

# Impacts of digital technologies on child and adolescent health: recommendations for safer screen use in educational settings

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## ABSTRACT

The use of screen-based digital technologies (such as computers and digital devices) is increasing for children and adolescents, worldwide. Digital technologies offer benefits, including educational opportunities, social connection and access to health information. Digital fluency has been recognised as an essential skill for future prosperity. However, along with these opportunities, digital technologies also present a risk of harm to young people. This issue may be particularly important for young New Zealanders, who have among the highest rates of screen use in the world. Our recently published review examined the impacts of digital technologies on the health and wellbeing of children and adolescents. Key findings revealed some positive impacts from moderate use of digital technologies; however, frequent and extended use of screen-based digital tools were associated with negative impacts on child and adolescent health in some areas, such as eye health, noise-induced hearing loss and pain syndromes. Conversely, in areas such as mental health, wellbeing and cognition, quality of screen media content and additional factors such as age may be more important than duration of use. These challenges gave us the impetus to develop pragmatic recommendations for the use of digital technologies in schools, kura kaupapa and early childhood education. Recommendations include interventions to lower risk across different ages and stages of development. Supporting young people to mitigate risk and develop safer screen behaviours will allow them to gain essential digital skills and access opportunities that will enable them to thrive.

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The use of screen-based digital technologies, such as computers and smartphones, is increasing for children and adolescents across the globe. Within education settings, this increased focus comes as a response to a fast-changing world. Digital technologies have advanced more quickly than any other innovation in history, with access and mastery of digital tools now recognised as being essential for future prosperity.<sup>1</sup> However, along with opportunities for learning, access to health information and other benefits, there is broad agreement among the scientific community that digital devices and internet access also present a risk of harm to young people.<sup>2</sup> This can be through exposure to inappropriate and harmful content, risks to privacy and security,<sup>3</sup> and with frequent and extended use, negative impacts to health, wellbeing and educational outcomes.<sup>2,4</sup> We therefore believe there is an urgent need to provide schools with evidence-based recommendations for their safer use.

In our role as practitioners and researchers in the field of paediatric health/wellbeing (including

national and international subject experts), we have a responsibility to protect and promote the rights of children. This includes their rights in a digital world, which often does not have their safety and best interests at heart.<sup>1,5</sup>

While acknowledging the need for young people to access and master digital technologies, these risks have more recently been recognised by the United Nations. The United Nations Educational, Scientific and Cultural Organization (UNESCO) has noted that educational screen use can contribute to risks of excessive screen use for young people.<sup>4</sup> Both the competing interests and growing influence of the educational technology industry have been recognised as a cause for concern, noting that the pull of commercial interests can be in the opposite direction of children's educational and health needs.<sup>1,4</sup> The United Nations Special Rapporteur has called for urgent discussion and regulation of the digitisation of education, including for potential risks to health and development (among others), and the necessary prerequisites of children's capacities

and skills in education before developing digital competencies.<sup>1</sup>

These issues may be particularly important for young people in Aotearoa New Zealand, who have among the highest rates of screen use in the world, both at home and school.<sup>5</sup> Organisation for Economic Co-operation and Development (OECD) data found that worldwide, screen use increased from 21 to 35 hours per week for adolescents between 2012 and 2018. For Aotearoa New Zealand youth, screen use increased from 22 hours to 42 hours in the same period. Students in Aotearoa New Zealand have the highest use of internet in class in the world, and among the highest use of digital devices in class in the world, including from young ages.<sup>5,6</sup>

Issues of equity around children and digital technologies are complex, with the focus to date primarily being on barriers to access for prioritised communities. Technology can offer benefits for Indigenous people and prioritised students, and in accordance with the Universal Declaration of Human Rights, everyone has the right to share in scientific advancement and its benefits.<sup>1,7</sup> Yet while the digital divide for Māori appears to be shrinking, a potential new equity issue has arisen. Screen use is now significantly higher for Māori children and children from low socio-economic communities than other groups.<sup>8,9</sup> Māori adolescents have the second highest internet use after Asian youth and are the most predominant group with internet use in excess of 6 hours per day.<sup>10</sup> Therefore, children and adolescents from

prioritised communities may be at greater risk of harms associated with excessive screen use.

These challenges gave us the impetus to develop pragmatic recommendations for the use of digital technologies in schools, kura kaupapa and early childhood education (see **Table 1**).<sup>11</sup> The purpose of these recommendations is to allow young people to benefit from the opportunities digital technologies afford while simultaneously protecting them from avoidable harms. The recommendations focus on evidence-based advice for safer screen behaviours in education settings, across different ages and stages of development. Recommendations include interventions to lower risk, such as advice on eye breaks, safer use of headphones/earbuds, ergonomics and lighting, and screen time limits or a balance of screen and non-screen learning tasks (depending on the age of the young person).

