



Canadian Association of Optometrists/Canadian Ophthalmological Society Joint Position Statement:

Effects of Electronic Screens on Children's Vision and Recommendations for Safe Use

Policy Issue

The prevalence of electronic screen-related ocular symptoms is estimated as high as 50–90% in adult electronic screen users.^{1,2,3} Due to a lack of scientific literature in the area, the corresponding statistic is not known for children. Children's use of electronic screens, however, has become more commonplace (home and school),^{4a} begins earlier in childhood than in the past,^{5a} and can last for long periods of time.^{4a,6a,7a}

Adult prevalence of electronic screen symptoms and resultant guidelines for safe use should not be automatically conferred to children. Compared to adults, children's visual and physical systems are different and are still developing. Also, children use screens differently and for different tasks.^{4a} This policy reviews the current literature on ocular and visual symptoms related to electronic screen use in children and provides evidence-based guidelines for safe use. The effect of screen time on other cognitive and developmental milestones is beyond the scope of this statement.

Definitions

For the purpose of this statement, "screen" refers to the electronic screens of all media: television, computer, tablets, smartphones, video games, etc., and "children" refers to individuals less than or equal to 18 years of age.

Clinical Evidence

The scientific literature on the effect of electronic screens on children's oculo-visual systems is scant, but the lack of evidence should not necessarily be interpreted as an absence of negative effects. Children may ignore discomfort if they are enjoying a task^{4a} and fail to complain, or they may fail to report some relevant symptoms, such as dry eye, even though they may report other symptoms, such as blur.^{8a}

Within the emerging literature on the oculo-visual effects of screen use on children, there is some evidence that both desktop and portable computer use are associated with musculoskeletal pain and discomfort in children.^{9a,10a,11a}

In a 2014 survey of 200 American children between the ages of 10–17 years, 80% reported burning, itchy, or tired eyes after using their portable electronic devices.^{7a} A South Korean study



of 715 children (mean age of 15 years) found that longer use of smartphones (greater than 2 hours) was associated with not only higher odds of ocular symptoms but also greater chances of multiple symptoms.^{12a} Additional studies out of South Korea found the daily duration of smartphone use, compared to television and computer, was a risk factor for dry eye disease in children between the ages of 9–11 years;^{13a,14a} the cumulative duration of the use of all video display screens together was also found to be a risk factor.^{14a} Temporary acute acquired comitant esotropia (inward turning of the eye) was noted in 12 students between the ages of 7–12 years in South Korea who used a smartphone within 30cm from their eyes more than 4 hours a day for over 4 months.^{15a} Some research suggests that screens may interfere with children's sleep¹⁶ due to emission of blue light, which can suppress melatonin production.^{17a,18a}

Most studies on the effects of screen time in children indicate that the odds of visual symptoms increase after 2–4 hours of use,^{12a,13a} whereas musculoskeletal effects increase after 2–3 hours.^{11a} No study offers a specific time limit on electronic screen use based on these symptoms. However, the Canadian Paediatric Society and the American Academy of Pediatrics suggest screen time limits based on age.^{19a,20a} While the reasons cited for these guidelines are not visual, they are compelling and are based on the association of high screen time use with increased risk of obesity, poorer school performance, poorer sleep quality, and risky behaviours in older children, as well as delays in critical cognition, learning, and social skills in younger children.^{5a,19a,20a,21a}

Despite earlier thinking, screen time is not a direct cause of the increased prevalence or progression of myopia; this prevalence has instead been linked with children spending fewer hours outdoors,^{22a} and may potentially be due to decreased exposure to outdoor light.^{23a}

Policy Position

It is our position that the safe use of electronic screens should encompass the following:

- a) Recommended amount of screen-time for children:^{19a,20a,21a}
- 0–2 years: None, with the possible exception of live video-chatting^{5a,24a} (e.g., Skype, Facetime) with parental support, due to its potential for social development,^{25a} though this needs further investigation.
 - 2–5 years: No more than 1 hour per day. Programming should be age-appropriate, educational, high-quality, and co-viewed, and should be discussed with the child to provide context and help them apply what they are seeing to their 3-dimensional environment.
 - 5–18 years: Ideally no more than 2 hours per day of recreational screen time. Parents and eyecare providers should be aware that children report total screen time use as much higher (more than 7 hours per day in some studies).^{5–7a} This is not unrealistic



