Therefore every possible action should be taken, as early as possible, to slow myopia progression.

Why does myopia occur?

Myopia is progressive. It will begin as mild but may progress in severity to moderate or high myopia. The earlier myopia starts, the greater chance a child has of developing high myopia.

The majority of myopia progression typically occurs between the ages of 6-17 as this is a key growth time for children, and their eyes.



Time for a united global industry approach

Eye care professionals worldwide must not only address the immediate vision issues associated with child myopia, but also work diligently to slow its progression, with the aim of minimising the number of people who become highly myopic.

It is the profession's responsibility to ensure each and every young patient receives the best possible chance to manage the progression of their myopia, minimising the serious long-term ocular health effects, as well as broader social impacts. Only then will patients be offered the best standard of care.

This is why CooperVision Australia and New Zealand has taken the initiative to convene an industry-based Child Myopia Working Group. The Working Group, made up of leading optometrists and ophthalmologists from both Australia and New Zealand, is underpinned by the belief that global collaborative action is needed to increase worldwide acceptance of the importance of child myopia management. It aims to define, create and deliver a new recommended standard of care for child myopia. This then has the potential to create an effective 'blueprint' for other countries to collaborate and drive a real treatment transformation.

Child myopia: A global issue

The prevalence of myopia around the world is staggering and poses a serious public health risk in many countries. The most common cause of correctable vision impairment in the developed world, myopia is also a leading cause of preventable blindness in developing countries.[18]

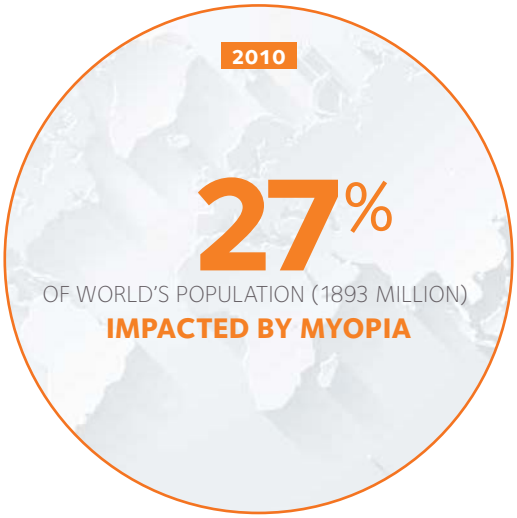
Child myopia: A global issue

In 2010, myopia was estimated to impact 27% (1893 million) of the world's population. High myopia was estimated to impact 2.8% (170 million) of the world's population.[19]

Myopia primarily impacts people of east Asian ethnicity, with research showing that the prevalence of myopia in that region is staggering. In east Asia, which includes China, Japan, South Korea and Singapore, around 50% of the population is estimated to be myopic.[20] By 2025, it is expected that Asia will still dominate in terms of myopia prevalence among those aged 19 and under. Interestingly, by 2025, marginal increases are predicted in Africa, resulting from a rapid expansion of this age group.[21]

It is thought that 80 to 90% of school-leavers in east Asia are affected by myopia. Disturbingly, it is estimated that 20% of secondary school children in east Asia are highly myopic, placing them at risk of the comorbidities associated with high myopia.[22]

However, it appears that there are definite ethnic and geographical differences in terms of prevalence. For example, more than 90% of east Asians aged 18 years and living in Singapore are thought to be myopic, while slightly less – 72% of east Asians aged 18 years and living in China had myopia.[23]



In south Asia (which includes Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan and, more recently, Afghanistan), the prevalence of myopia is significantly lower, yet there are also differences between people living in south Asia compared to migrant south Asian populations. For example, myopia rates for Indians living in Singapore are more aligned with rates for the Singaporean Chinese population than for Indians living in India. Similarly, south Asian children residing in Australia and England are approximately five times more likely to be myopic than their counterparts living in Nepal or India. At age 15, around 40% of migrant south Asians develop myopia, compared to 9% of indigenous south Asians.[24]

Child myopia: A global issue

An American study also highlighted differences in myopia prevalence among pre-school children aged between 6 and 72 months from different ethnic backgrounds. Myopia was present in 1.2% of non-Hispanic whites, 3.7% of Hispanics, 3.98% of Asians and 6.6% of African Americans.[25]

In white European populations, the prevalence of child myopia is comparatively low, with approximately 3 to 5% of 10 year olds having myopia, and up to 20% of those aged 12-13 years.[26] However, with myopia rates predicted to grow globally, these rates are also expected to rise in coming decades.

