

BONDING: A BRILLIANT BRAIN BUILDER

The importance of supporting parents to bond with their child from the earliest years

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Our name, Koi Tū, was gifted by Ngāti Whātua Ōrākei. It means the sharp end of the spear. Like a spear, Koi Tū aims to get to the heart of long-term issues challenging our future.

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The importance of supporting parents to bond with their child from the earliest years

Overview

Although it has long been acknowledged that children benefit from a strong bond with their parents, the precise ways bonding helps the child – through improved brain development and building specific skills necessary for lifelong wellbeing – are only now becoming clearer. New evidence also reveals specific ways parents can interact with their child to help promote bonding. These new insights demonstrate the critical need to develop social policies around ways to support parents in caring for children, such as through improved paid parental leave.

Key points:

- The brain develops rapidly *in utero* and during infancy, and optimal early life brain development helps children achieve lifelong success.
- Strong bonds between children and their parents/caregivers, facilitated by a supportive and nurturing parenting style, help promote early brain development, including a set of skills known as executive functions.
- Conversely, the absence of a strong parent-child bond may negatively affect brain development, with lifelong consequences.
- The development of a warm, secure relationship between parent and child is also affected by the family/whānau context and broader environmental factors.
- Bonding should involve the people most important in the child's life, but despite the desire, many fathers are less able to engage in early life bonding due to lack of structural support.
- Factors such as paid parental leave, screen time of parents and children, parental mental health and greater paternal involvement warrant special attention.

Dramatic brain development occurs in the early years

The early years of life are inarguably the most important period for brain development. From the time of conception through to infancy and early childhood, children's brains undergo massive growth, with potentially more than a million new neural connections being formed every second.¹ This rapid neurological growth serves to establish key physiological and behavioural functions and capacities, including sensory abilities, early language skills, learning and memory, and cognitive and socioemotional development.²

The period between conception to the age of two – often denoted the first 1,000 days – is particularly crucial. Substantial brain growth occurs *in utero*, and at birth babies' brains are just over a quarter the size of the adult brain. By the first year, the brain has already more than doubled in volume, and it reaches 80% of adult size by the age of two (Figure 1).³

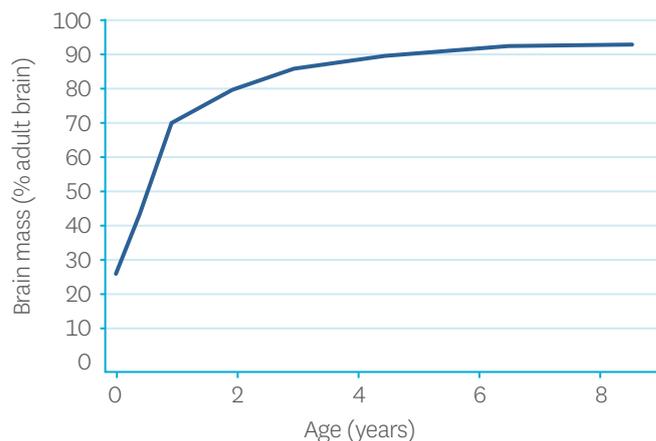


Figure 1: Brain mass shows tremendous growth by the age of two, and growth rates gradually slow as the child gets older. Data compiled from Dekaban & Sadowsky.³

Optimally developed brains provide the best foundation for lifelong wellbeing

Most of the brain architecture established in early life comprises the primary structures and connectivities that support fundamental aspects of brain function. These aspects serve as the scaffold on which more complex brain circuitry can later be laid down. Because of this, optimal brain development in early life provides a strong foundation for lifelong wellbeing and success.^{4, 5}

Of special importance is the development of the complex brain circuitry that includes a set of cognitive processes collectively known as executive functions. These processes help with paying attention, planning ahead, working towards goals and restricting impulsive behaviours; they are therefore essential for success in school and working life, and for maintaining good relationships with others.⁴ It is well established that experiences during early life, including receiving warm, responsive and sensitive parenting, enhance executive functioning.⁶

Given that the human brain is most malleable to change ('plastic') during early life, there is tremendous opportunity to help children develop to their full potential by providing them with appropriate experiences. Conversely, adverse exposures may lead to suboptimal brain development, which can lead to snowballing impacts throughout life in the form of school failure, losses in work productivity, poorer mental and physical health, and poorer interpersonal relationships.

