

SCREEN TIME: THE EFFECTS ON CHILDREN'S EMOTIONAL, SOCIAL, AND COGNITIVE DEVELOPMENT

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SCREEN TIME IN NEW ZEALAND CHILDREN

Key points:

- New Zealand children are using digital devices for recreation daily, and only one in eight are meeting Ministry of Health screen time guidelines.
- The influence of non-educational screen time on brain and behavioural development is complex and not well understood. However, there is accumulating evidence of potential negative associations particularly with children's ability to focus their attention and regulate their behaviour and emotions.
- Harmful associations are generally mild but appear strongest when children use non-interactive, non-educational media instead of talking and playing with people and objects around them.
- While recommendations to limit or avoid screen time without specifying the type of screen use may appear advantageous, such blanket time limits do not reflect contemporary New Zealand family life. There is insufficient scientific evidence to determine how much screen time is harmful.
- It may be more helpful to differentiate between the various available forms of electronic media and focus recommendations around engaging with screens in ways that minimise the chance of adverse effects and maximise the positive opportunities they can provide.
- Recommendations include prioritising interactive screen time, balance between screen time and other family activities, and monitoring content children are exposed to. Full recommendations are on page 7.

Rapid global technological change has seen electronic media become ubiquitous in modern society. Time spent using any electronic device with a screen, including computers, tablets, television, game consoles, and smartphones, is widely referred to as 'screen time'. Over recent years, the proliferation of such devices has led to growing concern about the impact of growing up in a digital world on children's development.^{1,2} The foundations for executive functionsⁱ are laid in early childhood. Therefore, the influence of screen time on children's emotional, social, and cognitive development is of great interest to both parents and researchers. Public concern is fuelled by media reports connecting screen time with various behavioural and attention problems in children.

Children may use digital technology for schoolwork in class and at home. This report focuses on recreational screen time such as watching television, using social media platforms, and playing games. The Ministry of Health recommendations for children's recreational screen time suggest zero use for children under two years of age, less than one hour per day for children aged two to five, and less than two hours per day for children aged five to 17.^{4,5} New Zealand children across all age groups use screens daily and exceed these time limits, some by a large degree. The 2019/20 New Zealand Health Survey reports that 88 percent of children aged under one to 14 exceed the recreational screen time guidelines.⁶ In 2021, data from the Growing Up in New Zealand study show over 80 percent of two-year-olds typically have the television playing in the same room as them, and 12 percent are exposed to more than six hours of television daily.⁷ The likelihood of excessive recreational screen time increases with age, with approximately 60 percent of two to four-year-olds, 80 percent of five to nine-year-olds, and over 90 percent of 10 to 14-year-olds watching screens for more than two hours per day (Figure 1).⁶

i Executive functions refer to the set of cognitive processes that enable us to work towards a goal. They involve skills such as planning and organisation, flexible thinking, focusing our attention, using information in our working memory, and being able to inhibit impulsive behaviours. They are highly predictive of lifelong success in social, emotional, behavioural, and academic functions.³

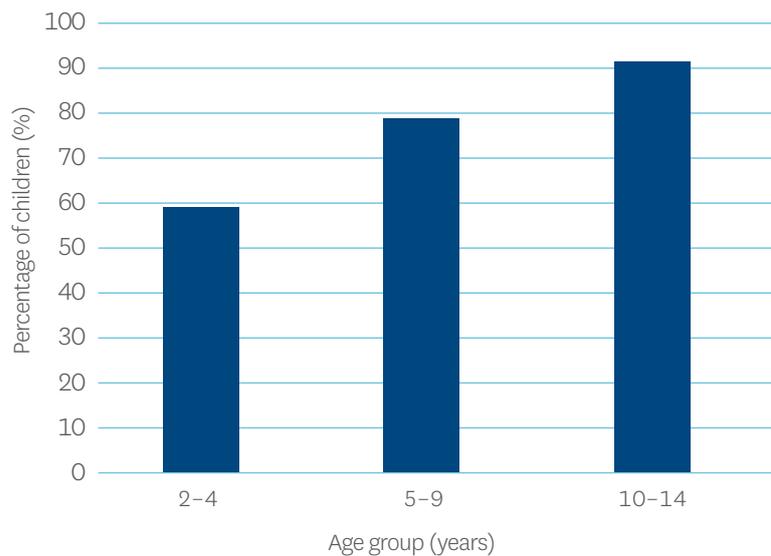


Figure 1: Percentage of New Zealand children exposed to high levels of screen time (usually watching screens for two or more hours per day, excluding use for school or homework). Adapted from the 2019/20 New Zealand Health Survey.⁶