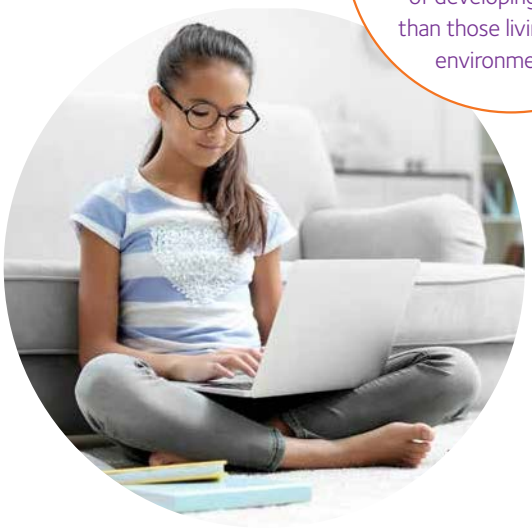
There are other factors that, combined with location, appear to impact myopia levels around the globe. Gender is one factor that could play a role. Research indicates that among east Asian and white populations, gender differences in myopia prevalence start to emerge at around the age of 9 years. At this age, girls emerge as having a higher prevalence than boys. By the age of 18 years, white females are around twice as likely to be myopic as males, with similar results for east Asians.[27]

Another factor that is emerging as influential in the development of myopia is whether the individual resides in an urban or rural environment.

It is estimated that children living in predominantly urban environments have 2.6 times greater chance of developing myopia than those living in rural environments.[28]

In fact, for all ethnic groups (except whites), living in an urban environment is linked with an increased risk of myopia. This is particularly the case for blacks living in Africa, south Asians and south-east Asians.[29]

It is estimated that children living in predominantly urban environments have 2.6 times greater chance of developing myopia than those living in rural environments.[28]



Regions that have undergone rapid economic transition, south and east Asia for example, have also experienced a rapid rise in rates of myopia.[30]

The global 'myopia epidemic' is perhaps most severe in terms of child myopia. Increasing levels of child myopia globally mean there is also high prevalence of high myopia in young people. The serious effects of these alarming trends, including a rise in the numerous conditions associated with high myopia, will become increasingly evident over the following decades. In fact, it is predicted that, by 2050, visual impairment that is associated with myopic macular degeneration will increase eightfold, compared to figures from the year 2000.[31]

Child myopia in Australia and New Zealand

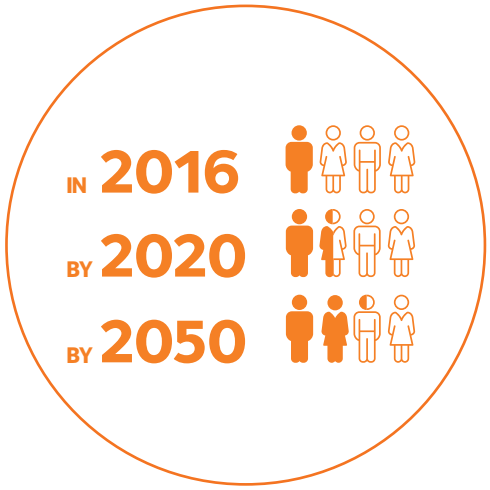
Whilst east Asia has long been seen as the worst-affected region, even countries like Australia and New Zealand, previously considered lower-risk, now face their own significant rises in myopia prevalence. By 2050, it is predicted that more than half of Australians will be myopic.[32] It is perhaps not surprising therefore that Australian studies mirror the rise in myopia incidence that is being seen around the globe.

Child myopia in Australia

There is limited information about the prevalence of myopia in Australia and New Zealand, particularly child myopia. For example, Australian child myopia studies to date have been focused on New South Wales, and not incorporated statistics relating to any other States.