The importance of parent-child bonding

To survive, children require basic necessities such as food, water, clothing and shelter. However, in order to *thrive*, children also require emotional security, for which they depend almost entirely on their parents (or primary caregivers).ⁱ Humans are social creatures, and infants are born to innately seek meaningful relationships. Having a secure relationship with a parent provides a child with a safe and secure base from which they can explore their environments and to which they can return in times of distress.⁷ Importantly, this has physiological benefits through brain growth, as well as psychological benefits through improved socioemotional development, cognitive coping skills and resilience mechanisms. Psychological resilience helps to act as a critical buffer against stress and poor mental health later in life.⁸

ⁱ While the term 'parent' is used for simplicity throughout this brief, this may also refer to other primary caregivers who are the people consistently closest to the child during their early life, regardless of biological relationship.

The strength of the parent-child bond, and in turn a child’s socioemotional development, depends on a range of factors relating to the individual child, their family/whānau, and wider environmental factors including the social and cultural milieu (Figure 2).^{9, ii} A child raised in a nurturing and supportive environment is more likely to have secure parental attachment and thus thrive, compared to a child exposed to emotional neglect, physical abuse, household conflict and other toxic stressors.¹¹ A chaotic home environment characterised by greater disorganisation and instability impacts negatively on parental responsiveness.¹² Additionally, parental stress can affect their capacity to responsively care for their children, and some parents facing mental health issues or relationship difficulties may also find it harder to be responsive or provide a loving and secure environment.^{13, 14}

The family/whānau environment itself is situated within the broader context of the wider environment. Socioeconomic status, the availability of appropriate social support, and supportive workplace or government policies can all feed into the ability of parents to establish a strong bond with their child.

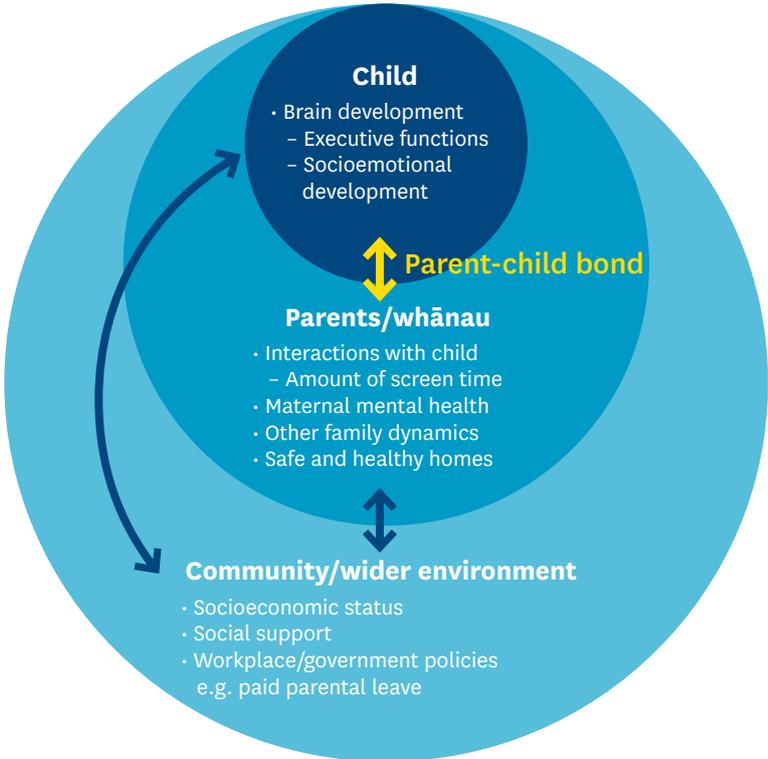


Figure 2: Multiple factors impact on the quality of parent-child bonding. A child’s emotional security and brain development occur within the wider context of their family/whānau, the broader environment and the interplay between each setting (arrows).

