



tamariki and technology:

insights from the research

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Our babies are surrounded by rapidly advancing technology. We absorb ever-changing information technology into our lives at a breakneck speed.

It's easy to forget that not that long ago, when we left the house, no one could contact us!

These changes have many advantages. The article you're reading now was largely researched, written, edited, and designed on multiple devices. Chances are, you're reading it on a device too. Information is more freely available than it has ever been.

But many are wondering how this technology affects babies and young children? It's a whole new world they find themselves in.

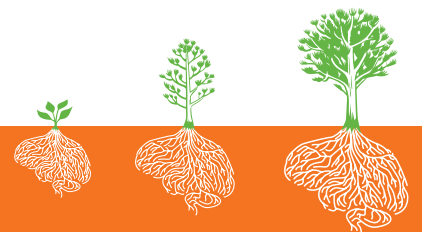
Changing times

In 1970 children began watching TV, on average, when they were 4 years old. Now, many children are using digital media from 4 months old,¹ or even younger. This is one example of many changes in the way we are using media.

Whānau viewing habits have changed over the years too. In the early years of TV, families tended to have one TV that they watched together, now many whānau have multiple sets, and children are more likely to be watching alone.² Of course, it's not just about TV. By the age of 10 years, it's estimated that children have access to five different devices in their home.³

Many newer technologies are portable, meaning they can go wherever children and parents go. Mobile devices, such as smart phones and tablets, are pervasive. They provide connection to people and information on an unheard of scale, which is different from earlier forms of technology.⁴

In the US, for example, the percentage of 2-4 year olds using mobile devices rose from 39% in 2011, to 80% in 2013.⁵ That's quite a shift in a short space of time. Here in Aotearoa, more than three quarters of four year olds are using electronic media at home on week days.⁶



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What do children need?

Although technology is changing, what children need hasn't changed.

Before we look into how screen use can affect children, it's worth quickly revisiting what we already know about what children need to develop in healthy ways. Children learn through their relationships, and experiences. When these relationships are positive (but imperfect!) and their experiences rich and interesting, they are laying strong foundations for many areas of their development.

When we talk about rich learning experiences in the first few months and years, these may be things adults take for granted. Watching the wind move through the trees, splashing in a puddle, helping in the kitchen; all provide stimulation to many of the senses and involve the body in the three dimensional world. Two dimensional screens don't offer this richness of sensory experience and human interaction.⁷

There is nothing that can replace parent-child interactions and the value of real world exploration and play.

Things that are repeated tend to be strengthened in the brain, whether it's repeated attempts at walking, learning waiata or being comforted when upset.

Research tells us that children need loving, interested adults interacting with them and involving them as they go about their day. They also need quiet time. Contrary to what some people think, children don't need to be busy doing something, or being 'entertained' all the time.

Some things to consider

When it comes to thinking about screens and our tamariki, there are many variables that make a difference. These include - the age of the child, the content they're engaging with, and the amount of time they spend using screens.

And of course, any screen use is occurring in the wider context of tamariki and whānau lives.

Here's what we know:

1. Age makes a difference

We are learning throughout our lives, and the experiences we have affect the way in which this development will unfold. The impact of this is greater at some points in our development than others, with early experiences often having a greater influence on brain development than those occurring later in life.

While some experiences support children's healthy development, others can get in the way, making healthy development less likely. Age makes a difference in many areas of development; what's beneficial, or at least



not harmful, at 50 years isn't necessarily the same at 5 years, or 5 months of age. Learning a new language as a toddler is a very different process from learning one at 35.

When it comes to technology use, this remains important. Young children aren't able to tell fantasy apart from reality.⁸ From around 3 years of age, children can learn from some media when and if a) it's appropriate for their age and development, and b) a parent or other adult is engaged in the activity with them.⁹ Earlier than this, there doesn't seem to be any benefit, and as we'll explore later, there are some risks of harm.