- considering the multitude of device screens children may be exposed to in a day, both at home and at school. Individual screen time plans for children between the ages of 5–18 years should be considered based on their development and needs.^{21a}
- b) Breaks no later than after 60 minutes of use (after 30 minutes is encouraged).^{26a} Breaks should include whole-body physical activity. The ideal length of break has not been identified for either children or adults.
 - c) Workstation ergonomics: Chair heights should be set such that the child's feet can lay flat on the floor or on a stool underneath the feet to allow for support. Chairs should not have arm rests unless they fit the child perfectly, as should back rests.^{26a} Desks should be set at the child's elbow height or slightly lower. There should be enough depth on the desk to allow for forearm support; this is specifically effective in preventing musculoskeletal strain.^{26a} Displays should be set in front of the child. There is no official recommendation for the angle of screen inclination. For computers, it is recommended to place the top of the display or monitor at the child's eye level, and then allow them to move the screen down into a comfortable viewing position as needed. Official recommendations regarding a screen's distance from a child do not exist; the computer screen should be placed at arm's length, and then moved as necessary.^{26a} External devices such as keyboards should also be placed in front of the child, with the mouse close to the keyboard and appropriately sized.²¹ Workstation lighting should be equal throughout the visual field, so glare and reflections that inhibit screen viewing or cause visual discomfort are inhibited.^{1,26a}
 - d) The use of screens should be avoided one hour before bedtime. Screens in the bedroom are not recommended.
 - e) Outdoor activity over screen time should be encouraged.
 - f) Children may or may not complain of electronic screen-associated discomfort. Regular* eye exams, which assess a child's visual ability to cope with their visual demands and offer treatments for deficiencies (e.g., glasses correction; treatment (other than glasses) of other contributing eye conditions, etc.) are recommended.

Reviewed: Nov. 5, 2017

* See guidelines regarding recommended frequency of eye examinations for children at: <https://opto.ca/health-library/frequency-of-eye-examinations>



References

1. Gowrisankaran S, Sheedy JE. Computer vision syndrome: A review. *Work*. 2015;52:303-14.
2. Bhandari DJ, Choudhary S, Doshi VG. A community based study of asthenopia in computer operators. *Indian J Ophthalmol* 2008;56:51.
3. Sa EC, Ferreira Junior M, Rocha LE. Risk factors for computer visual syndrome (CVS) among operators of two call centers in Sao Paulo, Brazil. *Work* 2012;41 Suppl. 1:3568.
4. Straker L, Pollock C, Maslen B. Principles for the wise use of computers by children. *Ergonomics*. 2009;52:1386-1401.
5. Reid Chassiakos Y, Radesky J, Christakis D, Moreno M, Cross C. AAP Council on Communications and Media. Children and Adolescents and Digital Media. *Pediatrics*. 2016;138(5). doi: 10.1542/peds.2016-2593
6. Boak A, Hamilton HA, Adlaf EM, Beitchman JH, Wolfe D, Mann RE. *The mental health and well-being of Ontario students, 1991–2013: Detailed OSDUHS findings* (CAMH Research Document Series No. 38). Toronto, ON: Centre for Addiction and Mental Health; 2014. 4925 / 05-2014 / PR102 pg 7.
7. Screen time: How device use affects children's vision, 2014. American Optometric Association Website. <http://www.aoa.org/news/inside-optometry/screen-time-how-device-use-affects-childrens-vision?sso=y&ct=95a17710a0ef64a88cd609684bf5231d1033a8b9e5fc15ca6eb738ec757bd28a8a4bdefac5cdf1b9b215f67f8a05fdb4add16639474c530e3f44767dda43d45c>. Accessed November 28, 2016.
8. Hu L, Yan Z, Ye T, Lu F, Xu P, Chen H. Differences in children and adolescents' ability of reporting two CVS-related visual problems. *Ergonomics*. 2013;56:1546-57.
9. Harris C and Straker L. Survey of physical ergonomics issues associated with school children's use of laptop computers. *Int J Ind Ergon*. 2000;26:337–347.
10. Jacobs K and Baker NA. The association between children's computer use and musculoskeletal discomfort. *Work*. 2002;18, 221–226.
11. Hakala, PT, Rimpela AH, Saarni LA, Salminen JJ. Frequent computer-related activities increase the risk of neck-shoulder and low back pain in adolescents. *Eur J Public Health*. 2006 Oct;16(5):536-41.
12. Kim J, Hwang Y, Kang S et al. Association between Exposure to Smartphones and Ocular Health in Adolescents. *Ophthalmic Epidemiol*. 2016;23:269-76.
13. Moon JH, Kim KW, Moon NJ. Smartphone use is a risk factor for pediatric dry eye disease according to region and age: a case control study. *BMC Ophthalmol*. 2016;16:188. doi: 10.1186/s12886-016-0364-4
14. Moon JH, Lee MY, Moon NJ. Association between video display terminal use and dry eye disease in school children. *J Pediatr Ophthalmol Strabismus*. 2014;51:87-92.
15. Lee HS, Park SW, Heo H. Acute acquired comitant esotropia related to excessive Smartphone use. *BMC Ophthalmol*. 2016;16:37. doi: 10.1186/s12886-016-0213-5.



