

# Digital Wellbeing

## Literature Review

### BACKGROUND

Navigating children's safe passage through the digital world is one of the great challenges of modern parenthood – and it is a challenge undertaken, mostly, without a roadmap. How much time should kids spend on devices? What does healthy device usage look like? What are the impacts of getting the screen time question wrong? How does parental screen time affect kids? What strategies work to bring a healthy balance to the way we raise our kids in a technological world?

These are questions no other generation of parents has faced.

Nature Play WA, in conjunction with researchers from the Telethon Kids Institute, has created a 'what you need to know' guide for parents on the impacts of excessive screen time, highlighting new and relevant research in the field.

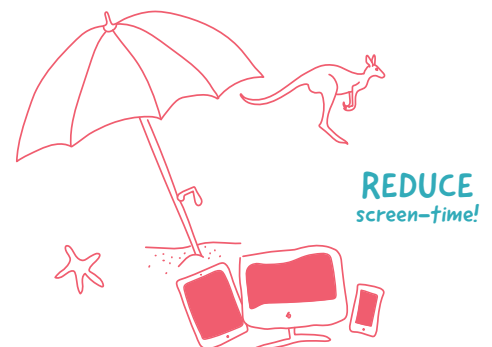
We have pulled together a lot of research in a relatively small document here, so the information comes pretty hard and fast. Think of it more as a reference document that you can dip into to find answers to specific questions, rather than a lazy Sunday read.

You will find all the research used to create this guide has been referenced and listed at the back in case you want to follow up and read more.

### WHAT IS SCREEN TIME?

First things first, what exactly do we mean when we talk about 'screen time'?

- Screen time includes television, working on a computer, or playing video games, as well as time spent on a range of devices, including mobile phones and tablets (1, 2).
- While screen technologies can be used during physical activity, most screen time is sedentary (1). Sedentary behaviours are any activities during waking hours that have low energy expenditure, and which are often done in a sitting or reclined posture (1, 3, 4).
- The main way children accrue sedentary behaviour is through screen time (5-7).
- When reading this report, it is important to consider that most research to date has focused on television viewing or computer use, and not on recent forms of device-based screen time such as smartphone and tablet use.



## WHAT IS THE EFFECT OF EXCESS SCREEN TIME ON CHILDREN?

Research shows that excessive screen time can impact children in a range of ways. To help you develop a sense of the work in this complex area we have broken down the research into sections according to excessive screen time's impact on Physical Health, Mental Health, Cognitive Development and Learning, and Social and Emotional Development.

### PHYSICAL HEALTH



#### PHYSICAL ACTIVITY

- Increased screen time is linked to less physical activity in school-aged children (8).
- This link has not been shown for younger pre-school-aged children, possibly due to their typically lower levels of screen use. Unsurprisingly, video games that include higher levels of physical activity are a better alternative to sedentary screen time (9).



#### SLEEP

- Sleep is essential for children's health, development, growth, memory, concentration and learning (10).
- Screen time negatively affects children's sleep, resulting in delays in going to sleep, reduced total sleep time, and daytime tiredness (11, 12). These negatives apply across all forms of screen time: television, computer, video gaming, tablets, and mobile phones (11).
- In particular, having a mobile phone in the bedroom is linked to poorer sleep in children (12) and using screens for long periods, especially in the evening, is a significant and common cause of sleep problems (10, 13).
- Every hour of television watched before bed can result in 5-10 minutes of lost sleep time (12, 14-16). Shorter sleep time can lead to fatigue the next day, which can lead to more screen use (13).
- Using self-luminous (blue light) tablets for just two hours suppresses the release of melatonin, a hormone which is essential for our internal process that regulates our sleep-wake cycle (circadian rhythm) (12, 17).
- It is also likely that the psychological, mental, or emotional stimulation associated with screen use can negatively impact children's sleep (18). The effects of screen time on sleep are the same for younger children's daytime naps as well as night-time sleep (13).