This document summarises 2 years of work, involving analysis of evidence and consultation. While not exhaustive, a substantial narrative review with a systematic search strategy was undertaken, to allow a holistic overview needed for decision-making, given the topic breadth.<sup>12</sup> We described and explored current evidence on the positive and negative impacts of digital technologies on the health and wellbeing of children and adolescents across eight areas: vision, hearing, obesity, pain, sleep, cognition, mental health and social impacts. Opportunities for further research to better understand these challenges were highlighted. This review focussed on large-scale

**Table 1:** Excerpt from *Recommendations for the use of digital technologies: schools, kura and early childhood education*.

0 to 6 years	
Restrict	No screen use for under 2-year-olds No screen use in ECE settings without approval from teacher or kaiako
Limit	Minimal screen use for over 2-year-olds If choosing to use screens, maximum session length 10 to 15 minutes Limit headphone/earbud use
Encourage	Purposeful and intentional use, co-viewing advised Outdoor exercise and free-play Reward prosocial and positive learning behaviours with social interactions or physical activities, rather than screen-based activities Correct ergonomics and lighting

**Table 1 (continued):** Excerpt from *Recommendations for the use of digital technologies: schools, kura and early childhood education*.

6 to 12 years	
Restrict	No smartphone/smartwatch access during class unless exempt No screen use in class without approval from teacher or kaiako
Limit	Up to a third of the school day learning on screens (limited use for younger students with gradual increase reflecting age/development), unless required for students with special learning needs Session length 20 minutes Limit headphone/earbud use
Encourage	Purposeful and intentional use of devices in schools only Outdoor exercise/activities Protect play in break periods (screen free, outdoors if possible) Reward prosocial and positive learning behaviour with social interactions or physical activities, rather than screen-based activities Adjustable seating and chairs Correct ergonomics and lighting Paper homework option preferred Education on healthy screen behaviours Continue to educate students about digital citizenship and cyber security
13 to 18 years	
Restrict	No smartphone/smartwatch access during class unless exempt
Limit	Eye breaks every 20 minutes of screen use, or change task Limit headphone/earbud use
Encourage	Purposeful and intentional use of devices in schools only Balance of screen and non-screen learning tasks Outdoor exercise/activities Reward prosocial and positive learning behaviours with social interactions or physical activities, rather than screen-based activities Adjustable seating and chairs Correct ergonomics and lighting Paper homework option if task allows Education on healthy screen behaviours Continue to educate students about digital citizenship and cyber security

**Table 1:** Excerpt from *Recommendations for the use of digital technologies: schools, kura and early childhood education*.<sup>11</sup> Adapted from: Cullen J, Muntz A, Marsh S, et al. Recommendations for the use of digital technologies: schools, kura and early childhood education. 2024. Available from: <https://www.paediatrics.org.nz/knowledge-hub/view-resource?id=59>

studies (with sample sizes including thousands of participants), systematic reviews and meta-analyses. Smaller studies were considered due to the large heterogeneity across disciplines, in areas of health where limited evidence was available.

Key findings revealed some positive impacts from moderate use of digital technologies; however, frequent and excessive use of screen-based digital tools were associated with negative impacts to child and adolescent health and wellbeing. We also noted that the definition of excessive use was difficult to establish, although the majority of harms in the review were found with total daily screen use of between 2 and 6 hours per day.

While debate continues around the importance of quality versus quantity of screen use, our review found more nuanced results. Total duration of screen time per day was found to impact eye health (myopia and dry eye disease), noise-induced hearing loss (NIHL) through headphone/earbud use and pain syndromes regardless of content, through mechanisms of use and/or the displacement of behaviours that would promote health. Conversely, the quality of screen media content is important and may be more relevant than duration of screen use, for child and adolescent mental health, wellbeing and cognition, with additional confounding factors including age/developmental stage and other variables.

Sustainable solutions regarding digital

technologies require a balance of children's rights to health, education and internet access. *Recommendations for the use of digital technologies: schools, kura and early childhood education* were based on findings from our review, existing international guidelines/legislation and input from subject experts. In developing these recommendations, consultation was sought with education stakeholders, industry, experts in health and education, and relevant government ministries, including collaboration with different sectors who have different perspectives and goals. They have been reviewed and endorsed by The Paediatric Society of New Zealand, The New Zealand Pasifika Principals Association (NZPP), Brainwave Trust Aotearoa, The Office of Early Childhood Education and others.

Digital technologies are changing the way we live in society and ensuring that they provide opportunities to our young people, contribute to equity and do not cause harm will require a multi-pronged approach for caregivers, educators and policy makers. Pragmatic recommendations aimed at educational institutions that can shape children's digital environments call attention to these challenges and offer actionable solutions. Supporting young people to mitigate risk and develop safer screen behaviours will allow them to gain essential skills and access opportunities that will enable them to thrive.

**COMPETING INTERESTS**

Nil.

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