16. Cheung, C. H. M. *et al.* Daily touchscreen use in infants and toddlers is associated with reduced sleep and delayed sleep onset. *Sci. Rep.* **7**, 46104; doi: 10.1038/srep46104 (2017).
17. van der Lely S, Frey S, Garbaza C *et al.* Blue blocker glasses as a countermeasure for alerting effects of evening light-emitting diode screen exposure in male teenagers. *J Adolesc Health.* 2015;56:113-9.
18. Salti R, Tarquini R, Stagi S, *et al.* Age-dependent association of exposure to television screen with children's urinary melatonin excretion? *Neuroendocrinol Lett.* 2006;27(1-2):73-80
19. Digital Health Task Force, Canadian Paediatric Society. Screen time and young children: Promoting health and development in a digital world. Canadian Pediatric Society website. <http://www.cps.ca/en/documents/position/screen-time-and-young-children>. June 1, 2017. Accessed June 23, 2017.
20. AAP Council on Communications and Media. Media and Young Minds. *Pediatrics.* 2016;138(5). doi: 10.1542/peds.2016-2591
21. AAP Council on Communications and Media. Media Use in School-Aged Children and Adolescents. *Pediatrics.* 2016;138(5). doi: 10.1542/peds.2016-2592
22. Rose KA, Morgan IG, Ip J *et al.* Outdoor activity reduces the prevalence of myopia in children. *Ophthalmology.* 2008 Aug;115(8):1279-85. doi: 10.1016/j.ophtha.2007.12.019.
23. French, AN, Ashby RS, Morgan IG, Rose KA. Time outdoors and the prevention of myopia, *Experimental Eye Research* (2013). doi:10.1016/j.exer.2013.04.018
24. McClure ER, Chentsova-Dutton YE, Barr RF, Holochwost SJ, Parrott WG. "Facetime doesn't count": Video chat as an exception to media restrictions for infants and toddlers. *Int J Child Comput Interact.* 2015;6:1-6. <https://doi.org/10.1016/j.ijcci.2016.02.002>
25. McClure ER, Chentsova-Dutton YE, Holochwost SJ, Parrott WG, Barr RF. Look At That! Video Chat and Joint Visual Attention Development Among Babies and Toddlers. *Child Dev.* 2017 [10.1111/cdev.12833](https://doi.org/10.1111/cdev.12833)
26. Straker L, Maslen B, Burgess-Limerick R, Johnson P, Dennerlein J. Evidence-based guidelines for the wise use of computers by children: physical development guidelines. *Ergonomics.* 2010;53:458-77.