2. Dose/Amount of use matters

It's not just screen use in itself, but the amount of time spent on devices that influences children's development. For example, higher levels of screen use at 2 - 3 years of age, were associated with poorer performance on developmental milestones a couple of years later.¹⁰ The research often refers to this as a dose-response effect, meaning that the outcomes vary depending on the amount of exposure. When something poses a risk of harm, the more exposure one has, the more likely they are to have adverse effects. A little bit may well be completely harmless. Over-use can cause harm.

¹ Chassiakos et al., 2016

² Christakis, 2009

³ Sigman, 2012

⁴ Kushlev & Dunn, 2019

⁵ Rideout et al., 2013, cited by Tang et al., 2018

⁶ Morton et al., 2017

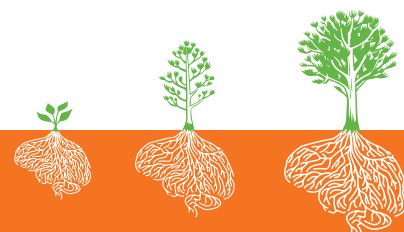
⁷ Lerner & Barr, 2014

⁸ Bailey & Bailenson, 2017; Christakis, 2009

⁹ Lerner & Barr, 2014

¹⁰ Madigan et al, 2019

¹¹ Hiniker et al., 2016



The word 'dose' may make you think of medications, and indeed the analogy is useful. A small dose of paracetamol when it is appropriate can help everyone sleep. A larger dose can be very harmful indeed.

What does this mean in everyday terms? Well, a child using technology every once in a while, and usually for short bursts is having less exposure to screens than a child using screens every day for a couple of hours, or even longer. Less screen time means less chance of undesirable effects. More screen time means a greater chance of poor outcomes.

Restricting screen use can be very challenging for parents.¹¹

When babies and young children are cared for by others, perhaps they attend ECE or are looked after by grandparents, it's worth considering how much screen time they are having across all those places, and how many of their waking hours are screen free. Regardless of quality, too much screen use can be harmful.¹²

3. Content matters

The content that tamariki are watching, or interacting with, matters. If they are using screens it needs to be appropriate for their age. Content that's intended for older children can lead to increased fear and anxiety when viewed by younger children.¹³ Even content that is intended for a young audience can be distressing for some tamariki.

Alongside the burgeoning technology, content has been changing over the years too. It's become more violent¹⁴ and fast paced.¹⁵ Neither of these changes are beneficial for tamariki.

As with all areas of child development, individual differences exist. Some children may be more affected than others by screen use.¹⁶ For example, children who are aggressive or from aggressive families tend to be more affected by media violence, than are other children.¹⁷

How can screens affect tamariki?

Screen use can affect children through both direct and indirect pathways.

Direct effects relate to the content tamariki are seeing or using. What programme are they watching, or what's on the app they're using? Examples include their reactions to scary or violent content. Is the content intended for young children? Children can be affected by what they see.

The indirect pathway refers to the fact that time spent using screens reduces the amount of time available for more developmentally beneficial activities, such as playing and talking with whānau.¹⁸ In other words, time spent using screens means children are missing out on opportunities to develop skills in a number of areas.¹⁹

Benefits of technology

New media has benefits, of course. But these depend on several factors including the child's age, whether the media is used with a parent, and, of course, the content of the media.²⁰

It's not just screen use in itself, but the amount of time spent on devices that influences children's development.

1. Skype, FaceTime etc.

Many whānau use live video chatting apps, such as FaceTime or Skype to keep in touch with more distant relatives, who might otherwise not see each other often.²¹ An advantage of these is the ability to see the person, including their facial expressions and body language. These apps have the potential to support the development of relationships between children and whānau.²² Pēpi and toddlers need parental support to understand what they're seeing. Because this use of technology promotes relationships, is usually brief, and involves adult support it's considered fine for babies and toddlers.²³

2. Touchscreen apps

The ability of touch screen media to engage children can be helpful in some situations. For example, they are being used more often to distract children undergoing anaesthetic and other medical procedures.²⁴ So this seems appropriate, as they would not otherwise be playing outside or at home with whānau. Again, these things are probably fine in small doses.

