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Pakiaka Tupuora Parenting From the Start: Evaluating a preventative intervention to improve attachment and health outcomes for mothers and their babies

A thesis presented in partial fulfilment of the requirements for the degree of

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Leith Anna Morrimire

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Abstract

Background: Parenting interventions can improve individual and societal outcomes but few are brief, preventative, or consistent with Indigenous knowledge. This is the first based on the latest multidisciplinary theory – the evolved developmental niche (EDN).

Objective: To evaluate the one-day (8hr) preventative antenatal *Parenting From the Start* workshop in terms of infant attachment and other medium-term outcomes.

Methods: Randomised controlled trial with two parallel arms open to pregnant residents of the Manawatū/Horowhenua regions of Aotearoa New Zealand. 57 English-speaking women aged 24 to 44 years were randomly assigned to intervention (n = 27) or wait-list control (n = 30) groups alongside standard free maternity care and parental leave. Retention rates were 81% at the home visit (n = 22 intervention; n = 24 control), and 74% at the clinic assessment (n = 20 intervention; n = 20 control). Primary analyses were based on maternal sensitive responsiveness as measured by the *Ainsworth Sensitivity Scales*, *Mini-Maternal Behavior Q-Sort*, and *Observational Measure of Sensitivity and Responsiveness* (11 to 24 months post birth) and infant attachment on the *Strange Situation Procedure* (11-22 months post birth). Secondary outcomes included a range of self-reported parenting intentions and strategies.

Findings: Intervention group infants had higher rates of secure attachment (90%) than the control group (64%). This effect was significant at the level of 3-way attachment security (p = .011, Cramer's V = 0.448), and attachment subcategory (p = .047, Cramer's V = 0.552), but not 2-way attachment security (p = .059, Cramer's V = 0.342). Maternal sensitive responsiveness did not differ across study conditions (p = .097, RBC = 0.288). Parenting intentions relating to breastfeeding, proximal care, room sharing, and elimination communication were significantly increased in the intervention group, as were responsive parenting beliefs, and frequency of positive care reported over the infants' first year.

Interpretation: The intervention significantly increased responsive parenting intentions and beliefs, positive care over the first year, and rates of secure attachment. *Parenting From the Start* warrants further study as a brief, preventative, bicultural intervention.

Trial registration ACTRN12617000321347, universal trial number U111111840331. Trial information can be found at: http://www.ANZCTR.org.au/ACTRN12617000321347.aspx

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CHAPTER ONE

Part 1: Pakiaka Tupuora

Te tupu o te māhuri tērā te tupu o te rākau.
The growth of the sapling determines the development of the tree.

Overview of the Research

This is a project about parenting – why it matters, whether we can improve it, and what this might mean for people's lives. I examine how childhood experiences influence future mental and physical health, and why inadequate caregiving contributes to societal problems such as violence and other criminal behaviour as well as personal and interpersonal distress. Pathways to mental illness and wellbeing are explored as part of the rationale for developing a preventative intervention that helps whānau (families) understand the difference between healthy and harmful childrearing. Based on the latest neuroscience and extensive multi-disciplinary research I argue that the best results are likely to be obtained by intervening early, to avoid missing sensitive periods for healthy development and to sidestep potential psychological problems before they appear. Intergenerational, biological, and social patterns suggest ways in which some kinds of therapeutic input might alter not just individual outcomes, but those of tamariki (children) and mokopuna (grandchildren/descendants) - making them excellent investments in the future. Too often parenting interventions have been based on incomplete knowledge about child development or assumptions about caregiving that are historically and culturally specific – inappropriate for the unique context of Aotearoa New Zealand. My aim was to develop and evaluate a parenting intervention for expectant mothers and their support networks with respect for the autonomy and diversity of families in my community. The intervention was to be brief, preventative, and based on the best evidence available across academic disciplines as well as culturally-appropriate for Aotearoa New Zealand. As a working title I called the workshop *Parenting From the Start*. The wider project was gifted the name *Pakiaka Tupuora* – which can be translated as 'the roots of healthy development', or 'the origins of wellbeing'.[1] Here I provide an overview of the two parts of my research, briefly outline the local context and describe the initial constraints I set for myself.

As a clinical psychologist I was trained as a scientist-practitioner: to work alongside individuals and families facing mental health challenges and synthesise biological, psychological, and

[1] I am eternally grateful to Dr Ian Christensen and Shirley Mullany of *He Kupenga Hao i te Reo* for naming my work and the Trust it birthed *Pakiaka Tupuora*, reflecting the strong foundations we need to reach our full potential, individually and collectively. The roots anchor a tree and provide it with nutrients, as well as a connection back to Papatūānuku (Earth mother). At a more abstract level, roots refer to whakapapa (ancestry) and are reminiscent of networks of brain cells – not obvious from the outside, but critically important nonetheless.

socio-cultural knowledge for their benefit, but also to generate research and extend our understanding of humans, health, and healing. Clinicians are well placed to investigate the problems they see again and again, and after several years working at the 'bottom of the cliff', I decided to climb the mountain and figure out why so many people kept falling off. The conclusion I reached, like so many others in the pregnancy and parenting field, was that there was an immense and important gap between research and practice. Parents and other caregivers want what is best for their tamariki, but access to good quality information and resources is uneven. Even health professionals may have minimal familiarity with parenting research outside a few key points, and the many families struggling just to get by cannot be expected to seek such information out. As a mother myself, with three beautiful children at home, my fourth baby miscarried the day data collection was to start, and my fifth born two weeks after completing the intervention phase of this project, I was well-motivated to tackle the mahi (work) of unearthing and disseminating scientific findings. What, I asked, do parents need to know before making decisions regarding their pēpi (baby's) early months and years? What matters for long-term outcomes? What is the least we could do that would make a real difference to the lives of local families? This project is my attempt to answer these questions.

The thesis has two parts. The chapters in Part 1 concern the *Parenting From the Start* workshop that I developed. The foundations for the programme are built on a review of key factors associated with healthy and suboptimal human development, synthesizing and critiquing literatures within history, psychology, neuroscience, biology, anthropology, sociology and Indigenous[2] scholarship. Part 2 of the thesis outlines the randomized controlled trial (RCT) I conducted to assess the effectiveness of the *Parenting From the Start* intervention. The remaining 5 chapters of Part 1 summarise the multiple literature reviews I undertook in designing the intervention. Chapter 2 – Traditional Māori Caregiving: Implications for a Bicultural Parenting Intervention in Aotearoa New Zealand places local parenting in social, historical, and scientific context and outlines my attempt to define and use a partnership methodology as the basis for my project. Chapter 3 – Who Cares? Alloparenting and Social Support Within the Evolved Developmental Niche outlines the influential body of thought relating to the attachment relationships which develop between infants and their caregivers, and explains why shared care by kin and non-kin group members should be at the heart of intervention design but usually is not. I argue that the newer multidisciplinary theory of the evolved developmental niche (EDN) is a better fit for the New Zealand context than traditional attachment theory. Chapter 4 – Improving Attachment in Aotearoa: Lessons From the Cross-cultural Literature explains why attachment remains an important concept that is relevant to all infants. Chapter 5 – Growing Up in the Evolved Developmental Niche: The Impact of Early Experience looks beyond attachment to the consequences of positive experiences and adversity, considering how they impact future health and wellbeing, the extent to which they are malleable, and where change is needed so that young people have the opportunity to reach their potential. I explain how the human EDN makes sense of this literature and offers the concept of 'optimisation' to move us beyond resilience as a goal for child outcomes. Chapter 6 – Outlining a Preventative Intervention: The *Parenting From the Start* Antenatal Workshop describes the interventions I developed to

[2] I follow the United Nations and others in capitalising the term 'Indigenous', to indicate "peoples of long settlement and connection to specific lands who have been adversely affected by incursions by industrial economies, displacement, and settlement of their traditional territories by others" (University of British Columbia's Indigenous Foundations, cited in Weeber, 2020, p. 1 para. 5).

cover the most important information needed during pregnancy and the first 12 months with a new pēpi. New and expectant parents are bombarded by claims relating to caregiving, many of them conflicting. The goal of *Parenting From the Start* was to provide attendees with sufficient background to evaluate such claims and choose their own paths. Topics like mammalian evolution, early brain development, and attachment provided the back drop for discussions of pregnancy, birth, feeding, toileting, and other elements of early care across cultures and time. Attention was given to presenting the large quantity of complex scientific evidence in an engaging, accessible, and non-judgmental way that left attendees well-informed and confident in their (diverse) parenting choices. Findings and ideas were placed in historical and geographical context, and explanations acknowledged contextual factors such as poverty and colonisation. Cultural sensitivity was considered key, and this issue is expanded on subsequently. Each workshop covered all elements of the human evolved developmental niche, with examples spanning many different cultural groups, and a focus on the responsive traditional parenting practices of Māori, as tangata whenua[3] (Indigenous people) of Aotearoa. Participants were also gifted a *Moby Wrap* baby sling in partial replication of a highly successful intervention study conducted 30 years ago and given less attention than it deserves (Anisfeld et al., 1990). With key resources and knowledge at their disposal, would Manawatū parents be empowered to optimize their attachment relationships and other markers of infant health?

Part 2 of the thesis, introduced in Chapter 7 – Evaluating a Preventative Parenting Intervention, outlines the randomized controlled trial I designed to evaluate the *Parenting From the Start* intervention. Chapter 8 – Methods describe how the study was conducted and the reasons for these decisions. Participants were randomly assigned to either an intervention or 'waiting list' control group on entry into the study during pregnancy. All participants self-identified as female, so the terms 'mothers' and 'women' are used interchangeably with 'study participants' throughout this thesis. The final part of the research journey was data collection and analysis. Chapter 9 – Results summarises what I found. Participants were followed-up over 1-2 years with a home visit and psychology clinic assessment as their babies approached and passed their first birthday. In addition to questionnaires, the final assessment included the *Ainsworth Strange Situation Procedure* (Ainsworth et al., 1978), which was videoed to allow later classification of the attachment relationship patterns. The famous series of separations and reunions were staged to activate the child's attachment system and allow classification of the relational expectations they had developed with respect to their mother. Obviously, attachment is only one component of many making up a person's experience and resilience. Nevertheless, links to important child outcomes (Sroufe et al., 2005a) make it one worth knowing about, and thus the primary outcome measure for the study. Chapter 10 – Discussion and Conclusions considers the implications of my findings to the field, the caveats, and suggestions for future research.

No researcher is a 'blank slate', and I came to this project with knowledge and values which influenced the direction it took. I served for six years on the trust board of a non-governmental organization (NGO) tasked with providing funded pregnancy and parenting services in the Manawatū rohe (region), and had some familiarity with the challenges involved. I was influenced and inspired in this work by my friend and mentor Aileen

[3] Tangata whenua can be translated literally as 'people of the land'.

Devonshire, a Māori childbirth educator who devoted decades to empowering local families. I worked alongside young people and families as a clinical psychologist, witnessed their struggles, and learned from the wisdom of my clinical supervisors. Finally, I was a parent myself, with the desire to do my best that many parents feel. Not everybody has the chance to go to such lengths to answer their burning questions about what babies need and how we might meet those needs. I count myself very lucky.

Context of the Research

Designing a parenting intervention involves making decisions about important characteristics such as the type, length, and intended audience, and these must make sense as solutions to problems within the local context. I begin by describing the baseline level of pregnancy and parenting information available in my region.

Current Antenatal Education in Aotearoa

Midwives, childbirth educators, and *Tamariki Ora/Well Child* nurses are universally-available sources of free, face-to-face information for parents-to-be in Aotearoa New Zealand. Ninety one point six (91.6) percent of the 2,120 Manawatū women who registered with a Lead Maternity Carer (LMC) during 2013 chose a midwife to provide their care antenatally and during the first 4 to 6 weeks postnatally (Midcentral District Health Board & Whanganui District Health Board, 2015). Antenatal classes are also available free of cost in the Manawatū region, through *Bumps to Babies* classes, with no restrictions on access (Barnardos, 2021). Barnardos describes *Bumps to Babies* as providing "expectant mums and partners (and support people) all the information they need to prepare for the arrival of their first child" (Barnardos, 2021, p. 1). Courses are offered over 6 weeks or a single weekend (12-hours total). Topics covered include pregnancy care, preparing for birth, labour and birth, informed decision making, and early parenting, including caring for the newborn, newborn procedures, breastfeeding, safe sleeping, and the transition to parenthood, with an emphasis on hospital birth and interventions (Barnardos, 2017). *Babies and Beyond* is an additional 6-hour postnatal programme offered free of cost in the MidCentral rohe (region). Further information on pregnancy and parenting is offered online through websites such as *Mokopuna Ora* (https://mokopunaora.nz). This is the 'care as usual' available to all women in my waiting-list control and intervention groups.

Despite this useful content, the parenting information available to those who attend existing antenatal classes is neither broad nor deep. Topics are designed and presented by childbirth educators, who have completed a two-year part-time training covering aspects of pregnancy, birth, and early infant care. The brevity of this training means that child birth educators are unlikely to have expert knowledge of developmental psychology, early brain development, or evidence-based parenting. Cultural differences and the context of colonisation are rarely examined, and the evolutionary value or history of particular practices is unlikely to be included. *Well Child* nurses, who visit several times during the first year, also provide parenting advice relating to infant feeding, sleep, and general care. Although they have

completed a three-year degree in nursing, nurses are similarly unlikely to have expertise in psychology or child development. An evidence-based psychological perspective on pregnancy and early parenting is lacking. The *Parenting From the Start* antenatal workshop was intended to fill this gap. The choice of longitudinal experimental methodology provided information regarding the causal relationships between the intervention and later outcomes.

I move now to the characteristics I held in mind as I created the *Parenting From the Start* antenatal workshop and the RCT to evaluate it. These were the initial criteria guiding the project, and are important to 'unpack' so my reasoning is apparent.

Desirable Characteristics of Parenting Interventions

I argue that the best interventions would be preventative, to set families up for success from the start. They would be cheap and replicable – able to be scaled up, as well as brief, requiring 'just enough' investment in time, energy, and resources to provide meaningful help to families/whānau. It is my view that parenting interventions should be culturally-appropriate to Indigenous peoples and de-colonise rather than perpetuating racism and injustice, as well as accessible to as wide an audience as possible (teens to grandparents, parents to professionals, and people with different socio-economic opportunities). They should be respectful and empowering – facilitating effective change. Finally they should be based on the best evidence available, and shown to work in the real world. These eight goals are summarized in Table 1. The following sections expand on these desirable characteristics of parenting interventions – incorporating information about the interventions that are currently available and the 'gaps' in the literature filled by the present study.

Table 1.