Poor bonding disrupts brain development and long-term wellbeing

Emotional neglect is a form of child maltreatment that involves poor bonding. It refers to the failure by the parent, within the limits of their resources, to attend to the child’s emotional needs, as reflected through emotional unresponsiveness and limited interactions with the child. Its estimated global prevalence is about 18%.¹⁵ New Zealand data are sparse, although a nearly 50-year-old analysis from the longitudinal Dunedin Multidisciplinary Health and Development Study found that 16% of 3-year-old children experienced maternal behaviours such as indifference and being unaware or unresponsive to their needs.¹⁶

ii This brief focuses on the social, psychological and environmental contexts; however, bonding is also influenced by biological factors such as the child being born prematurely or having some types of chronic illnesses.¹⁰

The adverse impact of emotional neglect on a child’s immediate and longer-term health is well established.¹⁷ Much of the research is centred on children who had been previously placed in institutionalised care, with limited responsive caregiving, one-on-one interaction and cognitive stimulation. Previously institutionalised children have been found to exhibit persistently poorer executive functioning skills.¹⁸ The Christchurch Health & Development study found that higher levels of exposure to emotional neglect were associated with a higher risk of psychosocial adjustment problems at age 18, including anxiety and substance abuse.¹⁹ More recent data from the 2019 New Zealand Family Violence Survey has linked childhood emotional abuse (another form of child maltreatment) to an increased risk of a wide range of poor health outcomes in adulthood such as heart disease, psychological and cognitive disability, depression, anxiety and other mental health conditions.²⁰ Other studies that specifically measured the adult’s reported feelings of a low level of support and love experienced as a child have similarly found adverse impacts on mental health.²¹ On the other hand, children with more secure parent-child relationships report experiencing greater positive emotions such as hope, love and gratitude in middle childhood.²²

Brain imaging data, which provides biological evidence of brain developmental dysfunction, has shown that children who remain in institutionalised care have relatively immature brain activation patterns during adolescence, and among those placed in foster care, those who experienced more disruption through multiple placements had altered brain activity.²³ Experience of early institutionalisation has also been reported to be linked to smaller total brain volume, decreased volumes of gray matter and white matter, and reduced cortical thickness, with associated changes in behaviour.^{24, 25} Other imaging studies involving people who experienced low to moderate levels of childhood emotional neglect have shown that associated depressive symptoms could be partly explained by disruptions in brain circuitry involved in reward responsiveness.²⁶

Building the bond

Building an emotionally secure relationship with a child depends on early engagement that is frequent and meaningful, beginning as early as the prenatal period (Figure 3).



Figure 3: Ways to promote parent-child bonding during early life.

Prenatal

Many components of the fetus’ hearing system are functional by the second trimester, and there is evidence that sound recognition and learning occur *in utero*. For example, newborns tend to prefer their mother’s voice to a stranger’s, their mother’s native language to another language, and even a story that had been read aloud during gestation compared to a new story.²⁷

Neonatal

After birth, repeated skin-to-skin contact (also known as kangaroo care for premature infants) stimulates many physiological changes in both mother and newborn that help establish bonding immediately and in the longer term.²⁸ Skin-to-skin care promotes the release of maternal oxytocin, a hormone that plays a role in social interaction and bonding by countering stress responses and

promoting growth.²⁸ Breastfeeding may help with bonding, with more months of breastfeeding associated with greater maternal sensitivity (responsiveness to the baby and its cues) even up to a decade later.^{29, 30} Non-breastfed babies can be bottle fed with skin-to-skin contact to also promote bonding.

Infancy (0 to 2 years)

Consistent affectionate touch from a parent has established benefits for the infant, including regulating stress responses and immune function, and promoting psychosocial development and secure attachment.³¹

Parent-infant bonding can also be strengthened by exposing the growing infant to an environment rich in so-called ‘serve-and-return’ interactions.³² This sporting metaphor describes how children continually seek interaction from their caregivers through ‘serves’ – in infants, these cues include vocalising, facial expressions and crying – which prompt the adult to respond with eye contact, reassuring words or a hug (‘returning the serve’). Adult-child play inherently provides opportunities for serve-and-return exchanges. For young infants, simple games such as copycat, peekaboo and naming objects can help to focus attention, use working memory, build language connections, develop self-control and build trust in the adult.³³

Serve-and-return interactions involve a high level of *sensitivity* from the parent in recognising and responding promptly to the needs of the child. They reinforce the bond between adult and child, promote optimal emotional development and psychological resilience, and fulfill the innate need for the infant/young child to establish meaningful connections.³⁴ The absence of such connections can cause stress and confusion, and over a sustained period may impede brain development and disrupt the child’s learning processes.