EFFECTS ON EMOTIONAL, SOCIAL, AND COGNITIVE DEVELOPMENT

Infancy (age under two years)

Screen time in children under two years of age mostly takes the form of background television exposure where the television is playing in the room but the child is not paying attention to it.^{7, 8} Infants only look at screens for a few seconds at a time and the state of their brain development does not allow them to learn well from two-dimensional media. In addition, images on screens lack important three-dimensional features and learning cues such as depth, making it difficult for the child to transfer what they see represented on a screen to real life.⁹⁻¹² Therefore, screen time in this age group is mostly a passive activity and should not be considered educational despite the availability of products marketed as such.

There is consensus that the effects of screen time during infancy on executive functions measured in early childhood are generally negative. Young children who had regular daily exposure to screens as infants score higher on measures of demanding behaviours like fussiness, do less well on questionnaires about thinking, problem solving, and language ability, and demonstrate more difficulty controlling their emotions.¹³⁻¹⁶ However, the study designs used make it difficult to filter out other influences or prove causation, and there is variation in the aspects of executive functions that appear to be affected. For example, one study recently found that children in the United Kingdom, the United States, and the Netherlands regularly exposed to screens at four months of age found it more difficult to resist touching a tempting object when tested at 14 months, but did not have any problems with memory or flexible thinking tests.¹³ However, a population study in Singapore reported that higher television exposure among 12 to 18-month-old children was linked to lower cognitive skills and poorer social development at age four.^{17, 18}

Since infants are incapable of engaging meaningfully with screens and learn best from live interactions, the negative effects of screen time in this age group are thought to be a result of background television

replacing adult-child talk and play.⁸ This is likely due to parents and caregivers watching adult-directed programming with their child in the same room, or screen time being used as a passive distraction so caregivers can do other activities. The link most commonly reported between infant screen time and development is moderately impaired language development.^{16, 19, 20} Parents tend to speak fewer words to their children when the television is on, and children exposed to background television vocalise less and have smaller vocabularies.²¹⁻²³ However, children whose mothers interact verbally with them during television watching do better.²⁴ Caregivers being mindful of the impact of their own screen use and actively engaging with their young child may reduce the negative effects of screen time in children under two.

Early childhood (age two to five years)

By around age two and a half, children can comprehend more of what they are watching and screen time is more of an interactive pursuit. The associations between screen time and development in this age group are complex, which is reflected in the available evidence. For instance, recent New Zealand research using data from the Growing Up in New Zealand study found that more screen time predicted poorer performance in a task designed to test resistance to temptation in four-year-olds. However, it did not predict performance in a cognitive task or a measure of inattention/hyperactivity.²⁵ Meanwhile, a Ministry of Social Development report that used Growing Up in New Zealand data reported a slightly increased risk of hyperactivity.²⁶ In addition, while some large-scale studies have reported associations between exceeding screen time guidelines and increased likelihood of behavioural problems (especially inattention), part of this could be explained if children who already display challenging behaviours are viewing screens more often because their caregivers use them as a calming tool.^{27, 28}

Findings within and between studies can be somewhat ambiguous; nevertheless, taken together, the overarching trends do allow some broad conclusions to be drawn. Generally speaking, letting preschoolers regularly watch screens without adult involvement has negative effects on development but these negative effects are mostly mild. Content and presentation appear to be driving factors and non-educational and/or fantastical programmes (e.g. cartoons) may negatively affect executive functions, particularly in areas of self-regulation and attention, possibly because trying to process unrealistic and surprising events can be overwhelming for developing brains.^{29, 30} At the same time, preschoolers can learn early literacy, mathematics and science skills, as well as positive social behaviours from educational content designed to be interactive and appropriately paced, such as certain games played on touchscreen devices and television programmes including Sesame Street.^{8, 30-32}