#### OVERWEIGHT AND OBESITY

- There is evidence that increased television screen time is associated with higher rates of overweight and obesity in children.
- However, there have not been enough studies yet to determine the impact of other types of screen time (e.g., tablets and mobile phones) on levels of overweight and obesity in children (11).
- Importantly, the risk of becoming overweight as a result of high levels of screen time in early childhood can persist into later life (19-24).



#### DIET

- Some studies have shown an association between screen time, particularly television watching, and a poorer diet, including diet quality, higher intake of high energy foods (i.e. fast food, energy-dense snacks and drinks such as lollies and chocolate, high-fat foods such as chips), and lower intake of healthy food groups (i.e. fruit and vegetables) (11).
- Children exposed to unhealthy food advertisements while using screens have higher energy intakes, putting them at risk for overweight and obesity (25, 26).



### **FITNESS**

- From the few studies conducted there is evidence that increased screen time (more than two hours per day) is associated with poorer overall cardiorespiratory fitness, muscular strength and endurance, and flexibility in children (11).



### **GROSS AND FINE MOTOR SKILL DEVELOPMENT**

- Fundamental movement skills are the building blocks for children's physical development.
- They allow children to do more complex and specialised skills, in turn helping them to enjoy sports, games and other types of physical activities.
- Fundamental movement skills include locomotor (walking, running, hopping, jumping, skipping, galloping, sliding etc.), object control (throwing, catching, kicking, striking etc.) and stability skills (balancing, bending, twisting etc.).
- Children who developed good fundamental movement skills are more physically active throughout life (5, 27).
- There is evidence that young children with higher levels of screen time are less likely to have developed the essential fundamental movement skills (28), needed to move well and be physically active and healthy throughout life (5). There is some evidence that active video games may improve large-muscle movement skills in older children and adolescents (29).
- In children aged 3-4 years, screen time is associated with poorer manual dexterity, which is necessary for writing and academic achievement (5). In contrast, findings from another study showed that specific iPad applications helped to develop manual dexterity which young children need for writing (30).



### **CARDIOVASCULAR RISK**

- Higher levels of television viewing and computer use are linked to higher cardiometabolic risk (i.e. higher blood pressure and greater risk of developing diabetes, heart disease, or stroke later in life) (31).



### **OTHER**

- There is some evidence that screen time negatively impacts children's cortisol levels (an important biomarker for stress) (13, 32), insulin sensitivity (a risk factor for type 2 diabetes) (13, 33), vision (13, 34), and bone strength (13, 35). For example, children who play video games for more than 30 minutes per day report headaches, dizziness, and eye strain (13, 34).
- Increased screen time is also associated with back pain and headaches, partly due to poor posture while using devices – requiring muscles to be flexed at angles that cause muscle tissue strain (18).

## **MENTAL HEALTH**

There is evidence that increased screen time is linked with poorer mental health outcomes in children (11). Screen time can also replace physical activity time which is important for mental health (11).



### **QUALITY OF LIFE**

- Greater screen time is linked to children reporting that they have a poorer quality of life (11, 36).
- Children who have more than two hours of screen time per day report poorer quality of life and psychological well-being more frequently (3, 11, 37).





### ANXIETY AND DEPRESSION

- There is moderate to strong evidence to show that increasing screen time is associated with depressive symptoms (11).
- In an Australian study of 8,000 children aged 10-16 years, those who met screen time guidelines of less than two hours per day were less likely to report depression (25, 38). Children (5-18 years) who use digital media for more than two hours per day also report more depressive symptoms (13, 39).
- There is some evidence to show that higher levels of screen time are associated with anxiety in children (1, 11, 40).

## COGNITIVE DEVELOPMENT & LEARNING

High levels of television screen time may be harmful to the cognitive development of infants, toddlers and pre-schoolers (6, 11, 41). Language use and acquisition, attention, cognitive development, and executive function in children younger than five years has been found to have been negatively affected by a high level of background television. It can also reduce the amount and quality of parent-child interaction and distract from play (19, 42-45).