Multiple neuroimaging studies have demonstrated how the back-and-forth nature of serve-and-return interactions helps build neural connections in brain regions important for executive functions including learning, self-regulation and impulse control. For example, a longitudinal study found that greater levels of a mother’s sensitivity to her five-month-old infant are associated with higher brain activity and development as measured by resting electroencephalography at age 10 months and again at 24 months.³⁵ Other longitudinal studies have also shown that maternal sensitivity is associated with forming specific functional connections in the limbic system by age four or six.^{36, 37} The limbic system, which includes the hippocampus and amygdala, is responsible for learning and memory, and for regulating behavioural and emotional responses. Neuroanatomical changes appear to be stable at least into late childhood, with another study finding that maternal sensitivity at one year of age could predict amygdala and hippocampal volume at age 10.³⁸ Studies are now beginning to directly link brain morphology changes to poorer socioemotional functioning.³⁹

Consistency in parental cues is emerging as another important factor. One-year-old infants exposed to more unpredictable maternal interactions demonstrated poorer cognitive development at age two and poorer memory at age six, and this was independent of maternal sensitivity or socioeconomic status.^{40, 41}

Importantly, the described neuroimaging studies involved infants who received care levels within the normal range, not extreme parental neglect. This highlights the sensitivity of the developing brain to subtle differences in experience.

Early childhood (2 to 5 years)

Spending meaningful time with a young child in a way that involves their growing interests helps promote bonding. A good example is shared book reading. This can provide numerous serve-and-return

experiences if the parent and child together review the book content during the process with questions, answers and comments.

Reading together during the early years benefits children’s brain development and is a powerful tool to improve language skills. For example, a longitudinal cohort study of Singaporean children showed that being read to by their parents for just 10 minutes a day markedly improved their literacy skills at age four, especially among those of lower socioeconomic status.⁴² A large OECD study of five-year-olds in England, the United States and Estonia showed that the more frequently parents read with their children, the more likely it was that the children showed better socioemotional skills and prosocial behaviour. A gradient was seen across the range of reading frequencies – that is, every extra day or two of being read to had a measurable effect on socioemotional skills, and children who were read to the most (five to seven days a week) scored substantially higher than those who were read to one to two days a week or less (Figure 4).⁴³

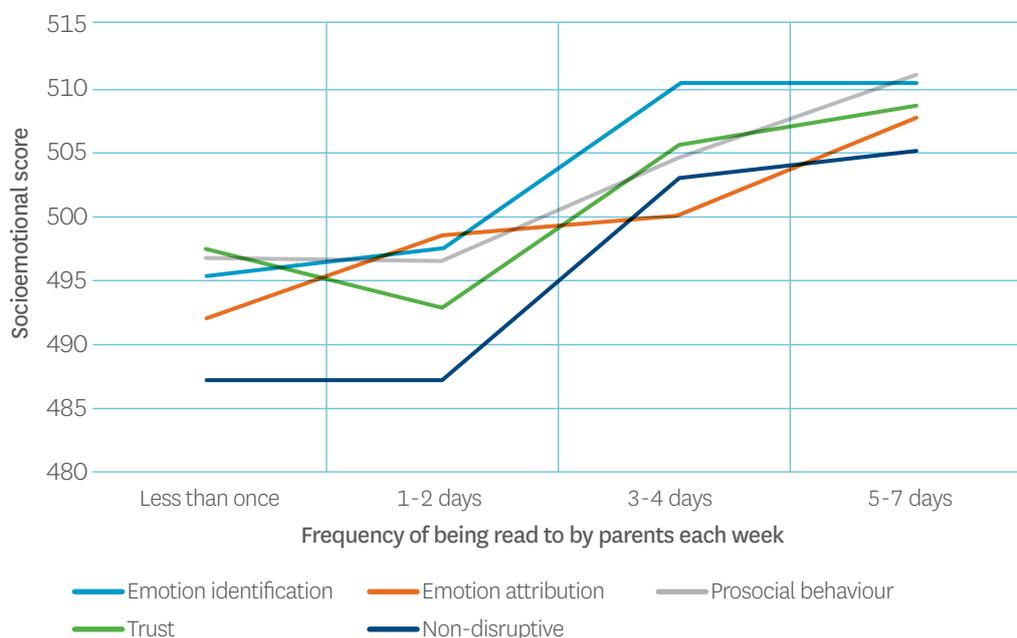


Figure 4: Being read to five to seven times a week by a parent is associated with higher mean scores on a range of socioemotional measures, even after accounting for socioeconomic status. Data compiled from OECD.⁴³