Desirable Characteristics of Parenting Interventions

	Goal of intervention	Rationale
1	Evidence-based	Interventions should be based on the best quality knowledge available
2	Respectful	Interventions should be non-judgmental and supportive, upholding the mana of all those involved
3	Empowering	Interventions should facilitate informed choice
4	Preventative	Interventions should utilize the earliest possible timing to avoid missing sensitive periods for healthy development and to sidestep potential psychological problems before they appear
5	Brief	Interventions should be resource-efficient to minimize costs and take the minimum time necessary to produce the degree of change required
6	Replicable/'scale-able'	Interventions should be accessible to the maximum number of people. They should be able to be repeated with some degree of consistency and designed with the potential to 'scale up' to larger populations if they prove to be helpful
7	Culturally appropriate for Aotearoa NZ	Interventions should be supportive for participants of all ethnic and cultural groups, and tangata whenua in particular - contributing to positive Treaty relationships and social justice

8	Effective	Should demonstrate positive outcomes such as reducing harm, improving wellbeing, and/or promoting healthy development

Evidence-Based

Many parenting interventions do not pass through a rigorous evaluation process, rendering weak any claims they are 'evidence-based'. This is true both of programmes which are universally available and those targeted at particular groups (usually those considered 'vulnerable'). *Bumps to Babies* antenatal classes are theoretically available to all birthing families in the Manawatū rohe, and their purpose is presumably to increase health for mother and infant, but they are not assessed in terms of their impact on birth, breastfeeding, postnatal depression or attachment outcomes. Reporting on pregnancy and parenting classes tends to focus simply on the number of attendees (colloquially referred to as 'bums on seats') and demographic characteristics such as ethnicity (Te Pai Hauora o Ruahine o Tararua/MidCentral District Health Board, 2020). Similarly, the assessment of targeted parenting programmes often relies on good intentions, participant feedback, and self-report measures. This is problematic. Without proper evaluation we cannot optimise outcomes. I suggest that 'evidence-based' interventions should follow a cyclical process. Firstly, they should be based on the most complete multidisciplinary theory and research available. Secondly, they require evaluation using robust methodologies. Returning the information gained to the clinical literature completes the process and encourages repetition of the research cycle. Thus, the *Parenting From the Start* workshop was developed with reference to a broad base of scientific findings. Effectiveness of the intervention was assessed using a robust experimental methodology in order to consider claims regarding causal relationships between variables. The intention was to provide a credible test of the intervention against meaningful criteria, to guide further research and ultimately benefit pēpi and tamariki.

Brief, Preventative, Replicable, and Scaleable

The most useful parenting interventions would be brief and preventative, with the potential for large-scale implementation. For the purposes of this thesis, 'brief' was defined as an intervention able to be completed in a single 8-hour day, while 'scaleability' was considered to relate to the number of individual consumers able to participate in each session. If sufficiently effective, such interventions could protect many children from harm. In contrast, existing interventions tend to be lengthy, and take place well after birth. For example, the *Circle of Security* intervention is aimed at toddler- or preschooler- caregiver dyads who are already experiencing difficulty and takes 25 hours in total: 75 minutes a week for 20 weeks (Hoffman et al., 2006). A newer version, the *COS Home visiting program for infants and parents* (COS-HV4) is conducted over four home visits (Mercer, 2015) and targets 6 to 9 month old infants considered 'at risk' due to economic stress and their high irritability scores on the NBAS (Brazelton & Nugent, 1995, cited in Mercer, 2015). Once again, the necessity of multiple visits and one-on-one nature of the programme limit brevity and scaleability. Similarly, the *Incredible Years* and *Triple P Positive Parenting* programmes largely focus on children over the age of two, after thousands of hours of parenting is complete. *Incredible Years* – a widely used parenting programme designed to alleviate early onset conduct problems – takes 12 to

14 sessions,[4] although session length is not provided in the published report (D. Fergusson et al., 2009).

Attachment-based parenting interventions developed to date also fail to meet these criteria. A recent review for an Australian audience (Gregory et al., 2020) identified three promising interventions in addition to the *Circle of Security*, but none were brief or preventative, and scaleability was also limited. *Child Parent Psychotherapy* (CPP) is 12-month, manualised, attachment-based intervention developed by Lieberman and Van Horn (Lieberman et al., 2005). *Attachment and bio-behavioural catch-up* (ABC) is a 10 session, home-based program for infants 6 months to 2 years old (Bick & Dozier, 2013; Costello et al., 2018; Dozier et al., 2006). While ABC is shorter than some of the other interventions (Berlin et al., 2016), like CPP it is "resource intensive", requiring "A skilled therapist who can conduct home-visits and provide videotaping equipment" (Gregory et al., 2020, p. 114). *Video-feedback intervention to promote positive parenting* (VIPP) was the briefest intervention considered in the Australian review. Developed by Juffer and colleagues (Bakermans-Kranenburg et al., 2005; Juffer et al., 2017), VIPP consists of four to six 90-minute sessions for children 1–3 years of age who are at risk of externalising behaviour problems.

Although these programmes have an important place as treatments, the length, timing, and content mean few could meet my strict definition of 'brief' and be completed within a single day. This has consequences for accessibility. The most vulnerable parents may be the least likely to attend multiple sessions. For those on low incomes, managing multiple streams of paid and unpaid mahi (work), or with insufficient access to affordable and practical transport and caregiving options, repeated sessions were considered to be potential barriers. Research to date does not tend to acknowledge this issue. While some of the programmes mentioned here can accommodate multiple families simultaneously (e.g., *Triple P* and *Incredible Years*), many are limited to one-on-one sessions. This increases costs and slows implementation. Finally, none of these interventions are intended to prevent problematic parenting in the first place. Although programmes targeted at children are often described as 'early intervention', so much important development takes place during the first few years of life that such interventions may occur subsequent to numerous damaging experiences.

The only intervention along these lines which is currently available in New Zealand is *Tākai* (previously S.K.I.P.*; Strategies with Kids, Information for Parents*), which provides positive parenting advice through freely-available booklets, fridge magnets, posters, and a website (www.skip.org.nz). At the time this project began, S.K.I.P. had been lauded internationally for its community-based but nationally-consistent approach (Hosking & Walsh, 2010). However, the advice was general in nature, with no discussion of the evidence-base underlying it, so S.K.I.P. did not always provide the level of detail needed by new parents. Recently (May 2022), S.K.I.P. was rebranded as *Tākai*, a whānau-support initiative which embraces mātauranga

[4] Outcomes of the *Incredible Years* programme were similar for Māori and non-Māori subjects (Fergusson, Stanley, & Horwood, 2009). Pre-test-post-test comparisons suggested high parental satisfaction with the programme as well as significant improvements in children's behaviour and social competence ($p < 0.001$), with effect sizes ranging from 0.50 to 0.77. The 214 parents involved in this study included those who had attended at least 9 sessions during one of 29 courses run by the *Ministry of Education*. Participants had children aged 2 to 8 and had been referred by education and nursing professionals (Fergusson et al., 2009).

Māori and Indigenous parenting approaches as well as incorporating neuroscience to a much greater degree. The *Tākai* website (https://www.takai.nz) includes articles on a range of parenting topics and is supported by a small team of community development kaimahi (workers) based at *Oranga Tamariki* (Ministry for Children). This is a huge step forwards.

The information provided by *Tākai* is consistent with the approach taken in the present study. However, *Parenting From the Start* is a 'flax roots' intervention with small groups of parents, rather than a 'forest-wide' approach intended to cover entire communities (although missing those unable to access the internet and read). The two approaches are complimentary, with their respective foci originating from the 'roots up' and the 'canopy down'. The *Parenting From the Start* antenatal workshop provides hours of face-to-face interaction, discussions, and hands-on activities that cannot be replicated online, but the reach is lower and more intensive in terms of human resources. The theoretical background is also broader, with greater attention paid to mammalian biology and human evolution as the basis for infant needs. My aim was to bring together the best information from multiple relevant disciplines to create a holistic antenatal parenting workshop that can be completed in a single session; supporting families right from the start.

There is no use studying the effectiveness of an intervention if it can't be repeated. Word-for-word scripting of the workshop and a *Keynote* presentation complimented by a fidelity checklist ensured the eight workshops were highly similar and can be replicated as many times as necessary in the future. There is, however, an inevitable trade-off between rigour and refinement. For this reason, an iterative process was used whereby small adjustments were made from workshop to workshop based on the written and verbal feedback of participants. These adjustments aimed to clarify any confusing terms, streamline explanations, and make other minor improvements. No major changes were made to the topics covered, the videos shown, or the ethical commitment to disseminating balanced information rather than offering advice. This valuing of qualitative experience runs through the entire project. Quantitative observational and self-report measures were supplemented by opportunities for qualitative comments, where mothers could add spontaneous statements and provide a context for their questionnaire responses. While these are not considered in my main analyses, these elements added richness to my understanding of the variables assessed during the study.

Culturally-Appropriate

As noted earlier, I considered it critical that the parenting intervention I developed should be culturally-appropriate. According to the local District Health Board, 20 percent of residents in the Manawatū rohe identify as Māori (Te Pai Hauora o Ruahine o Tararua/Midcentral District Health Board, 2019). Working as a Trustee of a non-governmental agency contracted to provide pregnancy and parenting information prior to beginning this project, my impression was that mainstream services did not adequately serve Māori. This concern has been echoed in the literature (Tikao, 2020). An increasing number of Kaupapa Māori (Māori-led) services are rising to fulfil this need, and it is important that mainstream services move to meet them. The intervention I developed is an example of the latter rather than the former. My hope was to compliment programmes run by and for tangata whenua (local people) with a programme

promoting the responsibilities of tangata tiriti – people who live in this country by virtue of *Te Tiriti o Waitangi.*[5] Expectations of biculturalism are evolving, as they must. My position is that Pākehā (NZ Europeans) such as myself need to become good Treaty partners. This is a matter of honour, integrity, and legality that pervades every part of our lives because Te Tiriti is the basis of our right to reside and belong here (Durie, 1989, cited in Bargh, 2021, p. 82).[6] This does not mean the intervention was designed solely for tau iwi (non-Māori) participants. Rather, it was designed to model a particular kind of respectful biculturalism. This is a complex undertaking, and I do not claim to have achieved it with any degree of perfection. But perhaps social justice is better served by genuine attempts than further delays. Māori have waited 184 years for their Treaty partners to step up.

Conclusion

My doctoral research consisted of two parts – a structure echoed in this thesis. Comprehensive evidence-based parenting information is a conspicuous gap in existing maternity services. I sought to address this gap by creating the *Parenting From the Start* antenatal workshops to explore what babies need and to put those needs in evolutionary context. The workshop was intended for a diverse audience of parents and their support people. I began with eight basic criteria, arguing that parenting interventions should be evidence-based, respectful, empowering, preventative, brief, replicable, scaleable, and culturally-appropriate to Aotearoa New Zealand. Rather than considering cultural appropriateness a nice-to-have 'add on', I sought to build it into the *Parenting From the Start* intervention from the beginning – seeking a theoretical background acceptable to Māori and congruent with traditional Māori parenting practices.

Part 1 of my doctoral research was the development of the *Parenting From the Start* workshop based on a series of targeted literature reviews which expand on these initial criteria. The process I followed was something like a koru (spiral pattern visible in Māori art) circling around the kaupapa (topic) of parenting to encompass bodies of research on traditional Māori caregiving, the impact of childhood experiences, attachment theory, caregiving across time and cultures, and the multidisciplinary theory of the evolved developmental niche. By definition, a trans-disciplinary theory such as the EDN draws on numerous fields of study, and I found it necessary to consider caregiving from many different perspectives. Thus, the early chapters of the thesis serve a dual purpose – providing the theoretical foundation both for my doctoral project and the *Parenting From the Start* workshops. Chapters 1 to 6 give insight into workshop content and build on one another to articulate my theoretical position. Each chapter has implications for the parenting

[5] The Māori version of the Treaty of Waitangi, which was signed by most signatories.

[6] Judge Edward Durie said at Waitangi in 1989: "We [Māori] must not forget that the Treaty is not just a Bill of Rights for Māori. It is a Bill of Rights for Pākehā too. It is the Treaty that gives Pākehā the right to be here. Without the Treaty there would be no lawful authority for the Pākehā presence in this part of the South Pacific... We must remember that if we are the tangata whenua, the original people, then the Pākehā are the tangata tiriti, those who belong to the land by right of that Treaty." This definition of tangata tiriti ("peoples of non-Māori origin who have a right to live in New Zealand Aotearoa under Te Tiriti") has been adopted by government agencies (Ministry of Health, New Zealand, 2020, p. 3).

intervention I developed – adding additional criteria to which my intervention was designed to conform.

Part 2 of my research was to evaluate the intervention. A randomised controlled trial investigated whether or not the workshop was effective when offered to expectant mothers. In particular, were one-year-olds whose mothers had attended during pregnancy more likely to be securely attached than those in the wait list control group? Were their mothers more sensitive and responsive? A second objective was to investigate the kinds of parenting strategies used in Aotearoa NZ and how these strategies relate to one another. What do mothers actually do and how is that working out for them? Can a one-day workshop change their approach to parenting, and if so, are the differences between the intervention and control groups statistically significant and clinically meaningful? Are the changes positive? Improvement should not be taken for granted when we interfere with a baby's formative experiences.

This is the first intervention of its kind, intended to transform the early experiences of New Zealand children by ensuring parents have a deep and broad foundation of knowledge, and the tools necessary to implement their chosen parenting approach. Unlike most interventions, a single 'correct' parenting approach was not specified in advance, because whānau are diverse and my wish was empower rather than instruct. *Parenting From the Start* aimed to increase parenting knowledge and informed choice about a range of biologically-appropriate options rather than to prescribe particular actions. In order to assess what, if any, transformation took place, my results encompass the three bodies of data collected in the study: (1) changes in parenting intentions on the day of the workshop (pre- versus post- test data), (2) workshop feedback (how the intervention was received by attendees), and (3) detailed outcome measures assessed at the two sets of follow-up assessments six to twenty months post birth. Together, these three strands of evidence weave a story about the potential to improve long-term outcomes for children and their whānau through the provision of evidence-based, culturally-appropriate parenting information and resources.

CHAPTER TWO

Traditional Māori Caregiving: Implications for a Bicultural Parenting Intervention in Aotearoa NZ

Me aro koe ki te hā o Hineahuone.
Pay homage to the essence of womankind

Embracing the Past to Inform the Future

Māori whānau (families) and hapū (close groups of related individuals) have a long history of positive caregiving in Aotearoa New Zealand. This chapter examines Māori caregiving practices around the time of European colonisation based on their documentation by historical and Indigenous scholars, weaving in transdisciplinary research relevant to mechanisms and outcomes. Colonisation had negative impacts on birth, feeding, and caregiving practices within this country and the health impacts of this colonial history continue to be felt. Embracing the wisdom of ancestral parenting practices, supported by the research findings of science and humanities offers a path forward for countries struggling with a colonial history and ongoing structural racism. *Parenting From the Start* is a brief, preventative, evidence-based intervention developed along these lines. Presented here as a case study for the development of a bicultural parenting intervention, *Parenting From the Start* highlights ways in which respect for Indigenous world views such as Te Ao Māori (the Māori world) offer insight into, and potential solutions to, modern health problems. Focusing on the local context of Aotearoa New Zealand and my responsibilities as tangata tiriti encouraged an approach that acknowledged Mātauranga Māori (Māori knowledge) and wove together other strands of research relating to early human development. The provision of culturally-appropriate pregnancy and parenting information is an urgent need, and while Kaupapa Māori services are an essential part of the solution, so-called 'mainstream' services must also move to meet them if we are to remove structural barriers to health and wellbeing. Māori are diverse in terms of their cultural engagement and preferences, and can and should be welcomed and supported within all institutions in Aotearoa New Zealand. Developing the *Parenting From the Start* antenatal workshop was my attempt to meet this need and my obligations as a Pākehā health professional to decolonise interventions (Glover & Cunningham, 2011). This case study provides an example of working within and between cultural epistemologies[7] with the goal of recognising shared values and incorporating the strengths of both into practice that empowers and uplifts stakeholders.