The negative effects observed from non-educational screen time may be due to children adapting to constant 'stimulation overload' from noisy and colourful media, making it harder to focus attention on the relatively mundane real life, or it may be that time spent on screens is substituting other activities better suited to developing focused attention such as toy play.²⁹ There is emerging evidence of structural brain changes in areas associated with executive functions, language, and literacy that are associated with increased screen use.³³ There is also some indication that boys are more strongly affected than girls in regards to social development, possibly due to more time spent playing games on the devices rather than engaging in deliberately prosocial content designed to promote care and concern for others.³⁴

In addition to content, attentive adult involvement is important. Children who watch screens unsupervised are more likely to show issues with attention and social interaction than those who are supervised,³⁵ and caregiver co-viewing and interaction has consistently been shown to maximise children's learning from both television and touchscreen media.³⁶⁻³⁸ As with infants, screen time in children aged two to five years is heavily influenced by caregivers' screen behaviours.³⁹

Primary-intermediate school years (age five to 12 years)

As children get older, they have more control over the content of their screen time. Activity in this age group starts to involve more independent internet use, social networking, and video gaming, so the ways children engage with screens become more diverse. Broad associations with executive functions and behavioural problems such as inattention and hyperactivity have been shown, but results are heavily reliant on the type and content of screen time. Generally, passive screen time such as television and movie watching is believed to have negative effects, but interactive use of computers and similar media does not and may have positive influences.⁴⁰⁻⁴⁴ For example, one study reported negative correlations between television and video screen time and mathematics achievement, executive functioning, and social development in primary school children. However, interactive smartphone or computer use was associated with better science and language achievement.⁴¹

Television viewing, movie watching, and video gaming for several hours per day are implicated in aggression, poor attention skills, and hyperactivity in seven to ten-year-olds, perhaps due to exposure to age-inappropriate adult-directed content.^{42, 43, 45} However, there is some evidence of a bidirectional effect (i.e. children with more attention problems subsequently spend more time playing video games, and vice versa),⁴⁶ and outcomes from gaming are not always negative. Children who play video games have been shown to acquire superior cognitive skills in certain areas such as switching between tasks and ignoring distractions, compared with non-gamers.⁴⁷

School-based electronic device use is an additional contributor to screen time in this age group. An increasing number of schools expect children to use electronic media at school and supply their own devices (known as 'Bring Your Own Device' or BYOD). A detailed discussion of school-based screen use and BYOD is outside the scope of this evidence brief, but it should be recognised that school-based use factors into a child's overall screen exposure. A 2019 synthesis of international evidence reported modest beneficial impacts of school-based device use on mathematics, science, and literacy. However, results were mixed and some studies have reported no evidence of benefit.⁴⁸ Research in this area typically focuses on academic achievement only, but a New Zealand investigation into digital technology access at school and social development concluded there are both positive and negative effects on socio-emotional skills like self-control, collaboration, and persistence, and that outcomes critically depend on how teachers design and implement screen-based activities.⁴⁹

The timing of recreational screen use is relevant for children in this age group who are gaining independence around managing their leisure time. Gaming and television watching are associated with reduced sleep,⁴³ and general screen time before bed can have detrimental effects on academic performance.⁵⁰ Inadequate sleep is itself a predictor of poor behaviour. While it is difficult to isolate the effects of screen time from the child's wider routine and environment, the type of content being consumed and the interaction between screen time and sleep is important.

Adolescence

The type of screen time during adolescence that is of most concern to researchers is internet and social media use and its impact on emotional and social development. The internet features heavily in daily life. The average 15-year-old in New Zealand spends more than three hours a day, and almost one-quarter spend more than six hours a day on the internet outside of school.⁵¹ Studies have consistently found inverse U-shaped correlations between internet use and wellbeing – some internet use is better than none but multiple hours per day has mildly detrimental effects on mood, levels of anxiety, and self-esteem (Figure 2).^{52, 53} This is dubbed the 'Goldilocks hypothesis' where, like finding the perfect

temperature of porridge, both too little and too much internet is undesirable but a moderate amount is 'just right'.⁵⁴ Just how much is too much remains controversial, with reports ranging from two to more than seven hours daily.