Having meaningful conversations with a child also strengthens bonding. Indeed, a greater number of conversations with parents has been directly linked to greater activation of Broca’s area (the brain region responsible for processing language) in four to six-year-old children, independent of socioeconomic status.⁴⁴

The Growing Up in New Zealand longitudinal study has found that children who demonstrated higher levels of self-control at age four and a half were more likely to have been read to or told stories by their mothers. They also received more praise and encouragement, and experienced more shared mother-child interactions not dominated by either person.⁴⁵

Importance of parental mental health

A critical factor in the fostering of a strong parent-child bond is the parent’s mental wellbeing. High levels of stress, anxiety or depression are likely to adversely affect a parent’s ability to bond optimally with their child. The overall prevalence of postnatal depression in New Zealand women is reported to range from 8 to 16%,⁴⁶⁻⁴⁸ although these figures do not account for the likely higher prevalence of

subclinical depression,⁴⁸ and also obscure the heightened risks for certain subgroups such as women who had experienced prenatal depression or are of Asian or Pacific ethnicity. Indeed, another New Zealand study focused on Pacific families found depressive symptoms in 31% of post-partum Tongan women.⁴⁹ An estimated 4% of fathers also develop depression following birth of their child.⁵⁰

The impact of poor maternal mental health on compromised bonding with the child can feed into a vicious intergenerational cycle. A longitudinal study showed that women exposed to childhood emotional neglect had more than four times the risk of experiencing prenatal depression.⁵¹ Prenatal depression is in turn associated with altered fetal brain development and biochemistry, including compromised development of executive functions in the child.⁵² These children may therefore become more susceptible to psychological distress later in life.⁵³

Fathers have a critical role too

Although the majority of research has focused on mother-child relationships, the increasing numbers of working mothers and changing social norms regarding gender and caregiving have prompted growing focus on the importance of fathers.⁵⁴ There is clearly a critical role for fathers to play in their child's development starting from the earliest days of life: fathers, like mothers, experience increased release of oxytocin following skin-to-skin contact with their infant.⁵⁵ Secure father-child attachment during infancy is associated with higher socioemotional development, language skills and self-esteem in early to middle childhood, even controlling for the mother-child relationship.⁵⁶ A systematic review has demonstrated a positive association between father involvement (level of engagement, accessibility and responsibility) and children's cognitive skills in early to middle childhood.⁵⁷ Notably, several studies reported that this finding held across ethnicities and socioeconomic status.

Paternal involvement generally requires wider environmental factors to accommodate it, such as workplace and government policies enabling paternal leave. Fathers who take longer periods off work after the birth of a child are more likely to partake in caregiving and developmental activities from infancy through to early childhood, and by middle childhood, their children report greater closeness and communication with their father.^{58, 59}

Implications for parenting and policy

The importance of strong parent-child bonding and its effects on brain development has many implications for parenting guidance and policy development. However, integral to all aspects is the need to recognise that efforts to promote a child's brain development, particularly through establishing strong bonds with a parent, cannot be regarded as an individual endeavour but rather as a collective behaviour involving the family/whānau unit. Parents need to be empowered with knowledge of the importance of bonding on brain development. Family/whānau circumstances and the wider social environment also need to be conducive for bonding to occur (Figure 2). Multiple barriers may be in play, such as disturbed family dynamics (e.g. family violence), lack of whānau/social support and low socioeconomic status, leaving a busy parent little time or opportunity to engage in sustained bonding activities.

Here we highlight three areas for further discussion.

1. Paid parental leave

The current paid parental leave policy in New Zealand has multiple limitations that mean intended benefits are not fully realised. One limitation is the length of paid parental leave. While recent legislative changes to increase the length to 26 weeks are a step in the right direction, this covers a small fraction of the first 1,000 days of the child's life. Although above the OECD average of 18.4 weeks, many countries provide considerably longer leave payments, notably Greece (43 weeks), UK

(39 weeks) and Slovak Republic (34 weeks).⁶⁰ A second limitation is the low payment rate.⁶¹ Weekly payments are currently capped at about 57% of the median weekly income,ⁱⁱⁱ placing New Zealand near the bottom among OECD countries. Fourteen other OECD countries offer a 100% payment rate.