### ACADEMIC ACHIEVEMENT

- There is some evidence that screen time is linked with poorer educational outcomes (4, 11, 31). In particular, watching television for more than two hours per day is associated with decreased academic achievement (4).
- Children with large amounts of television exposure at 29 months were found to play outside less, were less fit, and had decreased classroom engagement at 53 months (46). There is also evidence that high levels of screen time are associated with irritability, low mood, and delayed cognitive and socioemotional development, which can then lead to poor educational performance (11, 25).



### CONCENTRATION AND ATTENTION

- There is strong evidence that high levels of screen time (more than two hours per day) are associated with inattention problems in children (3, 11). These effects continue throughout childhood and into adulthood (3, 13, 47).
- Continued use of video games can have a detrimental impact on attention (48-50), potentially leading to a diagnosed attention deficit (51), worsened educational performance (52), and poorer memory (10, 53).



### LEARNING

- There is some evidence of the positive effect of touch screens on children learning new words when children use a touch screen with an adult (54-56). Using tablets may also help with reading and writing skills, improve maths and science knowledge and skills, develop small muscle movement skills, and improve problem-solving (13).
- From about two years of age, well-designed, age-appropriate television programs with specific educational goals can support young children's language and literacy (57). Quality television programming may also help with aspects of cognitive development, including positive racial attitudes and imaginative play (19, 58).
- Interactive media, specifically those that include an adult's timely reactions to what a child says or does can help children retain taught information. Parent responsiveness, coupled with age-appropriate content, timing and social interaction, can help teach new words to 24-month-olds (19, 42, 59, 60). Generally, screen time can help with language learning when quality content is viewed together and discussed with a parent or caregiver (61).
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### LEARNING (CONTINUED)

- Generally, screen time can help with language learning when quality content is viewed together and discussed with a parent or caregiver (61).
- Interactive 'learn-to-read' apps and e-books can help build early literacy by providing practise with letters, phonics, and word recognition (59, 62). But, preschoolers learn best (i.e. in expressive and vocabulary terms) from live, direct and dynamic interactions with caring adults (19, 43). E-book sound effects and animation can interfere with story comprehension and event sequencing for preschoolers, compared with paper books (19, 63-66).



### EXECUTIVE FUNCTION

- Executive function describes a set of mental skills that support decision making and self-regulation.
- Executive function begins to develop at around four years of age, and include task persistence, impulse control, emotion regulation, creativity, and flexible thinking (67).
- 'Media multitasking' is believed to be responsible for the association between reduced levels of executive functioning and excessive media use in early childhood (67, 68). Media multitasking (i.e., when visual and sound effects in screen applications cause rapid changes in attention) can lead to concentration lapses and cognitive overload (67, 68).
- Poorer executive functioning as a result of media multitasking has been found in children as young as four years. There is a growing body of research exploring whether brain-training apps can work to improve executive function in children (67).

## SOCIAL AND EMOTIONAL DEVELOPMENT



### SELF-ESTEEM

- Higher durations of screen time and computer use (more than two hours per day) are significantly associated with lower self-esteem in children (31, 69). With each increase in screen time, the risk for low self-esteem increases (4, 70).



### PRO-SOCIAL BEHAVIOUR

- Pro-social behaviour includes helping, sharing, and co-operating.
- Higher duration (more than two hours per day) and frequencies of screen time, including television viewing and video game use, are significantly associated with poorer pro-social behaviour in children (31).
- Increasing levels of television/DVD/video viewing in pre-schoolers is linked with children being less likely to follow rules and socially accepted behaviours, and may negatively impact on their social skills (71).
- There may be some benefits associated with the use of interactive mobile screen media devices, including learning opportunities, face-to-face connection with distant family and friends, and play opportunities (63, 72, 73).
- The social and emotional effects of mobile devices on young children have only been explored in two classroom-based studies. These studies suggest there may be enhanced peer interaction (as observed by teachers) and positive emotional effects, including enhanced self-confidence and self-worth, as a result of completing game tasks (74).