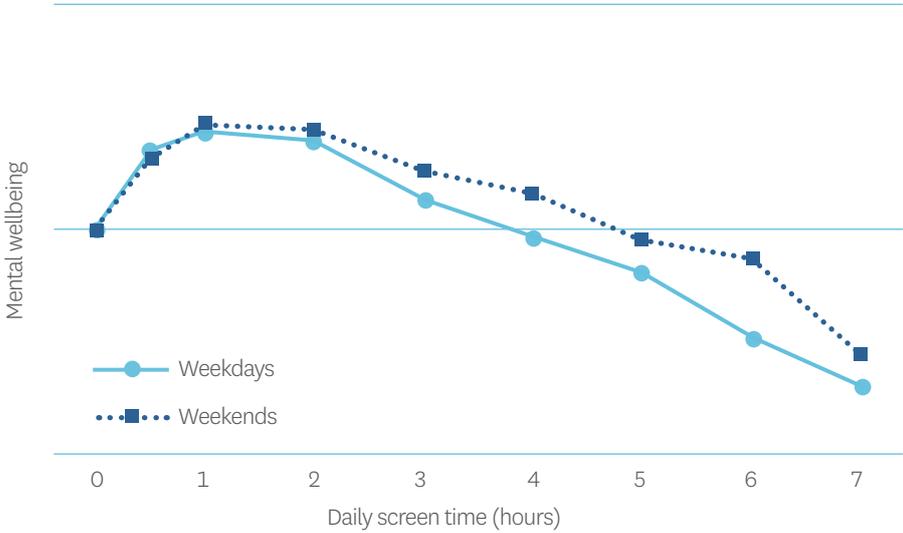


Figure 2: Illustration of the Goldilocks hypothesis. Mental wellbeing (incorporating psychological and social functioning, happiness, and life satisfaction) and its relationship to daily recreational computer time. Television and movie watching, video gaming, and smartphone use all show similar patterns. Adapted from a study by Przybylski & Weinstein.⁵⁴

Social media use amongst adolescents has been the subject of much public scrutiny with the rise of platforms such as TikTok and Instagram and the concurrent increase in the prevalence of depression and anxiety reported in teenagers. Adolescence is a time of rapid social and psychological change when relationships with peers become paramount. Social media has become a normative part of building relationships, forging connections, and staying in touch. Sharing comments, messages, and ‘likes’ is associated with boosted self-esteem, better-perceived closeness, reduced stress, less loneliness, and a more positive mood.⁵⁵ Teenagers can also join online communities which foster belonging and provide support, particularly for minority groups such as LGBTQ+ youth.^{55, 56}

However, there are also several avenues where social media is thought to have negative effects. Comparison with unrealistic standards set by carefully edited images has been linked with body dissatisfaction. It may reduce wellbeing through ‘FOMO’ (‘fear of missing out’ on positive things peers are perceived to be doing or having). Social status can become defined by the number of responses a post receives and teens can feel compelled to check their posts constantly, which can feed anxiety. Adolescents can also be exposed to sexualised, violent, or otherwise inappropriate content and may experience hateful speech and cyberbullying.⁵⁵⁻⁵⁷

Both positive and negative associations between wellbeing and social media use have been identified. However, much of the research measures negative outcomes only and implies that social media is the cause, even though it is inappropriate to draw such conclusions from the study designs used.⁵⁸ Mental health and social media use are both complex phenomena, and findings from newer longitudinal studies better designed to investigate causation have largely failed to show consistent evidence of any significant effect.^{56, 57, 59} The notable exception is cyberbullying, for which there is strong evidence of serious consequences, including suicidal ideation and suicide attempts.⁵⁷ Aside from this, while it is plausible that more typical everyday social media exposure has wide-ranging impacts simply due to its

extensive presence in young people's lives, the measurable strength of these impacts remains uncertain at this stage.