New Zealand does not have dedicated paid paternity leave, which tends to act as a major deterrent to fathers planning to provide primary care and establish strong bonds with their child,⁶¹ even though there is compelling evidence that New Zealand fathers prefer to spend more time with their child than they are able to, both after birth and during childhood; indeed, spending time with mother and baby is a strong cultural norm for Pacific fathers.⁶⁴⁻⁶⁶ Another consequence of the limitations is that parents of lower socioeconomic status are less likely to be able to afford to take unpaid parental leave, and therefore have less time and mental energy available to regularly engage in bonding activities with their child. In 2019, nearly half of all newborns were born into socioeconomic deprivation, and in 2021 an estimated 187,300 children were living in poverty.^{67, 68}

New Zealand currently ranks fifth-lowest on public expenditure on parental leave among OECD countries.⁶⁰ Improved paid parental leave – in both payment amount and duration of payment – may not only help provide opportunities to nurture strong bonds, but also reduce the financial stressors that exacerbate poor parental mental health.⁵³ This form of structural change will have numerous downstream benefits for parents, children and wider society that continue to future generations.

2. Screen time

Another factor that is increasingly implicated as interfering with parent-child interactions is screen time/device use, both by parents and by children. New Zealand tamariki are generally exposed to a substantial amount of screen time, with 2019/2020 data showing that more than half of two- to four-year-old children watch screens for two or more hours per day.⁶⁹ Time spent on screens tends to substitute for time best spent interacting with parents, and exposing young children to screen time is not recommended without attentive parental involvement.⁷⁰ Further, any screen time for infants under two years is not recommended due to potential adverse effects on cognitive and socioemotional development. The importance of monitoring screen time is supported by real-world data in the New Zealand context: having limits to screen time from the age of two was associated with improved self-control in preschool children from the Growing Up in New Zealand study.⁴⁵ Screen time and device use by parents themselves needs to be monitored, as this may detract from time and attention given to children. Preliminary research indicates that mothers of newborns tend to underestimate their own device use, suggesting the need to inform and support new parents in choices about device use.⁷¹

3. Executive functions

There is likely to be great value in emphasising the link between parent-child bonding and executive functions. These functions predict behavioural, emotional, academic and social competencies throughout life. The importance of a child's well-developed executive functions in leading to success across multiple domains of life, and the consequent benefits to society, cannot be overstated⁴ and further reinforces the value of ensuring all children are able to enjoy warm, secure relationships with their parents. Parents, too, will likely appreciate being provided with such knowledge and respond accordingly. Again, however, this depends heavily on supportive broader environmental factors that facilitate the establishment of such relationships.

Extensive economic analyses strongly support the concept that investing in children from the earliest stages is critical to obtaining the best returns in terms of health, education and productivity.⁷²

iii At the time of publication, the maximum weekly paid parental leave is \$621.76 while the median weekly salary is \$1,093.

Importantly, there are also intergenerational repercussions: children who lack strong bonds with their parents may, in turn, be less likely to form a secure bond with their own children; conversely, children who enjoy a strong bond with their parents may be more likely to later form strong bonds with their children.⁷³ Research from the Dunedin multidisciplinary study has shown that mothers who had experienced warm, sensitive parenting parented their three-year-old children in a similar way, with more positive behaviours seen in the child.⁷⁴ Interventions to promote parent-child bonding opportunities would therefore provide intergenerational benefits.

A mix of targeted and universal intervention measures can be adopted. With regards to targeted measures, overseas studies suggest that a range of interventions can be effective in at-risk families. For example, when parents at risk for child neglect or abuse underwent a programme to increase parental nurturance and sensitivity, their children demonstrated a range of improved outcomes in executive functions, emotional regulation and stress responses.^{75, 76} Effective interventions, reflected by improved post-treatment emotional bonding, have also been reported for other at-risk groups such as mothers with postpartum depression or with preterm babies.⁷⁷ On the other hand, more universal measures – whether involving educational guidelines for parents about executive functions and screen time, strategies to address maternal mental wellbeing, or increased financial assistance via paid parental leave – are also needed for impact at a population-wide level, and to be most effective these must be aimed not only at parents/whānau but also the wider societal environment.

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