[7] An epistemology is a theory of knowledge. Different cultures such as Te Ao Māori and Te Ao Pākehā (the Māori and European worlds) understand people and parenting in different ways, and these different world views relate to alternate understandings of what constitutes knowledge and how it should be gathered.

Historical Context and the Ethics of Partnership

The first people of Aotearoa are Ngā Iwi Māori – the many tribes who have occupied the islands of Aotearoa New Zealand for at least 900 years (Glover & Cunningham, 2011). *Te Tiriti o Waitangi* (1840) is the founding document of modern bicultural and multicultural Aotearoa, although it has been imperfectly honoured by tauiwi (non-Māori)/Pākehā (people of European descent) and consecutive New Zealand governments. More than two hundred years of colonialism resulted in vast loss of land, life, and health for Māori, who have since undergone a population and cultural resurgence (Belich, 1996). *Te Tiriti o Waitangi* guaranteed Māori protection of their taonga (treasures), including language and valued cultural practices as well as tino rangatiratanga (self-determination, sovereignty) and partnership with the Crown (Te Kāwanatanga o Aotearoa/New Zealand Government, 2023; Waitangi Tribunal, 2014). In reality, colonisation has resulted in social and health inequalities. These result from "significant land and language loss, the breakdown of traditional Maori way of life, beliefs, values and philosophy, social structures and systems of discipline and justice, as well as loss of identity... marginalisation of Maori... and dislocation from vital support networks for some Maori, with Maori whanau distanced from their whakapapa (genealogical links), reducing support from extended whanau and altering traditional roles within whanau" (Cooper & Wharewera-Mika, 2009, p. 5, macrons absent in original). Academic attention has often focused on the health inequalities associated with colonialism, although more recently there has been growing attention to the ongoing structural racism and personal discrimination Māori face in modern Aotearoa (Barnes et al., 2013; Houkamau et al., 2017; Houkamau & Sibley, 2015; Pack et al., 2015, 2016; Satherley & Sibley, 2018). The approach taken in the present study instead targets cultural strengths – considering historical evidence regarding Māori caregiving during the period of early Pākehā settlement in this country, and how that fits with evolutionary, biological, and cross-cultural research relating to adaptive parenting. I provide an overview of Māori parenting and alloparenting as nurturing and responsive – exemplified by natural birth, extended breastfeeding, and close physical proximity to multi-age caregivers within a stable and nurturing system of high social support. These are all adaptive elements of the human evolved developmental niche, which formed the theoretical basis of the *Pakiaka Tupuora* research project (Narvaez, Gleason, et al., 2013; Narvaez, Wang, et al., 2013).

The arrival of Europeans into Aotearoa negatively impacted the Māori population, although the extent of the decline has been the source of much debate (Belich, 1996). Pākehā historian James Belich argues for a conservative estimate of 85,000 Māori in 1769, falling to around 70,000 individuals in 1840, 60,000 in 1857-58, and 42,000 in 1896 (Belich, 1996). The addition of guns to inter-iwi conflict, introduced disease, and inter-cultural warfare all played a part in the increased death rate (Belich, 1996). It is noteworthy then, that Māori population resurgence is "the dominant fact of modern Maori history" (Belich, 2001, p. 471). Higher birth rates than Pākehā and decreasing mortality during the twentieth century resulted in a twelve-fold increase in the Māori population by the year 2000 compared to a century earlier (Belich, 2001). At the start of this project around 25 percent of pregnant women identified as Māori (de Joux, 2015), although Māori made up only 14.1 percent of the total New Zealand population in the 2013 Census (Midcentral District Health Board & Whanganui District Health Board, 2015). However, "[w]ithin twenty years, two out of every five children in Aotearoa New Zealand will be either Māori or Pasifika. These children will become major contributors

to our future economic and social health. We need to find better ways of investing in their childhoods and that of their parents to support them to reach their potential" (Henare et al., 2011, p. viii). There is an urgent need for culturally-appropriate pregnancy and parenting services. While kaupapa Māori approaches such as *Tīkanga Ririki* and wahakura wānanga[8] are slowly spreading, it is important for mainstream services to move to meet them. This is a complex undertaking.

While Māori and Pākehā bring equal value to the Treaty partnership, the relationship is unequal in terms of power, opportunities, and control. Loss has disproportionately affected Māori, while privilege is disproportionately experienced by Pākehā. I argue here for a methodology of respectful partnership, but doing so as a Pākehā researcher brings with it ever-present risks of obscuring harm, encouraging 'White saviour' thinking, over-generalisation, and cultural appropriation (DiAngelo, 2019). There are also tensions resulting from the legitimacy afforded to science at the expense of other forms of knowledge, and the power of medical models of birth, feeding, and parenting over experiences of maternity and motherhood. These layer over Christian legacies of sexism and sin, which "disrupted the complementary roles of Māori men and women" beginning early in our bicultural history (Jackson, 2021, para. 56). And yet, as Māori researcher Naomi Simmonds puts it "the responsibility for reclaiming and privileging mana wahine maternities must... rest with many. To expect that Māori women alone can carry such a task only serves to overload often already overburdened women" (Simmonds, 2014, p. 18). White American sociologist Robin DiAngelo argues that unequitable societal structures such as racism, sexism, and ableism, can only be dismantled with the active participation of the groups who hold power and benefit from the status quo. Those suffering structural oppression and subject to discrimination, such as people of colour, women, and disabled individuals, do not have sufficient access to mechanisms such as assigning funding, or writing and passing legislation, by which change can occur (DiAngelo, 2019). Maternity services sit at an intersection of race, colonialism, and patriarchy, meaning non-Māori New Zealanders must be recruited into solution-making if arguments for change are to travel the long and circuitous route to become reality. Māori lawyer Moana Jackson writes that, "Restoration (like colonisation) is… a process, not an event, and it will require a change of mind and heart as much as a change of structure. There will of course be difficulties: such transformation must confront the implacability of a power unjustly taken" (Jackson, 2021, para. 69).

The *Parenting From the Start* project is intended as a small step in the direction of meaningful partnership between tangata whenua and tangata tiriti, in the vital space of pregnancy and parenting. This necessarily begins with an honest accounting of colonialism as a racist and destructive force that continues into the present (Jackson, 2021; Tikao, 2020), but also requires recognition of the precious history of caregiving present in this country at the time of early European settlement. I turn to this next.

[8] Wahakura wānanga are events in which cultural parenting knowledge is passed on alongside the weaving of infant sleep baskets made of harakeke (flax) under the guidance of skilled kairaranga (weavers).

Birth and Breastfeeding as Cultural Practices

Birth, breastfeeding, and caregiving are highly valued within Māori worldviews. Māori midwife and researcher Hope Tupara (2013a) explains that "Whakapapa (genealogy) forms the foundation of Māori philosophy" and "Birth is the instrument by which whakapapa is created" (p. 2). The importance of women within Māori culture is captured in the whakataukī: "*Mate i te tamaiti he aurukōwhao; mate i te wahine he takerehāia*" (The death of a child may be overcome, but the death of a woman is a calamity; cited in Tupara, 2013a, p. 2). Women maintained the generational links by birthing and breastfeeding (de Joux, 2015). Babies were always breastfed, usually by their biological mothers but at times by other lactating women[9] (de Joux, 2015; Glover, 2008; Glover & Cunningham, 2011). Breastfeeding was essential to survival, and breastfeeding women exemplified mana wahine (Tupara, 2013a). "A well-fed child was reflective of the health status of the whānau, hapū and iwi, and ensured the continuance of future generations" (Ministry of Health, New Zealand, 2020, p. 11). One early European observer commented that "Children were suckled until they had teeth and could walk" (Salmond, 1991, p. 422). The importance of breastfeeding (ūkaipo/whangai ū) is captured by the whakataukī (proverb): "*He aroha whaearere, he pōtiki ūkaipō*" (A mother's love for her offspring, a breastfeeding child), where a nursing infant is presented as a symbol of appropriate maternal affection and caregiving. Childbirth was considered a time of great significance and some danger, as exemplified in the whakataukī: "*He puta taua ki te tane, he whanau tama ki te wahine*" which translates as "The battlefield with man, childbirth with women" (As an attack by a war party is to a man, so is giving birth to a woman; Jenkins et al., 2011, p. 8). After birth there was no separation of mothers and babies, and co-sleeping (close night-time proximity) was the norm (de Joux, 2015; Glover & Cunningham, 2011). Kaumatua (elders) were the repositories of knowledge and tikanga (de Joux, 2015). Culturally-sensitive parenting interventions would be undertaken with respect for the traditional Māori practices of giving birth naturally, breastfeeding, co-sleeping, and alloparenting (shared care by multiple adults).

Māori researcher Kelly Tikao (2013) has identified a number of practices that kept women healthy during pregnancy and aided birth and breastfeeding. These included herbal medicines, walking in the sea, massage with scented oils to calm and relax muscles and prepare the breasts, and upright positions which aided labour. A host of tools were also used: ipu whenua (vessels to hold the placenta), muka (flax) ties to bind the cord connecting the baby to the whenua (placenta), and special stones, shells, or pounamu (greenstone) blades to cut the cord (de Joux, 2015; Tikao, 2013; Tupara, 2013a). More recent tools include woven flax wahakura (sleeping baskets), which are rapidly gaining in popularity as a safe-sleep solution (Abel & Tipene-Leach, 2013). Waiata (songs), karakia (blessings) and chants served spiritual purposes and may have also ensured the birthing woman felt safe and supported during the emotional and physical challenge of labour. For example, *Te Tuku o Hine-te-iwaiwa (The Release of Hine-te- iwaiwa)* is a karakia for labour which was composed by Hine-te-iwaiwa for the birth of her son Tūhuruhuru (Simmonds, 2014). The word 'tuku' – used often in the karakia – can be translated as 'to release, let go, give up, descend, relinquish, set free, allow' among other meanings. Thus, the karakia describes the work and challenge of giving

[9] The practice of allomaternal nursing has been documented in 68 animal species and 93% of the human cultures for which data is available, although it is normative in only a few cultural groups (6%) (Hewlett & Winn, 2014).

birth: to release physical tension and allow your body to follow the rise and swell and rhythm of labour. There is imagery of water rising up, interwoven with calls to the birds above (perhaps a suggestion to fly above the sensations), weaving metaphors, and specific visualisations regarding the process of birth (releasing the baby's different body parts and finally the placenta). This karakia constitutes a blessing for the birthing woman and a welcome to the baby. The existence of karakia such as *Te Tuku o Hine-te-iwaiwa* gives further weight to the claim that considerable thought and preparation were associated with labour and birth. Culturally-appropriate antenatal parenting education would include reference to some of these tools as well as a general appreciation that pregnancy, birth, and early parenting have deep cultural and spiritual aspects.

Māori birthing and parenting traditions have been adversely affected by the realities of colonisation (Glover & Cunningham, 2011; Jenkins et al., 2011; Simmonds, 2014). *The Midwives Registration Act* 1904, which required that birth attendants be registered, effectively outlawed kaiwhakawhānau (traditional Māori birth supporters) and tāpuhi (traditional Māori midwives) because they lacked Pākehā qualifications (Simmonds, 2014). *The Infants Act* of 1908 restricted shared care by multiple adults by requiring sanctioned 'foster' relationships with one or two legal caregivers (de Joux, 2015). The move to hospital birth, which arose from tauiwi valuing of male medical professionals over traditional lay midwives, made it difficult for large whānau to be part of labour and birth (de Joux, 2015). Birthing in hospital also interfered with natural vaginal birth, which up until that time had been the norm, with all Māori women traditionally birthing 'at home' in the modern sense of the term (Simmonds, 2014).

In 1937 only 17% of Māori women gave birth in hospital, compared with 78 percent of Pākehā women (Bryder, 2005). The Māori rate of hospital birth rose to around 50% by 1947 and around 90% by 1959 (Tupara, 2013a). High maternal and infant mortality rates were used to justify "assimilatory policies" such as moving Māori birthing women into hospital and under the gaze of "qualified professionals" (Simmonds, 2014, p. 32). In the early 1900s Māori women were twice as likely as non-Māori women to die during childbirth and this rate rose to three times that of non-Māori in the 1960s, although by 1967, the vast majority (95 percent) of Māori women were birthing in hospital (Simmonds, 2014). The move from home to hospital birth may have benefited babies, although this is far from certain, but it was not good for mothers: Māori and Pākehā women "not only lost control of the birth process but also appear to have suffered from increased rates of puerperal sepsis, or 'childbed fever' (Belich, 2001, p. 175), likely resulting from inadequate hygiene in hospitals. The *Tohunga Suppression Act* of 1907 prevented tohunga (traditional experts/Indigenous healers) from practicing or passing on the cultural knowledge they held, including that relating to birth (de Joux, 2015; Glover & Cunningham, 2011). The introduction of new religions and value systems also played a role: "It was through Christianity that many Māori women were deprived of spiritual knowledge pertaining to maternities. The reproductive power of Māori women was quickly supplanted with ideologies of shame and sin" (Simmonds, 2014, pp. 27 & 30). Despite these negative impacts of colonisation, Māori women continue to have lower rates of intervention and caesarean section than Pākehā women (de Joux, 2015). Nevertheless, an awareness of Aotearoa New Zealand's colonial history and present is essential to the provision of culturally-sensitive pregnancy services for Māori, who deal with the ongoing repercussions of this history in their daily lives, and for non-Māori, who must also be part of

dismantling unjust systems and partners in the establishment of healthy relationships. Antenatal education that fails to take account of these issues may perpetuate colonialism in the present. In contrast, the restoration of "customary birthing rituals and practices may offset the disempowerment and historical trauma" endured by iwi (Tikao, 2020).

Breastfeeding was also impacted by colonisation, as it has been in many other countries (Palmer, 1993). The spread and aggressive marketing of artificial breastmilk substitutes ('formula') reduced breastfeeding rates amongst both Māori and Pākehā women, but the consequences were worse for Māori. European institutions such as Plunket explicitly encouraged breastfeeding while simultaneously undermining it with recommendations that damaged breastmilk production. For example, women were instructed to avoid feeding 'on demand' (that is, whenever the baby wants) – now considered best practice – and instead to feed every four hours for two minutes on each breast (de Joux, 2015). In hospital, which was actively promoted as the best place to give birth, babies were separated from their mothers and placed in a central nursery where they were often given formula. Mothers were "advised to leave babies alone between feeds and restrict attention so as not to spoil them" (de Joux, 2015, p. 19). Breastfeeding became unfashionable amongst Pākehā families, especially those who were middle-class and urban, and this likely interacted with the many other elements of colonisation to impact Māori (de Joux, 2015). The increasingly recognised risks of formula led Dr Te Rangihiroa (Peter Buck) to state in 1908 that "The introduction of the feeding bottle into Maori homes has caused as many deaths as the guns of Hongi" (cited in de Joux, 2015, p. 20). Nevertheless, in the words of Dr Marewa Glover, "Breastfeeding is not a lifestyle choice, it is tikanga Māori, every child's right" (cited in de Joux, 2015, p. 39). Thus, "[p]romotion of breastfeeding to Maori should focus on re-establishing breastfeeding as a tikanga (right cultural practice) rather than a perceived lifestyle choice" and encourage critical reflection on breastfeeding in sociohistorical context (Glover et al., 2007, p. 14; Glover & Cunningham, 2011).