### EMOTIONAL UNDERSTANDING

- Emotional understanding is our ability to understand, predict, and explain our own and others' emotions (6).
- Children's emotional understanding is associated with good mental health, social competence, and academic success, and is an integral part of their overall social-emotional development (6). Interaction between a child and their carers is critical for children learning how to understand emotions.



### EMOTIONAL UNDERSTANDING (CONTINUED)

- Children's emotional understanding skills mostly develop during the pre-school and early school years (75).
- Screen time can replace face-to-face interaction as well as decrease the quantity of interaction between children, parents and siblings (6). When children spend time watching and interacting with a screen, rather than with parents or other people, this can affect the amount of time they spend practising the important skills of:
  - recognising emotions in others,
  - experiencing emotions when interacting with others, and
  - being talked to about the nature, causes, and consequences of different emotions by their parents (6)
- In preschoolers, a high level of background television or night-time television viewing is associated with decreased sleep duration, which leads to a reduced capacity to understand mental states, motives, and feelings of others (76).
- Children who had a television in their bedroom at age six were found to have lower levels of emotional understanding at age eight (6).



### INTERNALISING BEHAVIOURS

- There is strong evidence that high levels of screen time are associated with internalising problems and behaviours (3).
- These problems include being withdrawn, having concentration problems, or feeling sad/lonely/afraid/unloved or unwanted/nervous or irritable; as well as physical behaviours such as eating/sleeping more or less than usual, and headaches and stomach aches (2).
- Children who show internalising behaviours are at higher risk of anxiety and depression, which can lead to social withdrawal, suicidal thoughts and other health issues (2).
- Across all child developmental stages, sleep disturbances caused by excessive screen time, are linked to internalising, externalising, and peer problems (77).



### BEHAVIOUR PROBLEMS

- Results from multiple studies show that greater exposure to television violence is associated with more aggressive and anti-social behaviour in young people, with the most significant negative impact in young children (birth to five years) (78).
- One reason for this is that exposure to violent behaviours desensitise children to violence, making it difficult for them to separate the virtual world from the real world.
- Evidence also shows a link between high levels of television viewing at age two and child-reported victimisation, social isolation, aggression, and anti-social behaviours in middle childhood (19, 46, 79).
- In addition, children who have more than two hours of screen time per day have been shown to have increased externalising, internalising, and behaviour problems compared to children who watch less than 30 minutes per day (47). These effects can continue into adolescence and adulthood (13, 80).
- A couple of studies have looked at parent smartphone use and children's social-emotional development. They showed that as time spent by parents on their phones increased, so too did the likelihood of children acting out to gain attention – often leading to negative interactions (19, 81, 82).
- In addition, parents who allowed their children aged 1-4 to use their smartphones often did so to reward or distract, which resulted in their child asking for their phone more often, and becoming upset if refused (19, 83).



### HYPERACTIVITY

- Higher levels of screen time are associated with hyperactivity (11).
- For example, children's screen time at age five and nine years has been shown to be associated with hyperactivity problems one and two years later (3, 50, 84).



## HOW MUCH IS TOO MUCH?

- There is no consistent evidence of any benefits of screen time for children's health, well-being or development. A few studies suggest that certain types of screen time may be associated with benefits such as learning and interactive experiences with other people (e.g., being able to connect with family and friends who are separated by distance) (11)
- There is evidence that as children's screen time increases, the negative impact it has on their health, well-being or development increases (11). Less screen time is better for optimal health (31)
- Screen time may be particularly problematic if it displaces other activities such as physical activity and sleep (13)
- Research evidence supports the Australian daily screen time guidelines for infants, toddlers, preschoolers, and school-aged children (85). They are:

- **BIRTH TO 2 YEARS OLD**

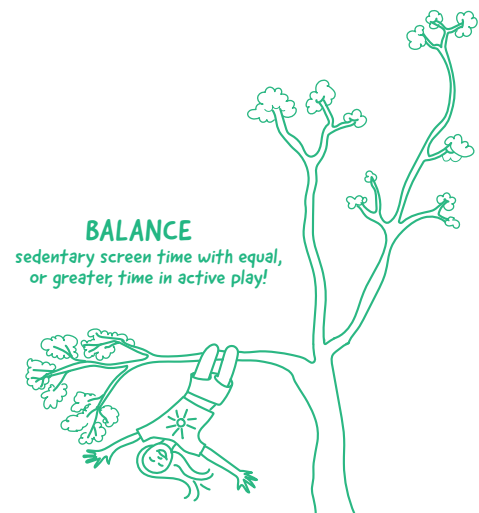
Screen time is NOT recommended

- **2–5 YEARS**

No more than 1 hour per day of sedentary screen time; less is better

- **5–17 YEARS**

No more than 2 hours per day of sedentary recreational screen time (does not include educational screen-based activities for educational uses)



<https://www1.health.gov.au/internet/main/publishing.nsf/Content/health-pubhlth-strateg-phys-act-guidelines>

## IMPACT OF PARENTAL SCREEN HABITS AND PARENTING FACTORS ON CHILDREN'S SCREEN TIME

Research on parental use of mobile and fixed screens shows that children of parents with higher mobile screen media use are also more likely to have higher mobile screen media use (72). This higher usage is due to parental role modelling, thus 'normalising' high screen use behaviour (72, 86). For young children (eight years and under), parental behaviours and the home environment are highly influential in shaping screen time behaviour (72).

Studies on screen-based language learning show that children can have positive learning experiences with media when caregivers join in the activity and are actively engaged (87). Learning is most effective when it mimics the real-life situation of interaction with a caring adult (88). The presence of parents or others while children are using screens is linked to shorter periods of overall screen time (89). Importantly, intervention studies show that increasing child-parent interactions is an effective way of reducing screen time in children (22, 90).

Parental rules around children's screen use are also associated with less television and DVD viewing, and less electronic game and computer use (24). Bedroom television has been related to more substantial television exposure (6). Televisions in children's bedrooms can result in parents having less control over the amount of television viewed, more private viewing, and fewer conversations about the television characters' emotions (6).

## WHAT CAN WE DO ABOUT IT?

- Screen use needs to be used appropriately by children with the support and guidance of their parents. The family environment plays a key role in maintaining a 'healthy media use' (72)
- Children should have limited or no screen time exposure before or during bedtime, to minimise any harmful effects on sleep and well-being (12)
- Television and other screen-based devices should be kept out of children's bedrooms
- Parental rules around screen time should be discussed and agreed upon between parents and their children
- Role-modelling by caregivers, family and friends is essential – 'be your child's role model and keep your own screen time to a minimum and be physically active too' (91). Parents model healthy screen habits when they:
  - Minimise their screen use in the presence of young children, especially for mealtimes, play, and other opportunities for social learning
  - Prioritise interactions with children through conversation, play, and healthy, active routines
  - Choose when to use media together, and turn off screens when they are not in use
  - Help children to recognise and question advertising messages, stereotyping and other problematic content, and ensure that media used in the presence of children is free of such content (19).
- Increasing the time a parent spends interacting with their child reduces the amount of screen time their child engages in
- Children younger than five years learn best from live, engaging interactions with family members and caregivers. Children will nearly always opt for talking, playing or being read to over screen time in any form (42). By using screen time mindfully, parents and caregivers:
  - Actively enhance – and limit – media use by choosing them together and purposefully ('Let's watch or play this, at this time, for this reason')
  - Limit screen use in public places and during family routines, such as at meals. Family times are perfect opportunities for social learning
  - Select content from high-quality, non-commercial sources, to minimise exposure to advertising
  - Pay attention to messages about gender, body image, violence, diversity, and social issues when choosing content (19, 92).



## WHAT DON'T WE KNOW ENOUGH ABOUT YET?

Currently, there is little information about the health and development impacts of newer and more common screen-based devices such as smartphones and tablets. There is also a lack of studies on the effects of screen time for children between birth and four years (93).



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