Excessive internet (or social media) activity combined with addictive, impulsive and/or compulsive elements that interfere with daily functioning is termed problematic internet use (or problematic social media use). It is associated with impaired cognitive development in areas relating to attention, memory and decision-making.⁶⁰ Multiple studies of problematic internet use have found links with anxiety and depression, as well as sleep disturbance.⁶¹⁻⁶⁴ Whether problematic internet use is a cause or a symptom of these issues remains unknown. There is significant debate about whether there is enough high-quality evidence to justify any formal classification as a psychiatric disorder.⁶⁵

It is difficult to isolate the developmental impacts of school-based screen time for adolescents because educational and recreational use have become so intertwined. For example, New Zealand has seen a rapid increase in secondary school device use over the last decade. We now have one of the highest levels of school device use in the OECD, but this has not been accompanied by a corresponding increase in academic performance.⁵¹ Further, the digital divide was clearly apparent for many during the COVID-19 lockdowns.⁶⁶ Reasons for the lack of improvement are multifactorial and likely extend beyond screen time. One theory is that the widespread use of social media, which favours surface-level, bite-sized texts, is changing the way students engage with and process more extended writing.⁶⁷ This kind of interplay between recreational social media use and academic achievement makes intuitive sense because teenagers spend large amounts of time on screens outside of schoolwork.

SUMMARY AND RECOMMENDATIONS

Although there is some evidence of harm relating to certain screen time practices, the detrimental effects are not as clear-cut as sometimes portrayed in popular media. Existing thinking relies heavily on associations reported from observational research. This means it is difficult to separate the effects of screen time from the multitude of other factors influencing a child's development or demonstrate a causative relationship between screen time and the cognitive, emotional, and/or social outcomes being measured. Furthermore, much of the available evidence is based on studies of television watching (a passive form of screen time) rather than newer technologies such as smartphone applications with interactive elements, or options which deliberately encourage physical activity like geocaching or Pokémon Go. In addition, although the widespread uptake of the internet and social media has been blamed for the rise in anxiety and depression among adolescents in recent years, there is also evidence of positive benefits. It is not yet well understood whether the observed relationships between internet use and mood are causal.^{58, 65}

A recent OECD report highlighted similar shortcomings in the evidence and concluded that current knowledge is insufficient to support any evidence-based guidelines on optimal daily amounts of screen time.⁶⁵ Existing New Zealand government recommendations sit within overarching advice around the importance of physical activity. The recommendations align with the equivalent World Health Organization guidelines, which conflate screen time with sedentary behaviour and are designed to reduce known health problems associated with reduced physical activity, such as obesity. Be that as it may, screens are well entrenched in our lives and our homes. Now that children are born into a world where technology is the norm, it may do them a disservice to apply blanket limitations instead of advice on how to engage with screens positively.

Screen-specific recommendations released by the United States and the United Kingdom are examples of policy approaches that address this problem. They are both comparatively less restrictive and more

nanced than the New Zealand Ministry of Health guidelines. The American Academy of Pediatrics distinguishes between the various types of screen time and suggests choosing interactive educational content alongside promoting strategies to enhance children’s learning, such as co-viewing.⁶⁸ The UK Royal College of Paediatrics and Child Health also suggests that the evidence of ill effects is overstated, and families should determine their own limits depending on whether screen time is interfering with other activities and with sleep.⁶⁹ New Zealand families may benefit from an approach that acknowledges the various types of screen time that exist, and supports parents and caregivers to teach children to engage with electronic media in age-appropriate ways that minimise the potential for harm.

SCREEN TIME RECOMMENDATIONS:



Avoid passive screen time for children under two years of age. Be mindful of caregivers’ own device use and whether it interrupts adult-child interaction.



Choose educational content for preschool-aged children and join in with their viewing whenever possible.



Monitor the content older children are exposed to, particularly with adult-rated movies and games, investigate parental controls on devices, and prioritise interactive screen time such as computer use over more passive options such as television.



Encourage and role model balance between screen time and other activities. Place limitations around screens where needed, for example, no screen use near bedtime and no devices in bedrooms.



Discuss the pitfalls of social media with adolescents, such as the potential for cyberbullying and the unrealistic editing of images. Check in with teens regularly, and be vigilant for any mood changes.

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