The New Zealand Ministry of Health acknowledges that "Breastfeeding practices in New Zealand Aotearoa have been compromised by various external influences. Colonisation, medicalisation, sexualisation of breasts, and the commercialisation of breast milk substitutes have contributed to environments that have undermined breastfeeding as a normal cultural practice" (Ministry of Health, New Zealand, 2020, p. 11: Further Reading, Section 2). This decline began early. The *Royal New Zealand Plunket Society*[10] was formed in 1907 to improve the nutrition of babies through the application of scientific principles, and had a "virtual monopoly on infant health care" during the first half of the twentieth century (Bryder, 2005, p. 189). Plunket nurses conducted antenatal check-ups until 1939, as well as postnatal check-ups on most infants until 1939, and continue as Well Child providers of postnatal visits today. Access was not equal however. Plunket was formed to support Pākehā families. Māori women were not included until the late 1960s and then only in "limited urban areas" (Glover & Cunningham, 2011, p. 254). Both this exclusion of Māori and the later inclusion were problematic, as Plunket was "strongly rooted in eugenics and patriotism" as

[10] Initially named the *Society for Promoting the Health of Women and Children.*

well as a paternalistic attitude towards "ignorant" mothers (Stace 1997, cited in Glover & Cunningham, 2011, p. 251).[11]

Dr Helen Deem, the medical advisor to the Plunket Society, surveyed breastfeeding rates in New Zealand in 1939 (N = 9,000 babies), 1945 (N = 7,700 babies), and 1952 (N = 12,000 babies). In 1939, 91.5% of Pākehā mothers were breastfeeding at the first postnatal visit, but this proportion had fallen to 74.4% in 1952 (Bryder, 2005, p. 188). Duration of breastfeeding also decreased, from 60% of mother-baby dyads at 6 months post birth in 1939 to 21% a decade later (Bryder, 2005). The medicalization of infant feeding which occurred during this period involved a transfer of responsibility and control from breastfeeding mothers to health professionals, so that "infant feeding was redefined as a process requiring professional guidance and expertise" (Bryder, 2005, p. 192). In fact the decline was stronger still in what many Pākehā continued to think of as the 'home country': "By 1961, only 12 per cent of mothers in Britain still breastfed at 6 months, and 40 per cent of all babies had been weaned by the age of two weeks" (Bryder, 2005, p. 193).

In the last 60 years, research on infant feeding has highlighted the benefits of human breastfeeding and the risks of artificial supplementation. Breastfeeding is associated with fewer illnesses, less severe illnesses, and slightly higher intelligence (World Health Organisation, 2009). A meta-analysis of 20 studies found that children who were predominantly breastfed scored slightly higher (3.2 points) on tests of cognitive function, on average, than those who were predominantly formula fed, even though duration of feeding was measured in weeks, with the highest category equating to little more than 6 months (>28 weeks). The difference was greater (by 5.18 points) among children who had low birth weights: "The results suggest that a significant developmental augmentation attributable to breast-feeding is established early in the life course and persists at least through midadolescence" (Anderson et al., 1999, p. 531). Increased duration of breastfeeding seems to affect white matter development in the brain (Deoni et al., 2013). Breastfeeding also has benefits for mothers: lowering their risk of breast and ovarian cancer, as well as hypertension, type-2 diabetes, hyperlipidemia, cardiovascular disease, myocardial infarction, metabolic syndrome, and Alzheimer's Disease (M. Fox et al., 2021). Exclusive breastfeeding day and night also delays the return of fertility, which naturally spaces children (Hewlett & Winn, 2014), and is associated with a quicker return to pre-pregnancy weight. In addition, a study of women over 50 years old (N = 115) found that ever having breastfed was associated with superior neuropsychological performance in the domains of Learning, Delayed Recall, Executive Functioning and Processing Speed compared to women who had never breastfeed (*p*-values 0.0003–0.015)[12] (M. Fox et al., 2021). A small exploratory brain-imaging (fMRI) study (N = 17) found that exclusive breastfeeding during the first few months was associated with greater activations to own infant cry in brain areas implicated in maternal-infant bonding and empathy, compared with formula feeding (P. Kim et al., 2011). Suckling increases oxytocin in both the breastfeeding parent and the infant, which promotes bonding (Depue & Morrone-Strupinsky, 2005; Gordon et al., 2010; Uvnäs-Moberg et al., 2020). Longer duration of

[11] In 1917 Plunket's 'Save the Babies' Week had the slogan "The Race marches forward on the feet of Little Children" (Glover & Cunningham, 2011, p. 251).

[12] Limiting the analysis to a subset of women who were not-depressed[12] and had experienced at least one pregnancy (parous) to remove nulliparity as a confound produced even lower p-values for statistical significance and increased effect sizes (all large, ranging from 0.80 to 0.97) (M. Fox et al., 2021).

breastfeeding is associated with increased sensitive responsiveness among mothers, more infant attachment security, and less attachment disorganization (Tharner et al., 2012).

In contrast, children who are fed artificial breastmilk substitutes have more risk factors for disease, such as obesity, high blood pressure, altered blood cholesterol levels, and atherosclerosis in later adulthood; get sick more often and more severely, on average (World Health Organisation, 2009). Acute illnesses associated with formula use include: diarrhoea, pneumonia, respiratory illness, otitis media, *Haemophilus influenzae* meningitis, and urinary tract infections. Long-term diseases related to formula use include asthma & other atopic conditions, type 1 diabetes, celiac disease, ulcerative colitis & Crohn disease, and childhood leukaemia. Research in developing countries shows that babies who are not breastfed are 6-10x more likely to die in the first months of life than those who are breastfed. Diarrhoea and pneumonia are responsible for many of these deaths. There is a dose-response effect, so that babies who receive no breastmilk are 25x more likely to die from diarrhoea than babies who receive 6 months exclusive breastfeeding. Partially breastfed infants have 8.6x the risk of exclusively breastfed infants (World Health Organisation, 2009).

For these reasons, in 2011 the World Health Organisation set an international standard of six months exclusive breastfeeding for all babies, and recommended that breastfeeding continue for two years or more[13] (World Health Organisation, 2011). According to Ministry of Health guidelines, exclusive breastfeeding describes a baby who has received nothing but breastmilk (direct or expressed) and prescribed medications since birth. Full breastfeeding also excludes other liquids or solid food except for a minimal amount of water or prescribed medicine, but applies only to the past 48 hours. Partial breastfeeding refers to any use of breastmilk that falls short of exclusive or full breastfeeding (NZ College of Midwives/Te Kāreti o ngā Kaiwhakawhānau ki Aotearoa, 2016). Wen and colleagues (2012) found that women's awareness of the WHO recommendations predicted breastfeeding initiation and duration. Thus, simply informing whānau of the WHO recommendations and reasons for them may constitute a meaningful parenting intervention and enable the reclamation of cultural taonga.

Nevertheless, according to the 2006 Plunket Breastfeeding Data, only 25% of New Zealand babies that year received the recommended six months of exclusive breastfeeding (cited in Glover, 2008, p. 3). A breakdown of this data, displayed in Table 1 shows that Māori babies were least likely to reach this basic health target.

Table 1.

Percentage of New Zealand Infants Meeting WHO Target of 6 Months Exclusive Breastfeeding in 2006

	Ethnicity of baby				
	Pākehā/NZE	Asian	Pasifika	Māori	**Overall**
Babies meeting target (%)	29	25	19	17	25

[13] "WHO recommends mothers worldwide to exclusively breastfeed infants for the child's first six months to achieve optimal growth, development and health. Thereafter, they should be given nutritious complementary foods and continue breastfeeding up to the age of two years or beyond" (World Health Organisation, 2011, para. 1).

Since 2006, breastfeeding rates have dropped even lower in NZ. Table 2 shows that fewer than one in five babies received six months of exclusive breastfeeding in the 6 years to 2013. A 2011 report gives the even lower rate of 8.2 percent of Māori babies receiving six months of exclusive breastfeeding (Henare et al., 2011). Exclusive breastfeeding has declined further since 2012, with an overall drop of 5.5% (NZBA: New Zealand Breastfeeding Alliance, 2021, p. 5).

Table 2.

New Zealand Exclusive Breastfeeding Rates at Three Ages by Year (2008 – 2013)

Baby's age:	2008	2009	2010	2011	2012	2013
6 weeks	53%	54%	55%	57%	56%	56%
3 months	40%	42%	42%	42%	42%	42%
6 months	16%	16%	16%	16%	16%	17%

Note: Data source (Royal New Zealand Plunket Society, 2017).

Unlike the United States, where attempting breastfeeding at all has become increasingly rare (Bryder, 2005), breastfeeding initiation remains relatively high in Aotearoa. Rates of exclusive breastfeeding are around 80 percent on discharge from baby-friendly hospitals, but this drops to 49 percent by 6 weeks post birth, and 16.7% at 6 months (New Zealand Breastfeeding Alliance, 2018). Other data also suggests that rates drop off sharply. Only 35% of participants in the representative *Growing Up in New Zealand* study (N = 6,470) reported exclusive breastfeeding to around 6 months as recommended by the *World Health Organisation* (de Castro et al., 2018, p. 9), and this varied significantly by maternal age, education, neighbourhood deprivation index, and self-prioritised ethnicity. Exclusive breastfeeding rates at 5-6 months of age were lower for Māori (24.3%) than for Pasifika (29.0%), Asian (31.8%), Other (34.0%) and European (41.1%) mothers (de Castro et al., 2018, p. 36), although all these rates are much higher than those reported in data sets based on nurse or midwife rather than maternal reports. The percentage of babies fed for at least 12 months also differed according to self-prioritised ethnicity, and was lower for Māori (31.5%) than for European (36.4%), Pacific (41.2%), Asian (42.3%), or Other (44.1%) categories (de Castro et al., 2018, p. 31).

Place of birth also matters in terms of feeding outcomes. Rates of exclusive breastfeeding at discharge are consistently higher for primary maternity services (91.14% in 2021) than secondary (79.52%) or tertiary facilities (71.42%). Across Aotearoa, only one third of tertiary services are meeting the BFHI standard for 75% of infants to remain exclusively breastfed during their post-birth hospital stay (NZBA: New Zealand Breastfeeding Alliance, 2021, p. 8). This information is important for whānau if they are to make informed choices about place of birth in light of their breastfeeding goals. The following section considers other ancestral parenting practices with benefits for whānau.

Traditional Māori Parenting

Gentle Nurturing in Multi-age Contexts

Historical evidence suggests that traditional Māori parenting was non-violent, respectful and highly nurturing, and thus congruent with recommendations arising from the evolved developmental niche. The French missionary Jean-Simon Bernard wrote home in 1844 that "The children here are completely free: the parents never do anything to them. They never beat them and do not allow anyone else to beat them" (cited in Tupara, 2013a, p. 3). A review of traditional Māori parenting notes that,

> "The fundamental principle for raising children was the underlying belief that children were favoured as gifts from the atua (spiritual beings), from the tipuna (ancestors) and preceded those unborn, which meant that they were tapu (under special rules and restrictions). Any negativity expressed to them was breaking the tapu by offending the atua and the tipuna gone before. Because of their intrinsic relationship to these spiritual worlds, the children inherited their mana (power, prestige). They were treated with loving care (aroha) and indulgence. Punitive discipline in whatever degree, as a method of socialising children, was an anathema to the tipuna" (Jenkins et al., 2011, p. x).

Children were socialised through modelling and instruction, under the tuakana-teina principle, whereby a younger person (teina/taina) learns from an older child or adult (tuakana) (Jenkins et al., 2011). This relationship between older and young siblings, or those in a similar relationship, is captured by the whakataukī: '*Mā te tuakana ka tōtika te taina, mā te taina ka tōtika te tuakana*', "It is through the older sibling that the younger ones learn the right way to do things and it is through the younger sibling that the older one learns to be tolerant" (Brougham et al., 1999, p. 131).

Throughout life, Māori were part of a web of interdependent relationships. Children were cared for by multiple adults and older children, and women had high levels of social support during labour, birth, breastfeeding, and parenting (Belich, 1996; Jenkins et al., 2011). "In pre-contact times kainga consisted of small units of 30 to 45 people or bigger where everyone helped with the children and were committed to raising the next generation" (Jenkins et al., 2011, p. 7). Children participated in formal councils of kaumātua (elders), and witnessed the work of "warriors, judges, food producers, artists, builders and caregivers" as well as attending wānanga (schools) and taking part in training activities such as races, wrestling, ti rakau (tossing light rods between players sitting in a square), and paddling small canoes, koruru (knucklebones) and kapa haka to increase dexterity, fitness, agility, and skill with light weapons (Jenkins et al., 2011, p. 7). This respectful inclusion in the lives of adults was thought to produce youth who were confident and secure as well as "observant, curious, thoughtful and adept" (Jenkins et al., 2011, p. xiii). Early European observers such as Edward Shortland were told that "freedom given children, made them bold, brave and independent in thought and act... curbing the will of the child by harsh means was thought to tame his spirit, and to check the free development of his natural bravery" (1882, cited in Jenkins et al., 2011, p. 22).

Shared care by people other than biological parents is referred to in the literature as alloparenting. Hrdy (2009) suggests the extra care, supervision, and food provided by

alloparents is quite likely the reason humans spread across the globe, because it means we can have babies almost twice as often than the other Great Apes. While we are the only Great Ape to allow caregiving involvement by others during infancy, some form of provisioning or nurturing is present in about half of smaller primate species alive today. For most of human history, childhood was a risky time and support from alloparents was essential for child survival. Amongst modern Hadza, !Kung, and Aka hunter-gatherers, 40-60% of children die before age 15 and child survival is "the single most important component of maternal reproductive success" (Hrdy, 2009, p. 109). For Efé foragers a baby's chance of being alive at age three is positively correlated with the number of allocarers toddlers have at age one (Ivey, 2000). Some studies (e.g., Mandinka horticulturalists in Africa) suggest alloparenting doubles the chance a child will make it to adulthood (Hrdy, 2009). Alloparenting has also been proposed as a reason we evolved bigger brains than our primate cousins. The better you are at reading other people's intentions towards you, the more likely you will be able to get extra food and care from the altruists while avoiding anyone who constitutes a danger. This suggests an immediate benefit associated with increases in theory of mind; the ability to figure out what other people are thinking (Hrdy, 2009). Alloparenting is a socioecological phenomenon, and likely impacted by context. Comparisons of 141 non-industrialised societies suggests that harsher environments such as climate instability and relatively lower average temperatures and rainfall are associated with increased alloparental care, while conditions of high starvation make alloparenting too costly (J. S. Martin et al., 2020)

Social support for parents and infants in non-foraging societies may also confer benefits, although the international evidence on multigenerational families including grandparents is mixed, with grandparental involvement often confounded with socio-economic vulnerability, loss of parents, and cohort-related pressure on mothers to formula-feed (Sadruddin et al., 2019). Positive impacts of multigenerational families have been reported for child survival (Gibson & Mace, 2005; Razzaque et al., 2014; Sear et al., 2002) and protection from physical injury (Tanskanen & Danielsbacka, 2017) in a range of countries. Other studies suggest negative effects on child weight (Ikeda et al., 2017; Moschonis et al., 2010), while the relationship between grandparent involvement and breastfeeding may be negative (Bai et al., 2016; Susin et al., 2005) or positive (Susiloretni et al., 2015). The relationship with child height also varies across samples (Pérez et al., 2007) and within samples (Gibson & Mace, 2005; Sheppard & Sear, 2016), with evidence that both cooperation and competition may operate within families. Within the UK Millennium Cohort (N = 15,696 infants), alloparenting and social support were associated with cognitive benefits. A significantly lower risk of developmental delay was observed among 9-month-old infants cared for by kin rather than other childcare arrangements, while the risk of delay was doubled for infants whose mothers spent no time with friends compared with those who saw friends every day (Waynforth, 2024). A meta-analysis and narrative review of 67 studies (N = 64,449 pregnant women) found that lack of social support during pregnancy is related to the risk of depression, anxiety, and self-harm (Bedaso et al., 2021), and there is a small but statistically-significant positive correlation between support from grandparents and mothers' mental health around the time of birth (Riem et al., 2023). The complexities of familial and socioeconomic relationships obscure pattens, but it is clear that there is nothing evolutionarily 'normal' about childcare falling to a single person bereft of social support and allocarers.