But it's educational, right?

In 2015 there were around 80,000 so-called 'educational' apps marketed for children in the App Store, which were largely untested.²⁵ Companies know that claiming educational benefits means they're more likely to sell their products.²⁶ Parents are wise to be sceptical about the many apps which claim to be educational. Reviews of these apps indicate that most are of low educational value, tend to target rote learning of things like ABCs and colours, and have had virtually no input from people who understand child development.²⁷

¹² Harvard Family Research Project, 2014

¹³ Hiniker et al., 2016

¹⁴ Bushman et al., 2013

¹⁵ Koolstra et al., 2004, cited by Nikkelen et al., 2014

¹⁶ Madigan et al., 2019

¹⁷ Nikkelen et al., 2014 ristakis, 2009

¹⁸ Radesky, Schumacher, & Zuckerman, 2015

¹⁹ Madigan et al., 2019

²⁰ Chassiakos et al., 2016

²¹ Chassiakos et al., 2016

²² Troseth et al., 2016

²³ Chassiakos et al., 2016

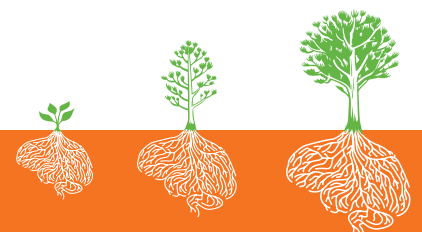
²⁴ McQueen et al., 2012

²⁵ Hirsh-Pasek et al., 2015

²⁶ Thomas, 2007

²⁷ Chassiakos et al., 2016

²⁸ Kucirkova & Radesky, 2017





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If media is being used, it's been suggested that in the first two or so years the apps that may be useful are those that support parent-child communication (such as sharing pictures) or connections with whānau members, such as Skype with a grandparent.²⁸

Will they be 'left behind' if they are not always on a screen?

Sometimes people think children should use technology from a young age, as otherwise they might be 'left behind' later on.²⁹ While it's understandable that parents don't want their child to miss out, it's worth knowing there is no research to support starting early. It's interesting to note that many of those involved in creating this technology limit their own children's access to it.³⁰

In fact, the research to date suggests that tamariki who use screens from a young age are more likely to be the ones missing out – on the real world opportunities and interactions that will support their development.

Areas that can be negatively affected

1. Sleep

Sleep is necessary for survival and inadequate sleep is associated with a variety of poor health effects.³¹ In the early years, sleep is important for early brain development (and usually welcomed by parents!). One of the ways in which technology use can impact babies and young children is through poorer quality and quantity of sleep.³²

In particular screen use before bed, as well as having devices in bedrooms overnight can delay and disrupt sleep throughout childhood.³³

It's not only viewing shortly before bed that can affect sleep; the overall amount of viewing throughout the day matters too. A study of children at 2 and 4 years old found that as their daytime television viewing increased, they slept less at night.³⁴ The good news is that when children's viewing decreased, over time they had more sleep.

There are several mechanisms for these effects. Blue light from screens can suppress melatonin, making it harder to fall asleep.³⁵ This impact of screen use affects people of all ages; parents as well as their tamariki. Other ways in which media use can affect sleep is through later bedtimes after evening media use,³⁶ children being quite stimulated so falling asleep later,³⁷ as well as the effects of watching violent content.³⁸

2. Language

Back when television and DVDs were the main media young children used, a number of studies found children were more likely to have language delay, particularly if their viewing began early and occurred regularly.³⁹