According to the Australian Bureau of Statistics (ABS), approximately 1 in 4 Australians are short-sighted.[33] By 2020, 36% of Australians are predicted to be myopic and by 2050, that number is set to increase to 55%.[34]

Australians who are short-sighted



In terms of younger Australians, myopia was the second most commonly reported long-term condition (20%), preceded only by allergic rhinitis (hay fever) at 24%.[35]

To gain insight into consumer perception of child myopia in Australia, CooperVision Australia and New Zealand recently conducted a survey of more than 1,000 Australian parents with children at home and aged under 18 years. While the results are concerning they are, perhaps, not surprising. The survey found that:[36]

- 65% of Australian parents of children aged 17 years and under do not know that myopia refers to short-sightedness
- 76% of parents of children under 12 years believe being prescribed glasses is the best course of action if a primary school age child is diagnosed with myopia

In terms of younger Australians, myopia was the second most commonly reported long-term condition (20%), preceded only by allergic rhinitis (hay fever) at 24%.[35]

Child myopia in Australia and New Zealand

Child myopia in Australia

- It seems very little is known about lifestyle impacts on myopia. Almost half (49%) of Australian parents of children aged 17 years and under admit they do not know what causes myopia
- 73% of parents do not know that genetics might play a role, and 91% are not aware of the role that excessive screen time – TV, computers, mobile devices etc – can play

Among Australian parents of children aged 17 years and under:

49% DO NOT KNOW WHAT CAUSES MYOPIA

73% DO NOT KNOW THAT GENETICS MIGHT PLAY A ROLE

91% ARE NOT AWARE OF THE ROLE EXCESSIVE SCREEN TIME CAN PLAY

Source: CooperVision Australia and New Zealand: Child myopia in Australia - consumer perceptions survey. Conducted by YouGovGalaxy August/September 2018

- Only 12% of parents with children aged 17 and under recognise the health risk that their children might develop later in life from child myopia, understanding that child myopia can lead to a higher risk of eye health issues.

Considering that myopia is the second most commonly reported long-term health condition in young Australians, it is troubling that the CooperVision Australia and New Zealand survey found that 31% of Australian children aged 17 years and under have never been to an optometrist to have an eye test.

Various studies based in Sydney have, over time, shown a steady increase in child myopia prevalence. The Sydney Myopia Study, published in 2005, found that 31% of children aged 17 years were myopic.[37] This was double that reported by The Blue Mountains Eye Study around a decade prior.[38]

In 2012, The Sydney Adolescent Vascular Eye Study revealed the annual incidence of myopia in 12 year olds was 2.2%, while 17 year olds had an annual incidence rate of 4.1%. The annual incidence rates of myopia in children of east Asian ethnicity were significantly higher than their European Caucasian peers. 6.9% of 12 year olds and 7.3% of 17 year olds of east Asian ethnicity were diagnosed with myopia annually, while only 1.3% of 12 year old and 2.9% of 17 year old European Caucasian children were diagnosed.[39]

Interestingly, rates of myopia progression were similar for children of east Asian and European Caucasian ethnicity living in Australia. These rates were also lower than those reported in children of east Asian ethnicity who live in east Asia. Again, this could suggest that environmental conditions can have an impact on the likelihood that an individual will develop myopia and on how the condition progresses.[40]

Myopia in New Zealand

Information relating to the incidence of myopia, particularly child myopia in New Zealand is minimal.

What we do know about myopia in New Zealand is based on an online survey of 109 New Zealand optometry students. The survey looked at the country and duration of early education, ethnicity and levels of myopia.[41]

In terms of ethnicity, 64.3% of Europeans reported having myopia, compared to 71.1% of Asians and 80% of 'other ethnicities'.[42]

Of those of east Asian ethnicity who spent their early education in New Zealand, 88.9% reported having myopia. This was only slightly higher than the 83.3% of respondents of east Asian ethnicity who spent their early education in east Asian countries.[43]

CooperVision Australia and New Zealand recently conducted a survey of 500 New Zealand parents with children at home and aged under 18 years. Again, the results were concerning. The survey found that:[44]

- 69% of New Zealand parents of children aged 17 years and under do not know that myopia refers to short-sightedness
- 77% of parents of children under 12 years believe being prescribed glasses is the best course of action if a primary school age child is diagnosed with myopia
- Again, little is known about the lifestyle impacts on myopia. 46% of New Zealand parents of children aged 17 years and under admit they do not know what causes myopia
- 70% of parents do not know that genetics might play a role, and 93% are not aware of the role that excessive screen time – TV, computers, mobile devices etc – can play