Parenting From the Start workshops acknowledge the advantages of alloparenting for

caregivers and children, distinguishing between stable groups invested in the healthy development of particular children and temporary carers with no ongoing connection to a particular tamaiti (child). Shared care by multiple well-known adults and older children is a taonga for Māori, and a valuable practice that could be reclaimed by other cultural groups to the benefit of children and caregivers alike.

Close Physical Proximity and Infant Carrying

John Savage, a surgeon who visited the Bay of Islands in 1807 described tamariki Māori (children) in continuous physical contact with a male or female caregiver, who carried them asleep or awake for "the whole day" (Savage, 1807, p. 45). It appears that carrying infants ('waha' or 'pīkau') was common, as illustrated in photographic evidence from the late 1800s and 1900s. While infants are shown under blankets and cloaks (e.g., korowai – tag cloaks) on the caregiver's back, the exact mechanism by which they are supported (for instance, whether there is another structure underneath) is unclear. The children range from a few months old to several years of age, with caregivers who look like mothers, older siblings, or kuia (grandmothers). In conflict with written records, few men appear in the photos. Many infants are carried high enough to provide a view over the caregiver's shoulders. This is of interest because carrying position influences infant behaviour (Field, Malphurs, et al., 1996). A within-subjects comparison of 3-month old babies (N = 32) carried chest-to-chest with their mothers or facing outwards in a soft baby carrier during counter-balanced 15 minute walks found the chest-to-chest position facilitated sleep, whereas facing outwards was associated with more active movement (moving arms, kicking) and looking at the environment (Field, Malphurs, et al., 1996). No significant differences were observed in positive or negative affect, or in the amount of time spent looking at mother. Examples of pīkau (carrying, or 'babywearing') by Māori at the time of European settlement in Aotearoa New Zealand are shown in Figure 1.

Figure 1.

Historical Images of Pīkau (Infant Carrying) by Māori women in Aotearoa New Zealand up to 1905



Photograph of Ana Rupene (Source: Foy Brothers (Firm), 1871- 1878).



Rapihana and child (Source: Carnell, 1880?).



Ani Doherty and son, Bob Doherty (Source: Iles, Arthur James 1870-1938, 1890).



Māori woman carrying a child on her back, on board a boat on the Whanganui River (Source: Unknown photographer, 1890-1900).



Unidentified Māori woman carrying an infant on her back (Source: Unknown photographer, 1892).



Marere and Rima
(Source: Carnell, 1893)



Unidentified Maori woman with child and tag cloak (Source: Denton, ca 1900)



Ipimia (Source: Partington, 1900a)



Maori woman carrying a baby on her back (Source: Partington, ca 1900b)



Mare carrying a baby on her back (Source: Partington, ca 1900c)



Rihipete Nikorima and baby (Source: Partington, 1900d)



Unidentified woman and child, Wanganui region (Source: Denton, 1904)



Ene Hemo Keremeneta Ramekakere Taituha with her son Whanake Taituha (Source: Pringle, 1905a)



Maori woman and child (Source: Pringle, 1905b)



Maori women greeting each other with a hongi (Source: Pringle, 1905c)

The scientific literature on infant carrying suggests positive outcomes both in the short- and long- term. Human infants, like a number of other mammals including rats, mice, and cats, exhibit a calming response when carried. This effect, termed the transport response, is "a coordinated set of vagal activation and behavioural calming conserved in altricial mammals" (Brewster & Leon, 1980; Esposito et al., 2013; Ohmura et al., 2022a, p. 1). Yoshida and colleagues suggest that the transport response occurs in a variety of mammals because it reduces the energetic burden required for carrying young (2013). In infant mice, the transport response involves cessation of vocalisations, assuming a flexible but compact posture, maintaining stillness, and increased pain tolerance, which may together increase the chance of maternal rescue (and thus survival) in emergency situations such as the destruction of the pup's nest (Yoshida et al., 2013). In humans, carrying is facilitated by appropriate slings, wraps, or baby carriers – informally termed 'babywearing'. Infant carrying is a central part of the *Parenting From the Start* intervention, so the literature is reviewed in some detail here.

A key finding of babywearing studies is a reduction in infant crying. This is important because infant distress may be challenging for caregivers, triggering harsher discipline (Williams, 2020). An early experimental study of 99 mother-infant dyads found that randomisation to an increased carrying group reduced crying and 'fussing' at 4, 6, 8, and 12 weeks of age relative to controls (Hunziker & Barr, 1986). Peak crying, which usually occurred at 6 weeks of age, was reduced by 43% overall among infants who were carried, with a reduction of 51% during the evening hours (4pm to midnight) compared with control group infants. There was no change in sleep or feeding duration, but infant contentment and feeding frequency were increased. Similar decreases in crying compared to control infants were observed at the other time points (4, 8, and 12 weeks post birth). These positive findings were replicated in a small randomised controlled trial with low income mothers in America (N = 49). Infants whose mothers were gifted a soft baby carrier at birth were less likely to experience a daily period of crying than control group mothers who were gifted an infant car seat (Anisfeld et al., 1990).

Significantly more control group infants (52%) than carried infants (21%) were reported to cry daily, and the number of infants who were securely attached a year later was twice as high in the intervention group (83%) compared with the control group (38%) (Anisfeld et al., 1990). This substantial improvement in attachment outcomes is of great interest given the relationship between attachment security and long-term individual, relational, academic, and mental health outcomes (Cassidy & Shaver, 2008; Sroufe et al., 2005a).

Further studies have expanded on these findings, suggesting that it is the combination of contact and movement that soothes infant crying. Esposito and colleagues (2013) compared the behaviour, vocalisations, and heart rate of infants (N = 12) under 6 months of age who were either held by their mother (*holding*) as she sat in a chair, carried as she walked about (*carrying*), or placed in a cot (*crib*). Each infant was assessed during all three conditions, which were presented in random order for intervals of 30 seconds each. Crying, bodily movement, and heart rate as measured by electrocardiogram (ECG) all increased during the *crib* condition but decreased during *carrying*. The *holding* condition, in which the mother sat still, produced intermediate results (Esposito et al., 2013). Subsequently, awake infants were assessed for episodes of *holding* followed by *carrying*. The infants tended to immediately cease crying and voluntary movement when carrying began. Crying was apparent in about half of the initial *holding* conditions, but stopped when the mother stood up and started walking ($p < 0.001$), as did the infants' voluntary movements ($p < 0.001$). Carried infants also exhibited a rapid and significant decrease in heart rate compared with being held by a sitting mother (Esposito et al., 2013). Even when infants cried during both *holding* and *carrying* conditions, carrying had a positive impact. Within this group, crying reduced from being almost constant during *holding* (96.7% ± 8.2%) to around two thirds of the time (65.8% ± 17.8%) during *carrying* (Esposito et al., 2013). These are remarkable differences for a behavioural parenting intervention lasting only 30 seconds.

A subsequent study by the same research team suggests that longer periods of infant carrying might further reduce distress and promote sleep. Maternal holding and motion were examined in a sample of 21 Japanese and Italian mothers and their healthy 0-7 month old infants by randomly alternating four conditions: (1) *carrying,*[14] (2) *holding,*[15] (3) *crib,*[16] and (4) *stroller,*[17] where infants were placed in their mobile crib or stroller and pushed back and forth. Each condition was either short (lasting 30 seconds) or long (lasting 5 minutes) (Ohmura et al., 2022a). Linear mixed-model (LMM) analyses suggested that for *crying* infants, *carrying* was the condition most robustly associated with increases in infant status scores and lowered heart rate (mISS, $p < 0.001$; mIBI, $p < 0.001$).[18] *Holding* was mildly associated with increased

[14] This condition was called 'WalkHold' in the original article. Mothers held their infants while walking.
[15] Called 'SitHold' in the original article. Mothers held their infant while seated.
[16] Called 'COT' in the original article. Mothers lay their infants in a cot.
[17] Called 'MCOT' ("mobile crib or stroller") in the original article (Ohmura et al., 2022a, p. 1). This last condition was only available where participants provided a buggy for their baby. Mothers were told they could skip a condition if they were tired or uncomfortable letting their baby cry.
[18] The details of these studies are relevant to parents. When infants were *crying hard* at the start of a condition, 30 seconds of *carrying* or pushing in a *stroller* decreased crying, increased the mean infant status score (mISS) towards alertness or sleep,[18] and increased the gaps between heart beats (mIBI). Simply *holding* the babies did not alter the number who were crying or change infant status scores, but did speed up heart rates, especially where the proceeding condition was *crib*. The authors suggest this may be due to the postural change from supine to upright. Transitions to the *crib* condition did not change infant status scores, but did slightly slow heart

heartrate (mIBI decrease, p = 0.037), but not with changes in infant status score (mISS, p = 0.629). In addition to soothing distressed infants, *carrying* appeared calming for *alert* infants (mISS, p = 0.004; mIBI, p < 0.001), and *holding* also demonstrated a weak effect on average infant status scores (mISS, p = 0.040), suggesting it was mildly effective (Ohmura et al., 2022a). Longer periods of *carrying* (up to 5 minutes) by Japanese and Italian mothers were even more effective than the short (30 second) interventions. After 5 minutes of *carrying* all infants had stopped crying and 5 of 11 infants (45.5%) were asleep despite all sessions taking place during the day. Two further infants (18.2%) fell asleep within 1 minute of the succeeding *holding* condition. This study clarifies the importance of context when assessing the appropriateness of parental behaviour. The authors suggest crying may indicate tiredness and readiness to sleep. *Holding* infants for 5 minutes while sitting still or placing them in a cot (*crib*) for 5 minutes were both ineffective at resolving crying or putting them to sleep, while the rhythmic motion of infant carrying had "robust calming effects on both crying and alert infants, possibly via proprioception or the vestibular system" (Ohmura et al., 2022a, p. 3). Nevertheless, sleeping infants were not served by further carrying. If infants were *asleep* at the start of a condition, placing them in a *crib* significantly slowed average heart rates, suggesting the cessation of movement calmed them further. *Carrying* and *holding* sleeping infants did not have this effect. This can be interpreted as an argument for caregiver attunement and responsiveness; the art of recognising what infants need moment-by-moment and meeting those needs.

Consistent with a bidirectional relationship between babywearing and sensitive responsiveness, there are indications that infant carrying increases this parental skill. The experimental babywearing intervention by Anisfeld and colleagues (1990) was associated with increased maternal responsiveness to infant vocalisations at 3.5 months. Infant carrying may be particularly protective in more challenging circumstances. A randomised controlled trial with 60 first-time Dutch fathers found that a 3-week carrying intervention increased activation of brain regions associated with sensitive responsiveness in response to an unknown infant crying, particularly the amygdala (Riem et al., 2021). The impact was

rates. When infants were *alert* at the start of the condition, 30 seconds of *carrying* or movement in a *stroller* did not affect their average infant status scores or heart rate, although *carrying* did slow heart rate when the previous condition was *holding* (Ohmura et al., 2022a). This was consistent with the previous study (Esposito et al., 2013). Unexpectedly, *holding* lowered the average infant status score (away from sleep or towards crying) and increased heart rate of alert-state infants (Ohmura et al., 2022a). It is unclear from the report how babies were held (e.g., facing outwards or towards their mothers) and whether mothers engaged in any interaction while sitting holding them. Laying infants in a *crib* decreased the average infant status score and marginally increased heart rate (Ohmura et al., 2022a). Where infants were *crying* at the start of the long conditions, heart rates tended to slow gradually over the first 3.5 minutes of *carrying* before reaching a plateau. *Holding* did not seem to promote sleep by itself and was frequently terminated by mothers when it failed to reduce crying, as was the long *crib* condition[18] (Ohmura et al., 2022a). The authors note that "picking up an infant is reported to be the most culturally common maternal response to infant cry", and this occurred often (Ohmura et al., 2022a, p. 3, citing Bornstein et al, 2017). Where infants were *alert* to begin with, a longer period of *carrying* did not promote sleep or significant changes in infant status scores or heart rate. Infants who started the long *holding* condition awake only fell asleep if their preceding condition involved 5 minutes of *carrying* (4 infants). Infants who began crying hard during this condition (mISS fell below 0.6) did not recover, which does not support the general assumption that infant distress is likely to be soothed by maternal holding in the absence of movement. The authors note that 5 minutes of carrying an infant in arms, upright against the mother's chest, is an effective parenting intervention for crying infants, with immediate physiological and parental benefits. An additional (5-8 minute) period of stationary holding while sitting may further support babies to relax into sleep (Ohmura et al., 2022a).

measured with functional magnetic resonance imaging (fMRI) and was strongest for fathers who had themselves experienced adverse childhood experiences.[19] As with the earlier RCT involving mothers, fathers already using a baby carrier at intervention level prior to the study were excluded (Anisfeld et al., 1990). Another small randomised controlled trial of adolescent mothers (N = 33) found that using a soft baby carrier one hour a day for 3 months improved relational performance on the *Still-Face task*[20] at 7 months (Williams, 2020). Repeated measures ANOVAs showed that infants of babywearing mothers demonstrated the classic distress response when their mothers assumed neutral facial expressions during the separation 'still face' phase, showing increased negative engagement such as protest (anger, fussing, crying) or withdrawal (sad expression, slumped posture, gaze aversion) as well as a reduction in positive social engagement ("facial expressions of joy and gaze directed at the mother") (Williams, 2020, p. 9). Control group babies did not follow this pattern, instead showing significantly greater negative engagement at reunion ($p < .0001$) (Williams, 2020). Intervention group mothers, for their part, spent longer on positive engagement and exaggerated positive engagement. That is, there was a significant main effect for condition ($p = .004$). Overall, mothers in the intervention condition displayed more exaggerated positive social engagement (M = 28.67, SE = 4.63) than control group mothers (M = 8.47, SE = 4.49). Babies randomly assigned to the carrying intervention displayed (healthy and appropriate) distress in the face of their mothers' non-contingent unresponsiveness, while babies in the control condition spent more time focused on objects and the environment when their mother assumed a 'still face'. This could be a learned response where mothers have been unresponsive in the past, a coping mechanism which functions to regulate their emotions, and/or the beginnings of avoidant behaviour such as that seen on the *Strange Situation Procedure* (Williams, 2020). Similarly, mothers assigned to the babywearing intervention were better able to repair the relational breach of the *Still-Face task*. Close physical contact during the newborn period may protect adolescent mothers and their babies from disordered responses to the *Still-Face task*.

