

A GP's guide to the impact of digital screens on young eyes

How much is too much for children's vision, and how can you help parents set limits?

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2 Comments

Without doubt, more of us are spending longer on screens in our increasingly digital world. GPs are likely to encounter parents asking about the effects on their children's visual and brain development.



‘Screen time’ includes any time looking at a screen, including television, computers, smartphones, tablets and video consoles.

As ophthalmologists, we are seeing an increase in device-related dry eye, and a new syndrome called ‘digital eye strain’, which tends to predominantly affect adults.

In children and adolescents, there is an increase in myopia, or short sightedness, directly related to increased hours performing near tasks.



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Along with the effect of digital media devices on eye health and visual development, there have also been recent recommendations based on the impact on brain development from the American Academy of Pediatrics.¹

This builds on recommendations from both Australia's Department of Health and the Children's Hospital Networks, as well as the WHO.^{2,3}

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Defining limits

The American Association of Pediatric Ophthalmologists and Strabismus, and the American Academy of Pediatrics, jointly recommend limitations on screen time for children: up to one hour for children aged 2-5 years, and up to two hours a day for older children.^{1,4}

The American Academy of Pediatrics along with the Digital Screen Media and Cognitive Development Working Group recommend no screen time for children under the age of two years.^{1,5}

Video-chatting with parental support is an exception to this.

However, despite these recommendations, there is in fact no published scientific evidence showing that video screens or phone screens cause long-lasting damage to the visual system.

That said, there are many practical reasons why children should have screen time limited. These include:

- Risk of digital eye strain.
- Risk of progression of myopia.
- Less active outdoor lifestyles, leading to obesity and decreased opportunities for vitamin D production.
- Sleep disturbance, with blue light emission from screens disrupting normal circadian rhythms.
- Neck/spine discomfort from long periods looking down at a screen.
- Decreased opportunities for developing language and social skills.
- The impact of challenging content, for example inappropriate content for age, negative behaviours and violence.

- Safety issues with content and interactions with unknown people.

There are also some positives from moderate and appropriate screen time, as outlined by the recommendations from the Sydney Children's Hospital.²

These include chatting online via apps like Skype and Face-time, which allow face-to-face communication with remote friends and family.

The skills and special interests of older children can also be further developed through online activity, with connection to global online communities.

Screen time increases digital media literacy, and for unwell children, there are opportunities for distraction and connection with other patients and support groups.



GPs can help parents to develop a media plan to tackle the problem of too much screen time.

What is digital eye strain?

Digital eye strain, also known as ‘computer vision syndrome’, is a symptom or combination of symptoms rather than a disease process.⁶

Symptoms fall into two main categories: those linked to binocular or accommodative vision stress, and external symptoms linked to dry eye.

The latter relates mainly to decreased blink-rates and incomplete blinking.

These symptoms result from prolonged periods of near work.

In children and young adults, increased near work can result in progression of existing short-sightedness or myopia.

Treatments for digital eye strain are targeted at improving ergonomics of the working environment — in particular, reducing glare, correcting any refractive error with glasses or vision correction surgery, and taking frequent breaks from looking at a screen.

A good idea for taking breaks is the 20-20-20 rule: every 20 minutes, look at something at 20 feet away (6m) for 20 seconds.

As blink rate reduces significantly with screen use, more frequent blinking is also encouraged.

In addition, first-line treatments for dry eye include the use of artificial tear drops (preservative-free formulations are preferred), improving the lipid layer of the tear film (hot compress and massage targeting meibomian glands, and omega-3 and flaxseed oil supplements), and humidification of the environment.

There is currently no clear evidence for the effectiveness of blue-blocking lenses (glasses or contact lenses) in treating digital eye strain.⁷

In fact, we receive significant exposure to blue-light from sunlight.

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What can GPs do?

Referral to an ophthalmologist for any concerns regarding vision is crucial for young children.

Otherwise, doctors can recommend to parents resources to create a customised, healthy media plan for their children based on age, rather than a one-size-fits-all approach.

This conversation should be proactive and start early, in order to raise awareness and facilitate good habits.

There are many useful tools available, including the American Academy of Pediatrics Media Plan (see Resources at the end of this page), which allows for screen time to be planned and tailored for individual children.