²⁹ Sigman, 2012

³⁰ Berger, 2018

³¹ Marinelli et al., 2014

³² Cheung et al., 2017; Vijakkhana et al., 2015

³³ Cespedes et al., 2014

³⁴ Marinelli et al., 2014

³⁵ Salfi et al., 2006, cited by AAP Council on Communications and Media, 2016

³⁶ McDonald et al., 2014, cited by Kucirkova & Radesky, 2017

³⁷ Vijakkhana et al., 2015

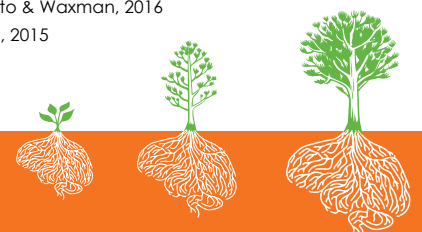
³⁸ Garrison & Christakis, 2012, cited by Kucirkova & Radesky, 2017

³⁹ Chonchaiya & Pruksananonda, 2008; Christakis et al., 2009

⁴⁰ Ma et al., 2017, cited by American Academy of Pediatrics, 2017

⁴¹ Hirsh-Pasek et al., 2015; Lovato & Waxman, 2016

⁴² Radesky, Schumacher, et al., 2015



The longer babies and toddlers spend using handheld devices, the more likely they are to have language delays.

More recently, similar findings have emerged in relation to hand-held devices. The longer babies and toddlers spend using handheld devices, the more likely they are to have language delays.⁴⁰

During the important early years, when so much development is occurring, one of the most important things that helps healthy development is interaction between tamariki and caring, interested adults.⁴¹ Screens cannot provide this critical interaction.

3. Wellbeing & behaviour

Devices such as phones and tablets are increasingly being used to help manage children's behaviour.⁴² While this might seem to work in the short term, if this happens often, they may be missing opportunities to learn to manage their range of emotions, potentially increasing social and emotional difficulties later on.⁴³ It might not be fun, but when parents support their pēpi or tamariki with their feelings (rather than handing over a phone or tablet), they're building their relationship and providing valuable learning opportunities that will support their child's development.

From time to time, using media may be an understandable strategy to avoid or reduce distress. But most of the time babies and children need support to develop other ways to be calmed and learn to calm themselves, without relying on screens to do this.⁴⁴ The ability to handle the range of emotions develops over many years, however the foundations for this are laid in the first few years of life. Like other skills, such as walking, this doesn't just 'happen' but develops over time, with support and plenty of practice. If a screen is used to distract them when they are feeling 'big' emotions, they are not learning to deal with these emotions.

In addition, habits that start early can affect later behaviour. It seems that the more tamariki use screens when they're young the more difficulty they have turning them off as they get older.⁴⁵ Some children become very distressed when parents ask them to stop using the device. It's easy to see how this could escalate, with parents wanting to avoid such distress, thereby leading to more and more screen time.

The newer technologies are potentially addictive because of their interactive nature and because of the reward tamaiti feel as something happens when they touch the screen, and dopamine is released in their brain.⁴⁶ A large study found that children who had more screen time were more likely to face a number of issues with their psychological well-being than children who used screens less often. These included often losing their temper, difficulty making friends, less curiosity, struggle calming down, trouble finishing tasks and less self-control.⁴⁷



Early well-being is associated with later development, and those with poorer well-being are more likely to experience issues such as depression or aggressive behavior later in life.⁴⁸

Parental use

"We are engaged in a great natural experiment. With the click of a button we talk, text and share photos. These possibilities lead not only to unprecedented connectivity but also to overwhelming distraction."⁴⁹

When we're thinking about technology it's not only children's own use that can affect them, but also that of their parents and whānau. There's a growing body of research looking at parental mobile use and possible effects on interactions between parents and their children.⁵⁰

While many parents are using phones at times, research indicates that when they are often using their phone they are less likely to be interacting with their tamariki.⁵¹ Parents are also likely to be less sensitive and responsive to their child's needs when they're using their phones with some either missing their children's attempts to interact, or reacting in hostile ways.⁵²