Finally, babywearing is associated with breastfeeding outcomes. Pisacane, Continisio, Filosa, Tagliamonte, and Continisio (2012) found that baby carriers increased the frequency and duration of breastfeeding for Italian mothers and their healthy term infants (N = 200). Mothers receiving the intervention were encouraged to use the carrier frequently and for at least one hour a day during the first month post birth. While breastfeeding rates in the intervention and control groups were similar at discharge from hospital, the babywearing group had significantly higher rates when infants were 2 months (47% vs 32% exclusive

[19] Unexpectedly, the impact of babywearing on neural reactivity to crying was direct rather than mediated by levels of the hormone oxytocin, which did not increase for intervention fathers as was hypothesised (Riem et al., 2021, p. 7). The study did not use recordings of the fathers' own infants however, but rather general recordings of a baby crying, despite the possibility parents respond differently to their own child.

[20] The Still Face procedure is a 6.5 minute videoed interaction between mother-baby pairs, usually involving 90 seconds each of 'engagement', 'separation', and 'reunion' with 15 second breaks between phases. During engagement mothers are encouraged to interact with their infant as they usually would (without toys); in the separation phase they relax the muscles in their face into a neutral expression (still-face) but maintain eye contact with their baby; in the reunion (repair) phase mothers return to normal interaction. The classic pattern observed during the still-face procedure is a reduction in infant eye contact and positive effect from the engagement phase during separation, an increase in negative affect (e.g., crying, fussiness), and only partial recovery during reunion (Mesman et al., 2009, cited in Williams, 2020, p. 5).

breastfeeding; 74% vs 51% any breastfeeding) and 5 months old (8% vs 1% exclusive breastfeeding; 48% vs 24% any breastfeeding) ($p < 0.05$; Pisacane et al., 2012, p. 3). Mothers in the intervention group fed their babies significantly more frequently during the day (44% fed more than 7 times per day vs 16% of controls, $p < 0.01$) and at night (35% fed at least 3 times overnight vs 10% of controls, $p < 0.01$) during the first month. During the second month post birth frequent breastfeeding (>7 times per day) remained more frequent in the intervention group (28%) than the control group (10%), as did frequent (>=3) night feeds (8% vs 0%). The increased number of breastfeeds per day may be the mechanism whereby carrying increased breastfeeding duration (Pisacane et al., 2012). Within the intervention group, 31 of the 100 mothers did not use the baby carrier they were assigned. These mothers breastfed with the lower frequency and shorter duration observed in the control group (Pisacane et al., 2012). Reasons for not using the baby carrier included infant crying while using the carrier (n = 20), problems with caesarean pain (n = 15), and discomfort with the carrier (n = 10). All mothers who used the carrier said they would recommend it to friends. The reasons they gave for using the carrier included facilitation of "bonding and intimate contact" (n = 65), finding it "useful for breastfeeding" (n = 58), and "understanding baby needs" (n = 53), and that it helped with outings and getting work done at home (n = 40) (Pisacane et al., 2012, p. 3).

Infant carrying is a parenting intervention which may reduce stress for parents and improve developmental outcomes for pēpi. This is an example of offering the right support at the right time, and suggests that parenting interventions need not be lengthy and expensive to be effective. The *Parenting From the Start* intervention tested the effect of a gifted sling in a New Zealand sample and combined it with an antenatal parenting workshop which provided cultural and evolutionary rationales for keeping babies close and carrying them. Slings were considered culturally-appropriate resources that would facilitate close physical contact and sensitive responsive caregiving.

A Partnership Approach to Intervention Design

The approach taken in the present project was consistent with wider moves within the health system to honour Te Tiriti on Waitangi. For instance, the National Breastfeeding Strategy for Aotearoa recognises Te Tiriti as the basis for partnership between tangata whenua and tangata tiriti ("peoples of non-Māori origin who have a right to live in New Zealand Aotearoa under Te Tiriti") and "commits to upholding the mana of Te Tiriti o Waitangi by ensuring the breastfeeding needs and aspirations of wāhine Māori and their whānau are reflected in the Strategy's whāinga (goals), whakaarotau (priorities) and putanga (outcomes)" (Ministry of Health, New Zealand, 2020, p. 3). The Strategy focuses on "increasing health equity and improving the hauora (health) and wellbeing of parents, their pēpi and whānau in New Zealand Aotearoa", noting that "Improving breastfeeding rates will support the reduction of inequalities between Māori and non-Māori" (Ministry of Health, New Zealand, 2020, p. 3). The Ministry of Health notes that "Meeting obligations under Te Tiriti [including specifically relating to breastfeeding] is necessary to realise the overall aims of He Korowai Oranga: Māori Health Strategy" (Ministry of Health, New Zealand, 2020, p. 3). Guidance for the government and health system comes from Whakamaua: Māori Health Action Plan 2020–2025, which lays out the goals, priorities, and outcomes meant to give effect

to He Korowai Oranga and contribute to pae ora – healthy futures (Ministry of Health, New Zealand, 2020, p. 3).

The four high-level outcomes of Whakamaua: Māori Health Action Plan 2020–2025 have implications for the design of parenting interventions in Aotearoa, and these were taken seriously in the construction of *Parenting From the Start*. Outcome 1: "enabling iwi, hapū, whānau and Māori communities to exercise their authority to improve their health and wellbeing" (Ministry of Health, New Zealand, 2020, p. 3) was supported by disseminating good-quality parenting information in a culturally-appropriate format following the *Hui Process* (Lacey et al., 2011; Pitama et al., 2017) without offering advice. This is elaborated below. Making pregnancy and parenting information accessible and comfortable for Māori assists with Outcome 2: "ensuring that the health and disability system is fair and sustainable and delivers more equitable outcomes for Māori". Explicit acknowledgement of the ongoing negative impacts of colonisation was intended to facilitate Outcome 3: "addressing racism and discrimination in all its forms" (Ministry of Health, New Zealand, 2020, p. 3). The use of traditional Māori parenting as an exemplar of optimal caregiving and the deliberate valuing of Māori scholars and scholarship can be understood as part of Outcome 4: "protecting mātauranga Māori throughout the health and disability system" (Ministry of Health, New Zealand, 2020, p. 3).

Hui[21] (gatherings) are ubiquitous in Māori settings. The *Hui Process* "adapts the structure of a hui to clinical interaction", incorporating the four components of mihimihi (appropriate greetings), whakawhanaungatanga (relationship-building), kaupapa (dealing with the purpose of the gathering) and poroaki/whakamutunga (closing the session) (Pitama et al., 2017, p. 8). Whakawhanaungatanga involves connecting with clients and their whānau at a personal level, including acknowledging links with place (whenua/land) and determining the appropriate use of te reo (Māori language) on a particular occasion (Lacey et al., 2011). A degree of self-disclosure by the clinician is important, in marked contrast to the exclusive focus on maintaining professional 'boundaries' which is emphasised in Western clinical training (Lacey et al., 2011). This traditional approach to engagement within Te Ao Māori was reapplied to a group setting in the present project. *Parenting From the Start* antenatal workshops began with a bilingual mihi (greeting), and were opened and closed with non-religious karakia in te reo Māori. The ongoing process of whakawhanaungatanga included the presenter outlining her place of birth and residence and offering the chance for all participants to locate themselves in a similar way through brief introductory activities. Biographical information including relevant employment history and details such as the names and ages of children were also shared by the presenter, and informal kōrero during meal breaks was deliberately collegial, with presenter and participants eating and conversing together. Time was set aside for discussions on particular topics, as well as face-to-face debriefing, where participants could share their thoughts and responses to the workshop as a whole. These interpersonal elements of the workshop provided insight into the meaning participants took away, and helped 'complete' the hui process. Lacey (2011, p. 75) notes that "the traditional role of the poroporoaki was to ensure all 'business' of the hui was completed, that both parties understood what would come next, and that the relationship existed for

[21] The Māori word 'hui' is both a noun (gathering, meeting, assembly, seminar, conference) and a verb (to gather, congregate, assemble, meet) (Moorfield, 2011).

further steps to be negotiated as required". Spending time listening to each participant in turn offered a chance to learn more about their priorities and challenges and to clarify misunderstandings. Although the related Meihana Model is not directly applicable to working in the group setting of parenting workshops, the presenter maintained a deliberate attunement to factors which have been identified as relevant to Māori and other minority participants, including racism, colonisation, migration, and marginalisation (Lacey et al., 2011).

The values underlying this approach to disseminating pregnancy and parenting information (see Chapter 1) were also made explicit in the *Parenting From the Start* workshops. These values impacted numerous other decisions, including the avoidance of 'advice giving'. Many public health messages are reduced to simplified instructions (e.g., "Breast is best", "Back to sleep") – stripped of the explanations and context caregivers might use to deduce their importance and relevance to their unique circumstances. *Parenting From the Start* took the opposite approach of contextualising research within the latest trans-disciplinary, cross-cultural and evolutionary theory of human development (The evolved developmental niche; Narvaez, Gleason, et al., 2013; Narvaez, Wang, et al., 2013), as well as the specific history of Aotearoa New Zealand, while also describing specific studies to give attendees a sense of the strength of evidence for particular infant needs. Caregiving strategies consistent with this evidence were offered as options rather than imperatives, and creativity was encouraged when it came to developing an approach to parenting that worked within unique individual/family/social contexts. This approach acknowledges the mana motuhake (autonomy and self-determination) of Māori and non-Māori whānau with regards to parenting. Leaving families free to choose their own path without undue pressure[22] was considered more respectful and culturally appropriate than presenting a single kind of parenting as 'right' and universally applicable.

Conclusions

Traditional Māori parenting was respectful, indulgent, and responsive. Children took part in the activities of their multiple caregivers, and remained close at all times. Babies were birthed naturally, breastfed, and carried. Parenting was characterised by high levels of social support for the biological parents. Many elements of Māori child care were disrupted as a result of colonisation, including birth and breastfeeding (Simmonds, 2014). In recent times Māori have undergone a population resurgence, meaning mainstream pregnancy and parenting services must become more culturally-appropriate or fail this important and rapidly growing segment of the population. Traditional Māori caregiving practices benefit babies and have ongoing relevance in modern Aotearoa New Zealand. Failure to recognise these practices and ignorance of their fit with the science of parenting may contribute to further harm. As a clinical psychologist working with whānau during pregnancy, I acknowledge the following points and gave attention to their implications within *Parenting From the Start*:

[22] While the presentation of 'evidence' from specific studies might have implicitly put pressure on parents to consider particular approaches to parenting, the evolved developmental niche takes Indigenous non-Western caregiving as the norm, providing some critique and contextualisation of studies involving Western/Global North understandings of child development and what it means to be a 'good' parent.

- Intergenerational harm and trauma associated with colonisation and colonialism, including ongoing systemic injustice and exposure to racism/discrimination as well as loss of land, language, and mana, and the associated trauma and financial stress/poverty. Interventions should encourage contextualised understandings of how negative experiences such as these impact long-term health.

- The de-valuing of wāhine Māori (women) associated with Christianity and other imported European ideas, and the lack of support for tāne (men), koro (grandfathers), kuia (grandmothers), and other family members as caregivers within patriarchal and gendered Pākehā society. Interventions should uphold the mana (power/prestige) and wairua (spirit) of all participants, recognising gendered assumptions as culturally and historically bound rather than universal.

- The value and interconnectedness of non-institutional vaginal birth and extended breastfeeding, including allomaternal nursing. Interventions should leave people free to embrace valued cultural knowledge and practices that support health.

- The benefits of alloparenting and high social support. Interventions should be designed to include and support the whole whānau and others in their network.

- The benefits of close, physical contact including babywearing. Interventions should promote hands-on nurturing of pēpi (babies) and tamariki (children).

- Co-sleeping as our evolutionary norm. Safe sleep information should acknowledge the psycho-social influences on risk such as poverty, and provide sufficient information on specific issues such as smothering so that whānau can make informed decisions. Culturally-appropriate solutions such as wahakura should be mentioned routinely.

- The mana of pēpi/tamariki from birth. Interventions should be child-centred and respectful – prioritising the needs of children over the preferences of adults.

- The limited utility of attachment theory if the dyadic relationship between biological mother and baby is emphasised to the exclusion of other important relationships with kin and non-kin carers. Interventions should be based on the latest multi-disciplinary information about caregiving and human development.

Clear policy and guidance around the provision of culturally-appropriate pregnancy and parenting services is readily available in Aotearoa New Zealand (Ministry of Health, New Zealand, 2020, p. 3). The challenge now is one of implementation. This chapter provided an overview of relevant scholarship relating to traditional Māori caregiving and the implications for the development of parenting interventions. The above guidelines were incorporated into the design of the *Parenting From the Start* antenatal workshops to improve the cultural appropriateness for a mixed audience of tangata whenua and tangata tiriti. This utilisation of a partnership model was my attempt to fulfil my moral obligations as a Pākehā woman and my ethical obligations as a health professional. Combining Mātauranga Māori with scientific efforts to elucidate child development and the needs of infants and caregivers constitutes a model of partnership emphasising the strengths of cultural diversity. This approach is not

without risks, and ongoing engagement between tangata whenua and tangata tiriti will be necessary to ensure the integrity of the bicultural approach within an arrangement that should decolonise and decrease inequality – benefitting both parties.

CHAPTER THREE

Who Cares? Alloparenting and Social Support Within the Human Evolved Developmental Niche

Ko te whaea te takere o te waka.
Mothers are like the hull of the canoe, they are the heart of a whānau (Tikao, 2020, p. vi)

Who looks after children? Who cares for the carers? There is a continuing Western academic trend towards regarding the biological mother as the default primary caregiver and attachment figure. Despite the potential benefits of shared care, little academic consideration is given to the possibility a child may be cared for by related and unrelated others, let alone by multiple people. Detailed research with hunter-gatherer groups on multiple continents suggests our evolutionary norm involved alloparenting by a number of adults and older children, with high levels of social support supplementing (but not replacing) maternal care. Far from constituting a 'trade-off', infants in hunter-gatherer societies are held more by alloparents than their Western counterparts while *also* receiving more direct care from their mothers (Konner, 2009). The present chapter considers the appropriateness of attachment theory to Māori, and introduces the evolved developmental niche (EDN) as a broader and more relevant theory of cross-cultural child development. The evolved developmental niche refers to humanity's evolved system of care for our young (D. Narvaez, personal communication, April 14, 2025). While Māori researchers accept attachment bonds and maternal relationships as important, they form part of a wider network of relationships contributing to holistic health. Acknowledgement of alloparenting and valuing of Indigenous practices in the EDN makes it more appropriate than attachment theory (AT) as a foundation for parenting interventions in Aotearoa. Nevertheless, attachment remains a crucial part of the human evolved developmental niche, and established measures such as the *Strange Situation Procedure* (SSP) and *Adult Attachment Interview* (AAI) continue to play important roles. Clarifying 'who cares' led me to adopt a more complete theory of human development that incorporates, but is not limited to, particular kinds of mother-infant bonds. This chapter overviews theory and research related to alloparenting and social support with reference to human cultures who retain foraging lifestyles, and to other species on our branch of the evolutionary family tree. Our embodied history as mammals and primates is embraced as a key aspect of our heritage which has biological and psychological consequences relevant to parenting.