Among New Zealand parents of children aged 17 years and under:

46% DO NOT KNOW WHAT CAUSES MYOPIA

70% DO NOT KNOW THAT GENETICS MIGHT PLAY A ROLE

93% ARE NOT AWARE OF THE ROLE EXCESSIVE SCREEN TIME CAN PLAY

Source: CooperVision Australia and New Zealand: Child myopia in Australia - consumer perceptions survey. Conducted by YouGovGalaxy August/September 2018

- Only 12% of New Zealand parents with children aged 17 and under recognise the health risk that their children might develop later in life from child myopia, understanding that child myopia can lead to a higher risk of eye health issues
- 28% of New Zealand children aged 17 years and under have never been to an optometrist to have an eye test.

Access to detailed, long-term data relating to myopia and, child myopia in particular, in Australia and New Zealand is urgently needed.

It will not only provide a deeper understanding of behaviours, lifestyle factors and other trends that contribute to the development and progression of myopia, it will also act as a benchmark against which incidence, treatment and risk factors can be measured in the future.

Summary

With the prevalence of myopia and high myopia increasing significantly around the world, health organisations globally are now faced with an issue requiring urgent attention.

In the last two generations, the average age of myopia onset has dropped, from 11 years of age in 1983 to 8 years in 2000.[45] This is a significant contributing factor to the increased prevalence of high myopia and, as we look to the future, rates of myopia and high myopia are only set to continue their rapid rise.

Considering that 50% of the world's population are predicted to be myopic by the year 2050, and 10% are predicted as having high myopia, the potential for future vision loss is shocking.

Projections indicate that between 2000 and 2050, vision loss resulting from high myopia will increase seven-fold, making myopia the leading cause of permanent blindness worldwide.[46]

While myopia is far more common among people of east Asian ethnicity, the rest of the world cannot be complacent. Despite increasing availability of proven options for long-term treatment of myopia, evidence suggests that the prevalence of myopia is rising globally.

Myopia statistics for Australia and New Zealand are lacking, but we can be certain that neither are immune to these disturbing global trends. According to the Australian Bureau of Statistics, 1 in 4 Australians are currently short-sighted.[47] It is predicted that by 2020, 36% of Australians will be myopic. By 2050, this figure will have increased to 55%.[48]

Projections indicate that between 2000 and 2050, vision loss resulting from high myopia will increase seven-fold, making myopia the leading cause of permanent blindness worldwide.[46]

20% of young Australians are myopic, making it the second most commonly reported long-term condition in young people, preceded only by allergic rhinitis (hay fever) at 24%.[49]

Increasingly, eye care practitioners around the world are going to be faced with more young myopic patients. It is the profession's responsibility to ensure each and every young patient receives the best possible chance to manage the progression of their myopia, minimising the serious long-term health effects, as well as broader social and economic impacts.

A new recommended standard of care for child myopia

In developing a recommended standard of care for child myopia in Australia and New Zealand, the Australia and New Zealand Child Myopia Working Group aims to enable eye care practitioners to not only address the immediate sight issues related to myopia, but to also manage the progression of the condition from an early age, reducing the risk of high myopia later in life.

There are a number of recognised treatment options with more being developed. All of these are available to Optometry and are already in regular use. However, many practitioners have still to establish myopia management within their practices.

As attention increasingly focuses on child myopia, practitioners will have unprecedented opportunities for conversations with parents relating to child myopia. Starting a conversation is a positive first step.

It is clear that a global, collaborative approach is needed to increase worldwide acceptance of the importance of myopia control in children. It is the profession's responsibility to do all we can to rein in increasing rates of child myopia and, in doing so, help to reduce the long-term health effects and social impact of vision impairment and loss.

The profession of Optometry, as a primary eye care provider, is best placed to mitigate this growing threat to ocular health and drive fundamental change to create and deliver a recommended standard of care for myopia in children to avert a public health crisis in the years ahead.

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The development of this report, and the establishment of the Australia and New Zealand Child Myopia Working Group has been enabled by CooperVision Australia and New Zealand.

For further information about child myopia visit www.childmyopia.com