Both mothers' and fathers' own screen use, and parenting practices regarding screens influence their children's screen time.⁵³ For example, if parents use screens during mealtimes, their children tend to have

⁴³ Radesky, Schumacher, et al., 2015

⁴⁴ AAP Council on Communications and Media, 2016

⁴⁵ Christakis & Zimmerman, 2006, cited by Campaign for a Commercial-Free Childhood

⁴⁶ Christakis, 2014

⁴⁷ Twenge & Campbell, 2018

⁴⁸ Hinkley et al., 2014

⁴⁹ Reed et al., 2017, p. 1428

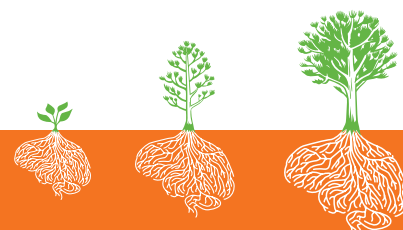
⁵⁰ Kildare & Middlemiss, 2017

⁵¹ Radesky, Miller, et al., 2015

⁵² Hiniker et al., 2015, cited by Kushlev & Dunn, 2019; Radesky et al., 2014

⁵³ Tang et al., 2018

⁵⁴ McDaniel & Radesky, 2018



more screen time over the week than parents who keep mealtimes screen-free.

A new term has been coined - technoference – referring to everyday interruptions in time spent together due to mobile technology devices.⁵⁴ We've known for a while that background television tends to interrupt parent-child play.⁵⁵ Unsurprisingly, recent studies suggest parental mobile technology use also affects the way in which parents interact with their children.⁵⁶

Children learn an awful lot from watching what their parents do.⁵⁷ As many parents know – what we do seems to matter more than what we say! Parents are huge role models for their children, especially while children are young.

Parents who are unable to resist checking new messages and feel they are using their phone too much, tend to have tamariki with more difficult behaviour.⁵⁸ There are a number of possible reasons for this. A study of families eating out noted that when adults were using their devices, some of the children's behaviour would escalate as they tried harder and harder to interact with their caregiver.⁵⁹

The research on parental technology use is in its infancy, but there is no shortage of research showing the importance of parent responsiveness for children's social and emotional development.⁶⁰ "The very devices intended to connect us with others can, ironically, undermine our feelings of connection while spending time with the most important people in our lives".⁶¹

Conclusions

"Screen time is one factor, among many, that plays a role in children's development."⁶² For our youngest children there are many potential risks to their health and development from any type of screen use, especially with frequent or lengthy use.⁶³

There are many unanswered questions about the impacts of the newer technologies,⁶⁴ and research on its effects can't keep up with the rapidly expanding developments in technology. That's not likely to change anytime soon.

Something else that isn't changing though, is what tamariki need to develop well. We have a wealth of knowledge about what tamariki need to thrive. We also have enough information about screen use to suggest that when it comes to our precious pēpi and tamariki, we should proceed with caution.

Glossary of Māori terms:

Pēpi – baby, infant

Tamaiti – child

Tamariki - children

Waiata - song

Whānau – extended family

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⁵⁵ Schmidt et al., 2008

⁵⁶ McDaniel & Radesky, 2018

⁵⁷ Sigman, 2012

⁵⁸ McDaniel & Radesky, 2018

⁵⁹ Radesky et al., 2014

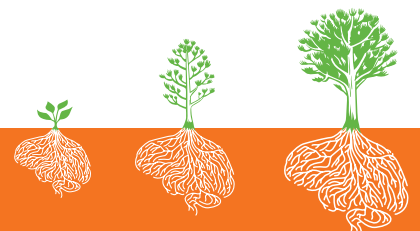
⁶⁰ McDaniel & Radesky, 2018

⁶¹ Kushlev & Dunn, 2019, p.17

⁶² Browne et al., 2019, p. E1

⁶³ AAP Council on Communications and Media, 2016

⁶⁴ Kucirkova & Radesky, 2017



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