A Brief History of Attachment Theory

Attachment theory (AT) was developed by psychiatrist John Bowlby and colleagues to explain why and how our crucial early relationships develop. A series of studies in the 1940s, 50s, and 60s suggested that young children separated from their mothers displayed recognisable

patterns of protest, despair, and finally detachment over subsequent days and weeks (Bowlby, 1991a). The longer the separation, the more serious the psychological and interpersonal sequelae. Bowlby both built on, and broke from, his training in Freudian psychoanalysis to create a theory fitting the existing scientific and cross-cultural data relating to infant relationships. Unlike Freud's theory, Bowlby's was empirical and testable. Multi-disciplinary from the start, Bowlby embraced the findings, methods, and concepts of ethology (the study of animal behaviour), experimental psychology, anthropology, archaeology, and neurophysiology to examine maternal and child behaviour (Bowlby, 1991a). Attachment theory was thus, from its outset, a bio-psycho-social model of human caregiving, and the breadth and depth of supporting data continues to grow after more than half a century of research.

Strongly influenced by the theory of evolution by natural selection (Darwin, 1859), attachment theory postulates that human infants display certain behaviours - such as crying when put down - that function to increase caregiver proximity and thus keep them safe from potential threats. In the 'environment of evolutionary adaptiveness' (EEA), infants who protested against separations would be less likely to die of cold or starvation or fall prey to predators. Bowlby argued that the 'attachment system' is innate, and activated by unfamiliar locations, unknown people, and the unavailability of an infant's usual caregiver (Bowlby, 1991a). The system is biologically based – resulting in an 'attachment bond' which differs from more general affiliative behavioural tendencies such as those promoting connection with others (the 'sociable system', see Cassidy, 2008, p. 9). An infant forms attachments with *specific* caregivers, and those people are not interchangeable. A child who wants their mother (for instance) is unlikely to be satisfied by other adults, although they may accept some comforting from these alternatives if their mother is not present (Cassidy, 2008).

A key criticism of attachment theory is that it has focused too much on the biological mother, and too little on other potential attachment figures (Hrdy, 2009; Mikahere-Hall, 2019). Various lines of evidence suggest, however, that children form attachments with anyone who spends significant amounts of time caring for them, and collaborative childcare may be normative across modern and ancestral human communities (Abraham & Feldman, 2018; Ahnert et al., 2006; De La Chica et al., 2018; Hewlett & Lamb, 2009; Narvaez, Fuentes, et al., 2014). Attachment theory has also been critiqued for promoting a form of intense nurturing termed 'continuous care and contact mothering' at the expense of shared care (Hrdy, 2009). The focus on a single dyadic relationship does not fit well into a New Zealand context where cooperative care of tamariki is a valued Māori cultural practice (Mikahere-Hall, 2019). Developing a parenting intervention suitable for Aotearoa led me to consider whether any part of attachment theorising remained relevant after acknowledging these critiques. The following sections summarise my review of the literature.

What Bowlby and Ainsworth Really Said

In a theory as well-discussed as attachment theory, numerous interpretations of the original theorists exist. To avoid misrepresentation I return to the original writings of Bowlby and Ainsworth, and utilise quotes to keep their voices clear. Both acknowledged the possibility of multiple attachment relationships. Bowlby routinely refers to the primary caregiver as the

"mother-figure", shortening this often to "mother" for succinctness. He writes,

> *This usage, which for the sake of brevity is unavoidable, has nonetheless given rise on occasion to misunderstanding… For example, it has sometimes been alleged that I have expressed the view that mothering should always be provided by a child's natural mother, and also that mothering 'cannot be safely distributed among several figures' (Mead, 1962). No such views have been expressed by me* (Bowlby, 1991a, p. 303).

Certainly, Bowlby acknowledged that "almost from the first many children have more than one figure towards whom they direct attachment behaviour", and "the role of a child's principal attachment-figure can be filled by others than the natural mother" (Bowlby, 1991a, p. 304). Nevertheless, the 'natural' or birth/biological mother is described as "the principal figure" in a child's environment (Bowlby, 1991a, p. 180), and Bowlby makes it clear that "these attachment figures are not treated as equivalents of one another" (Bowlby, 1991a, p. 304). He points out that most children protested more to their mother's absence than to being left by others, followed only "one special person", and sought that person alone when tired, hungry, or unwell (Bowlby, 1991a, p. 305). Bowlby claims that "whom a child selects as his principal attachment-figure, and to how many other figures he becomes attached, turn in large part on who cares for him and on the composition of the household in which he is living". He further states that "in virtually every culture the people in question are most likely to be his natural mother, father, older siblings, and perhaps grandparents, and that it is from amongst these figures that a child is most likely to select both his principal attachment-figure and his subsidiary figures" (p. 305). Similarly, according to Ainsworth, "The mother figure is… the principal caregiver, whether the natural mother or someone else plays that role" (Ainsworth et al., 1978, p. 5, cited in Howes & Spieker, 2008, p. 317). Thus, although the original attachment theorists allowed for maternal replacements, the focus remained clearly on one key dyadic relationship at the expense of others. Despite admission of the possibility, little attention was given to the concept of multiple relationships. It is not unreasonable to describe attachment theory as 'mother centred'. Bowlby makes explicit his assumption that "it is usual for a child's natural mother to be his principal attachment figure"(Bowlby, 1991a, p. 306). Similarly, Ainsworth concluded: "there is nothing in my observations to contradict the hypothesis that, given an opportunity to do so, an infant will seek attachment with one figure, . . . even though there are several persons available as caretakers (Ainsworth, 1964, cited in Bowlby, 1991a, p. 305). Bowlby went so far as to coin a special term, 'monotropy', to describe the "strong bias for attachment behaviour to become directed mainly towards one particular person" (Bowlby, 1991a, p. 308). This claim requires close inspection – particularly of contexts in which shared care is the norm.

Attachment theory's emphasis on mother-child relationships has had several consequences. One of these is a contribution to myths that early *Homo sapiens* lived in 'nuclear' families predominantly involving father, mother and children.[23] Another is that adult women are

[23] Non-nuclear families are common in hunter-gatherer groups, with reports that only 58% of Aka 11-15 year olds, 65% of Yanamamo 10-year-olds, and 40% of 15-year-olds live with both biological parents (Hewlett, 1991). Similarly, 35% of Mbuti households and 55% of Paliyan households contain only one biological parent (although there may be a step-parent). Fostering due to parental death, divorce, or child gifting is common and flexible (lasting a few years or a lifetime), and does not terminate the concern or involvement of the natural parents.

'naturally' responsible for the bulk of child-rearing. The focus on dyadic relationships to the exclusion of more complex networks and shared care arrangements has rendered attachment theory less suitable to cultures that maintain our ancestral human tradition of shared care. This is problematic for a theory that claims to be cross-cultural and unfortunate given the actual findings from cross-cultural studies, which suggest non-Western communities may have *higher* rates of secure attachment than their Western counterparts despite the devastation of colonisation and Western interference in traditional lifestyles. I argue, following others, that "a less monotropic and mother-centered approach might better inform our understanding of cross-cultural variation and highlight the evolutionary implications of the attachment process" (A. Crittenden, 2014, p. 283).

Managing Multiple Attachments

The monotropic perspective of attachment theory raises questions about how children manage a web of relationships, and how these experiences combine (Van Ijzendoorn et al., 1992). Bowlby claimed that "a child's attachment figures could be arranged in hierarchical order" (Bowlby, 1991a, p. 305). Cassidy proposes three reasons why a pyramid of attachments topped by one primary figure makes evolutionary sense. Firstly, bonding most strongly to one key person increases the chances that they will take ultimate responsibility for your care. This prevents, for instance, a situation in which meals are missed because nobody was coordinating and monitoring a toddler's food intake. Secondly, monotropy speeds up reaction times in the face of danger by ensuring you automatically seek your primary attachment figure rather than pausing to make judgements about multiple others. Likewise, it is presumably desirable to have one person who will always seek you in these moments. Thirdly, it may be most adaptive to bond most strongly with the person most invested in your wellbeing and survival, because they are most likely to provide support. Commitments to a particular child vary, and mothers in general have the greatest biological investment. Birth mothers share 50% of their baby's genes, but they also invest physical resources during pregnancy and breastfeeding that the biological father does not, and can be sure of biological relatedness to boot. Further, fathers and siblings (who also share 50% of a brother or sister's genes, on average) may have more opportunities to invest in other infants (Cassidy, 2008). Colin (1996, p. 194) suggests several factors that are likely to affect the structure of an infant's attachment hierarchy: "(1) how much time the infant spends in each figure's care; (2) the quality of care each provides, (3) each adult's emotional investment in the child, and (4) social cues". Cassidy (2008) adds that stability across time is likely to be important, even if encounters are brief. Whether or not the primary attachment figure is the mother may depend on the specifics of a particular case: even if infants have a biological predisposition to prefer their mother over other possible candidates, she may or may not be available and willing, and the examples of single fathers and adoptive, foster, and whāngai relationships make clear the adaptiveness of children in this regard.

Divorce occurs often, in 18% of Agta marriages, 25% of Aka marriages and 35% of Paliyan marriages (Hewlett, 1991).

Where a child has multiple caregivers, several different models have been proposed to explain how this attachment network is translated into a mental representation or internal working model of attachment. The attachment representation could be 'hierarchical' in the sense the most salient caregiver has the greatest influence, but subsidiary attachment figures act as a secure base if the primary figure is unavailable; 'integrative', where experiences with different caregivers are melded into a single representation; or 'independent', with caregivers forming unique relationships with a child which may be specialised and domain-specific (Howes & Spieker, 2008; Van Ijzendoorn et al., 1992). Integrative models suggest that relationships with various caregivers will settle into a single internal working model over time. While relationships with particular caregivers are distinct in childhood, Hesse states that "what were originally independent attachments to mother and to father will have coalesced" by adulthood (2008, p. 555). This perspective is supported by research which finds significant correlations between *Adult Attachment Interview* (AAI) classifications relating to a subject's mother and father (Furman & Simon, 2004). Another interpretation of this finding is that maternal and paternal caregiving styles are not necessarily independent (N. A. Fox et al., 1991). The correlation between AAI classifications may result from some similarity in actual caregiving rather than an amalgamation of relationship experiences into a single cognitive/affective representation. Two meta-analyses have investigated concordance of attachment relationships across caregivers. Fox and colleagues (1991) found that infant attachments to mother and father were modestly concordant. Ahnert et al (2006) found that infants were more likely to be securely attached to their mothers than to other caregivers. Data from Holland and Israel suggests that the predictive power of attachment is increased when a child's network of relationships (comprised of mother, father, and paid caregiver) is taken into account, with three secure relationships being more beneficial than one or two, and secure relationships to some degree compensating for insecure relationships (Van Ijzendoorn et al., 1992). The extent to which experiences of multiple caregivers are combined in our mental representations of attachment is not yet settled, and it may be that relationships begin to coalesce over the course of development but are never fully integrated (Furman & Simon, 2004). However these relationships come to be incorporated into our internal working models, the notion of a hierarchy of real attachment relationships provides theoretical space within AT for multiple alloparents.

Primate Models: Continuous-Care-and-Contact Mothering[24]

Attachment theorists have tended to assume that our evolutionary ancestors practiced exclusive maternal care. Bowlby (1969) singled out four species of primate (chimpanzees, gorillas, baboons and rhesus macaques) as prototypes for ideal human caregiving, primarily because their terrestrial adaptations make them similar to land-walking humans (Hrdy, 2009). Our closest evolutionary relatives are the Great Apes, which partially overlap with Bowlby's selections. The ancestors of orangutans diverged from our own line sometime before 12-13 million years ago, gorillas 7-8 million years ago, and the closely-related chimpanzees (*Pan*

[24] My final edit of this section utilised the artificial intelligence of ChatGPT as an aid to remove unneccesary detail. Five overlong paragraphs were pasted into ChatGPT with a request to "shorten this passage so there is less reliance on quotes". While none of the resulting text was used verbatum (not least due to the inaccuracies introduced), this process helped me to re-think what to leave in and out as I edited for succintness. My final section is at least twice as long as the one ChatGPT produced, but benefitted from the AI trial.

troglodytes) and bonobos (*Pan paniscus*) 5-6 million years ago (Gagneux & Varki, 2001).[25] All four of these species, as well as many Old World monkeys including savanna baboons and rhesus macaques provide a highly intensive form of maternal care termed continuous-care-and-contact mothering, involving physical contact day and night, 4-7 years nursing and zero separation during the early months[26] (Hrdy, 2009).

While chimpanzee, orangutan, and gorilla mothers are exemplars of sensitivity and responsiveness, ("with the attentiveness of a private nurse and the patience of an angel"; (Van Schaik, 2004, p. 102, cited in Hrdy, 2009, p. 70), a number of factors render them inappropriate as prototypes for early or current human caregivers. Because nonhuman ape mothers tend not to live with their kin during adulthood, only the father shares their biological relationship to the infant, and even fathers do not share her investment and commitment to individual offspring. Infanticide by adult males is common within primate species and considered to be sexually motivated, as the cessation of lactational amenorrhea returns females to cycling and increases the chances of paternity (Scott et al., 2019). Ape mothers differ from human mothers in their higher level of devotion, longer length of intensive caregiving, and less conditional care.[27] Abandonment or abuse of full-term infants by macaque and ape mothers occurs almost exclusively among captive individuals reared without normal social interaction.

In contrast to the single-minded commitment of chimpanzees, gorillas and orangutans, human maternal devotion is more complex. All Great Apes (including *Homo sapiens*) experience the same hormonal changes during pregnancy, but human parenthood is affected by context: "A newborn perceived as defective may be drowned, buried alive, or simply wrapped in leaves and left in the bush within hours of birth" (Hrdy, 2009, p. 71). Although abandonment is relatively rare in traditional hunter-gatherer societies – perhaps around 1% of live births - and "almost always undertaken with regret", human mothers routinely examine each infant soon after birth and make "a conscious decision to either keep the baby or let it die[28]" contingent upon "specific attributes and her own social circumstances (especially how much social support she is likely to have)" (Hrdy, 2009, p. 72). Even when an infant is judged both 'fit' and able to be kept, human mothers do not display anything like the same degree of possessiveness as other Great Apes. The necessity of alloparenting for child

[25] More recent research continues to refine these dates (e.g. placing the last common ancestor between chimpanzees and humans 6.5 to 9.3 million years ago; Almécija et al., 2021; Langergraber et al., 2012).

[26] "The earliest a wild chimpanzee mother has ever been observed to voluntarily let a baby out of her grasp is three and a half months. Among wild orangutans, half a year elapses, five months at the very least, before a mother allows any other individual, even her own older offspring, to hold her baby" (Hrdy, 2009)(Hrdy, 2009).

[27] Even an infant that has died will be carried about for days, and "[n]o matter how deformed, scrawny, odd, or burdensome, there is no baby that a wild ape mother won't keep. Babies born blind, limbless, or afflicted with cerebral palsy – newborns that a hunter-gatherer mother would likely abandon at birth – are picked up and held close. If her baby is too incapacitated to hold on, the mother may walk bipedally or tripedally so as to support the baby with one hand" (Hrdy, 2009, p. 70).

[28] According to ethnographers, the rate of abandonment is much higher (41 percent) "among people with strong sex preferences, as among the pre-missionized Eipo horticulturalists of highland New Guinea[28]" (Hrdy, 2009, p. 72). In modern Western societies, the inability to care for a child is usually accommodated by cultural mechanisms such as adoption and whāngai, a traditional Māori practice in which some children are raised by family members other than the biological parents. In Bowlby's time, and in a number of non-Western countries still, children were placed in institutions such as orphanages. Infanticide continues to occur, rarely but unceasingly.

survival presumably led our hominin ancestors to invest in infants who were most likely to survive, and most flexible in adapting to their context, as well as to enlist the help of alloparents as early as possible. Thus, even the most devoted human mother may allow trusted family or group members to hold the baby during the first hours and days post birth. Many modern parents take this relaxed approach further – employing paid childcarers beginning sometime during the first year or even the first 6 months. Clearly our species is less possessive than nonhuman apes (Hrdy, 2009).