At minimum, media plans should include the following three ideas: creating screen-free zones; ensuring the quality of media consumed; and encouraging good sleep hygiene and exercise.

Screen-free zones

In general, the guidelines set by parents should include screen-free zones in the household, such as bedrooms and dining table.

Devices should be recharged overnight outside a child's bedroom for various reasons. These include limiting incoming messages and calls interfering with a child's sleep, helping to avoid the temptation to use or check devices when children should be sleeping, and minimising the light emitted from devices charging, which can affect sleep quality.

Screen-free dining protects family time and social gatherings around mealtimes, which has benefits for children engaging in face-to-face communication and social development.

In addition, distractions from screens can lead to unconscious food consumption, resulting in eating long after children are full.

A word on myopia

Myopia is the most common eye disorder in the world. In some Asian countries, such as Singapore, up to 90% of young adults are affected.⁸

The prevalence among pre-teens in Australia is around 12%.⁸ Near work has been found to be associated with prevalence of myopia in Australian, Singaporean and American children.⁹ Genetic factors have the strongest influence when parents have moderate to high myopia, defined as refractive error greater than -5.0.⁹

Myopia is not a condition that children grow out of. At best it remains stable. It is uncommon in very young children, but importantly, it should be treated with spectacles during the critical period of neuroplasticity in visual development, that is, up to the age of seven, and possibly even up to 13.^{10,11}

Time spent outdoors, as an independent variable, is associated with less myopia. This has led to the development of clinical trials for outdoor intervention programs to reduce incident myopia and the results are promising. However, cross-sectional data have been unable to demonstrate direct temporal relationships between near work and myopia.⁹

Significantly, there is evidence for treatment to slow myopia progression. The strongest evidence supports the use of low concentration atropine eye drops.^{12,13}

Although the exact mechanism is not known, it is believed that there is an indirect or direct inhibition of retinal and scleral thinning, and thereby eye growth and consequent increase in axial length.

There is mixed evidence for the use of orthokeratology, using reverse geometry contact lenses overnight to temporarily flatten the cornea.¹⁴⁻¹⁶ The risks of sight-threatening microbial keratitis, or corneal thinning and scarring are not insignificant.

Quality of digital media

Diversified media is recommended so that connection, interaction and creativity are encouraged.

This includes co-watching media with children, which promotes discussion, as well as co-playing games and apps, which increases interaction and facilitates learning.

Also recommended are ‘educational’ shows and apps reviewed from trusted sources, media use for connecting with others such as video-chatting, and limiting the use of digital media as an ‘electronic babysitter’.

Background media and fast-paced shows or apps should also be avoided.

The latter may affect brain development and may make it harder for children to concentrate later in life, according to the 2017 publication by the Cognitive Impacts of Digital Media Workgroup.⁵

Sleep and exercise

Devices including television should be turned off an hour before bedtime.

The blue light emitted from these devices can interfere with sleep.

Additionally, vibrating and audio alerts can wake children from their sleep.

Age-appropriate sleep time (8-12 hours), and one hour of exercise each day should take priority over screen time.

Other ideas included in media plans include device curfews, balancing online and offline time, manners matter, digital citizenship and safety first.

Details of these subheadings can be found on the American Academy of Pediatrics’ website (see Resources).

Conclusion

Although there is no clear and conclusive evidence for near work causing myopia de novo, there is evidence to show it causes progression of existing myopia.

As such, early diagnosis and interventions play a pivotal role in improving outcomes for this common condition.

With regards screen time, no doubt less is better, with a maximum of two hours a day for children being an accepted limit.

Key messages

- Start the conversation early to allow for the development of good media use habits from the outset.
- Eight-12 hours of sleep each night should take priority over screen time.

- One hour of exercise each day should take priority over screen time.
- Limit screen time, ideally to less than one hour for children aged 2-5, and two hours for older children. Screen time for children under two is not recommended, except for limited video-chatting.
- Families can set up a media plan, involving older children in decision-making. This should include agreements on screen-free times (eg, meal times, an hour before bed, homework times) and screen-free zones (eg, bedrooms, dinner table).
- Parents should be a role model for children by being active and limiting their own screen time.

Resources:

- American Academy of Pediatrics Media Plan

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