Exclusive maternal care and continuous mother-infant contact is only characteristic of about half (50-60 percent) of the 276 or so living primate species (De La Chica et al., 2018; Hrdy, 2009). Among the remaining species, childcare by other group members allows mothers to conserve energy for other tasks: "continuous-care-and-contact mothering is a last resort for primate mothers who lack safe and available alternatives" (Hrdy, 2009, p. 85). The existence of infanticide, alloparenting, and conditional commitment towards offspring suggest that *Homo sapiens* differ in important ways from the other Great Apes, who are not appropriate templates for all aspects of infant care. Human infants may nevertheless have evolved to expect continuous close contact with caregivers. Even if this care was not provided exclusively by mothers, it remains possible that continuous close contact with *someone* was adaptive.

Constant Proximity and Care

We have no direct information regarding caretaking practices during the evolution of our species, but the absence of farming during the majority of human evolution suggests looking at forager societies to further our understanding. Humans only started forming settled, agricultural societies in the last 10 thousand years or so, and most extensively in the past five thousand years (Gurven & Kaplan, 2007; Larsen, 1995; K. Martin & Sauerborn, 2013; Wells & Stock, 2020). Because that is the time period closest to us it is easy to mistake the features of farming societies for the norms of our species. *Homo sapiens* have existed as a species for perhaps 200,000 years (Bermúdez De Castro & Carbonell, 2022; Schwartz & Tattersall, 2010), and within the genus *Homo* for around 2 million years. For 95-99% of this evolutionary history our ancestors gathered and hunted – moving from place-to-place following resources (Gurven & Kaplan, 2007). Hunter-gatherer societies tend to be egalitarian and relatively small, with a fluid structure (Hewlett et al., 2011). Seminomadic lifestyles such as those of the !Kung San (Bushmen) of northwestern Botswana, and the Efé in the Ituri forest in northeastern Zambia support flexible subsistence strategies across a range of geographic locations (Mesman et al., 2016). Commonalities across modern hunter-gatherer societies guide us to features that were likely important during evolutionary history and thus widely preserved in extant groups.

It may have been the introduction of agriculture that initiated growing diversity in caregiving patterns, with some shifting from proximal to more distal. Comparisons of non-Western societies that are in close geographical proximity find differences between settled agricultural groups such as the Ngandu, and foraging groups such as the Aka (Hewlett, 1991). The traditional gatherer-hunter lifestyle is associated with greater proximity and physical touch. In an Aka camp, for instance, people of all ages tend to sit in physical contact with others (Hewlett et al., 2011). Aka infants are held for 91% of daylight hours, compared to 54% for Ngandu infants. This pattern holds for children too. While both farmer and forager children

are held less as they grow, the proportion of holding is lower among the Ngandu at all ages studied and decreases to 0% by age 4 years as seen in Table 3.

Table 3.

Comparison of Daytime Holding Between Infants in Farming (Ngandu) and Foraging (Aka) Communities (%)

	Infants	2-year-olds	3-year-olds	4-year-olds
Aka (forager)	91	44	27	8
Ngandu (farmer)	54	18	2	0

Note. Data from (Hewlett et al., 2011) and (Hewlett & Roulette, 2014).

Within hunter-gatherer societies babies are nurtured by a range of group members, breastfed often, and never left alone (Hrdy, 2009). !Kung infants, for example, are held or carried by a range of alloparents: "When not in the sling [babies] are passed from hand to hand around a fire for similar interactions with one adult or child after another. They are kissed on their faces, bellies, genitals, sung to, bounced, entertained, encouraged, even addressed at length in conversational tones long before they can understand words. Throughout the first year there is rarely any dearth of such attention and love" (Konner, 1972, p. 292). Similarly, in Tanzania, Hazda infants are breastfed frequently and held by the biological parents, family members, and others (A. N. Crittenden & Marlowe, 2008).

Infant holding is constant (Hrdy, 2009). Alloparents account for a substantial portion of this holding, ranging from a low of 25 percent among the !Kung to a high of 85 percent during the first few days of a Hazda child's life. Hazda children under 4 years of age are held by their mothers 69% of daytime hours on average, and by alloparents (mostly kin) the rest of the day. Children and young people aged 1.5 to 17.9 years make up 62% of alloparents – substantially contributing to childcare (A. N. Crittenden & Marlowe, 2008). Among the Efé, multiple caregiving is high but variable. The proportion of time an infant spends with a caregiver other than their mother averages 39% at 3 weeks of age (range = 0 to 65%) and 60% at 18 weeks (range = 20 to 80%), at which point babies are passed to a new caregiver an average of eight times an hour (Konner, 2009). Efé mothers nevertheless spend more time holding their babies than do any other individuals, and undertake all nighttime parenting. Co-sleeping, where parent and child are adjacent in the same space and sometimes on the same sleep surface, is nearly universal across human cultures (Hewlett & Roulette, 2014) – leading to further hours together and supporting breastfeeding (Baddock et al., 2019; Barry & McKenna, 2022).

Care in foraging groups is baby-focused and continuous (Hrdy, 2009). Among Efé caregivers, infant distress may be briefly tolerated where a competing task is short, but response to infant cries is usually rapid. Caregivers attempt to calm the child by warmly and patiently meeting any immediate needs, and interpret ongoing distress as a sign of poor health. This responsiveness is thought to minimize distress and build trusting relationships, with average distress bouts ranging from only 11 to 20 seconds (Morelli et al., 2014). Allomaternal nursing, in which infants are fed by lactating women other than their own mothers, appears common within hunter-gatherer cultures, although it is normative in only a few (Hewlett & Winn, 2014). Breastfeeding the children of friends and family members is a practice that continues

to the present time in sections of Māori and Pākehā society in New Zealand, somewhat complicated by the wetnursing traditions of colonial England and elsewhere.[29] Milk-sharing, in which human milk is gifted through milk banks and private donations between families is a modern extension of the more ancient and egalitarian practice of allomaternal nursing.

Extensive anthropological reports of caregiving in modern foraging societies on multiple continents suggests that constant care and physical proximity constitute one aspect of the human evolved developmental niche (EDN). Holding and carrying of infants is usual, although the extent to which this care is provided by the biological mother versus alloparents varies by infant age and culture. This intensive care was likely adaptive in the ways Bowlby and other attachment theorists have articulated from the outset. Constant proximity and close contact protects vulnerable infants from starvation, predation, and dangerous temperature fluctuations. Available and responsive caregivers provided safety and essential care, and physical proximity was the first necessary-but-not-sufficient prerequisite for attunement to a child's needs. Correlates of this infant care were formative relationships with caregivers. The following sections clarify what is meant by the term 'attachment' as it applies to relationships, and how it is measured in small children.[30]

Measuring Infant Attachment

Based on extensive home visits in Uganda, Ainsworth observed the extent to which infants used their caregiver as a 'secure base' from which to explore, and as a haven to retreat to in times of threat (Weinfield et al., 2008a). The *Strange Situation Procedure* (SSP; Ainsworth et al., 1978) is the 21-minute procedure Ainsworth designed to evaluate the functioning of the attachment system in babies between 12 and 18 months of age. It is neither cheap nor easy to administer, with recommendations that raters receive between 3 and 14 days of specialist training. Perhaps for this reason the SSP has rarely been used in Aotearoa, and never in longitudinal studies. The *Strange Situation Procedure* measures patterns of attachment developed over the first year of life, and cannot be used much beyond 18 months or where separations (for instance for child custody reasons) have disrupted a child's usual relationships (Carlson, 2016; Sroufe, 2016).

The *Attachment Q-Sort*[31] (AQS; Waters & Deane, 1985) is an alternative measure, but the *Strange Situation Procedure* is more established, with a stronger empirical base in this age group. Multiple research directions have added to evidence of the SSP's (construct,

[29] Wetnursing raised/raises complex issues of privilege and exploitation involving intersecting ideologies of gender, race, and class, for example see West and Knight (2017) and Thorley (2015).

[30] The term 'infant attachment' conflicts with local definitions of 'infancy', which in Aotearoa New Zealand refer to newborns and babies of a few months old rather than the one-year-olds discussed here. I use the term 'infant' in both senses and hope the context will make my usage clear.

[31] The AQS is a 90-item card sort measure, made up of statements about infant behaviour which are sorted into nine piles ranging from 'most descriptive of this child' to 'least descriptive of this child' based on a period of observation in a low-stress setting such as home. Sorts are then compared to a criterion sort based on expert consensus about prototypical secure-base behaviour, dependency, affectivity, social interaction, social perceptiveness, and object manipulation. Results reported here are for the observer ASQ. The self-report version is more weakly correlated with sensitivity and more strongly correlated with temperament, and there is no evidence that discriminant or predictive validity is improved by training (Cadman et al., 2018).

predictive, criterion) validity. *Strange Situation* accreditation requires high interrater reliability with experienced raters to ensure consistency across observers (Waters & Deane, 1985). Meta-analyses have found moderate correlations between the AQS and the SSP, suggesting some convergent validity (r = .25; r = .39 for long observation periods, based on 245 studies, N = 32,426 participants, Cadman et al., 2018; r =.31 based on 139 studies with a total of 13,835 participants, van IJzendoorn et al., 2004). Clearly though, the two measures are not assessing exactly the same thing. While the measures share a number of strengths, each has particular weaknesses.

Attachment behaviour can only be identified when the meaning in terms of adaptive function and proximate causes is understood (Bowlby, 1991a; Waters & Deane, 1985). Phenotypically similar behaviour[32] may have different aims within different contexts. Both the *Strange Situation* and the AQS depend on contextual understandings of child behaviour. Bias and subjectivity are minimised by detailed rating scales anchored to observable interactions between caregiver and child. While the AQS assesses day-to-day attachment behaviour, only the SSP evaluates the attachment relationship under pressure. The SSP is designed to 'activate' an infant's attachment system in a series of separations and reunions (O'Connor & Byrne, 2007) which temporarily tilt the balance of a toddler's behavioural control system from exploration to physical contact (Waters & Deane, 1985). This advantage of the SSP also constrains its use, as the mild stress of the separation episodes create strong carryover effects. Although the AQS is more suitable as a repeated measure, the SSP has clearer links both to attachment theory and to evolutionary ideas, and may tap problems in the attachment relationship more accurately. Further, the AQS does not produce attachment classifications (Weinfield et al., 2008a), which are a key outcome measure in the present study, as in most intervention research.

For the purposes of research, and particularly intervention research, the *Strange Situation* is the "gold standard" measure of attachment relationships prior to 20 months (Cassidy & Shaver, 2008). The next section outlines the procedure and its interpretation in more detail.

Attachment Classifications

The eight episodes of the *Strange Situation Procedure* are designed to see what kinds of relational expectations the baby has developed over their first year of life. The episodes, shown in Table 4 are presented in standard order, and videoed to allow for later scoring and classification by a trained assessor. The venue mimics a doctor's office waiting room, with two chairs and a collection of attractive toys nearby on the floor. Each episode except the first is up to three minutes long. Three mild stressors are utilised in sequence to provoke attachment behaviour on the part of the infant: an unfamiliar place, an unfamiliar person (the 'stranger'), and lack of access to their caregiver during two brief separations. The reunions between caregiver and infant are the key focus of interest, with the goal of considering how the child copes with stress and how they use the attachment figure in that process (O'Connor & Byrne,

[32] That is, looks similar, such as crying due to hunger and crying due to discomfort. Same category of behaviour. Different solutions.

2007). The focus on behaviour-in-context makes the SSP "[m]ore a psychometric instrument than an observational measure" (Waters & Deane, 1985, p. 50).

Table 4.

Summary of Ainsworth's Strange Situation Procedure (SSP)

Episode	People	Description	Purpose
1	Host leaves mum & baby	Introduce mother and baby to the room (1 minute)	Observe amount and quality of child play/exploration & interaction with mum
2	Mum & baby	Mother and baby settle in (3 minutes)	Observe amount and quality of child play/exploration & interaction with mum
3	Mum, baby & Stranger	Introduction of a Stranger (3 minutes)	Observe changes in play, amount and type of attention child pays to Stranger in comparison to mum, & how child accepts the Stranger's attempts to interact
4	Mum leaves baby & Stranger	First separation (up to 3 minutes – cut short if baby is very upset)	Observe child's response to mother leaving, child's play/exploration in comparison to earlier, & how child responds to Stranger (e.g., comfort, being held, attempts to interact)
5	Baby & mum, Stranger leaves	First reunion (3 minutes)	Observe child's response to mother's return & their subsequent interaction
6	Mum leaves baby alone	Second separation (up to 3 minutes – cut short if baby is very upset)	Observe child's reaction to mother leaving (e.g., distress, search behavior) & quality of play/exploration while alone
7	Baby & Stranger	Stranger returns (up to 3 minutes – cut short if baby is very upset)	Observe how child responds to Stranger upon reunion & amount/quality of play (to compare with mother's reunions)
8	Baby & mum, Stranger leaves	Second reunion (3 minutes)	To observe child's response to mother's return, their subsequent interactions, & whether/how baby returns to play.

Table 5 summarises the main attachment classifications in infancy. Type B babies are classified as securely attached, Type A and C babies are insecurely attached. Each main category is then broken down further into subcategories: B1, B2, B3, and B4 relational patterns are all classed as secure; A1 and A2 are coded as insecure avoidant; and C1 and C2 constitute two kinds of insecure resistant attachment relationships. Of these subcategories, B3 is considered the exemplar of security, with B1, B2, and B4 babies displaying relatively higher levels of resistance or avoidance while still using their caregiver as a 'secure base' (Ainsworth et al., 1978; Main & Solomon, 1990).

Infants classified as secure (B) in the *Strange Situation Procedure* display the ability to use their caregiver as a source of comfort or reassurance in times of stress, but balance this with enthusiasm for exploring the new environment (Sroufe, 2016; Weinfield et al., 2008a). This is considered to be the outcome of a healthy and well-functioning attachment system. Securely attached children are confident in their caregiver's responsiveness, and thus happy to explore or play while their attachment figure is present, occasionally returning for an emotional 'top up' or checking from a distance that the parent is there if needed. Upon separation the infant may become distressed and cry – expressing a desire for their caregiver's return and a clear preference for that particular adult over the stranger. Attachment security is indicated either by infant comfort and warm communication with their caregiver throughout the procedure (where there is no crying), or by the 'problem' of separation being solved by the 'solution' of reunion. Thus, secure children will actively seek proximity and comfort from their attachment figure when they need it. Comforting by the parent is effective, and securely attached infants are likely to return to play by the end of the episode (Weinfield et al., 2008a).

Table 5.

Infant Attachment Classifications Based on the Strange Situation Procedure (SSP)

Classification	Description
Secure (B)	Good balance between exploration and attachment. Uses caregiver effectively as a 'secure base'. Distress on separation is effectively soothed during reunion and child usually returns to play.
Avoidant (A)	Parent is ignored or avoided throughout. Little or no distress/anger is evident on separation and child shows no interest in parent on reunion. Infant focuses on toys and environment at expense of caregiver.
Resistant/ambivalent (C)	Parent is the focus throughout. Infant's preoccupation with their caregiver prevents play and exploration, and child is unable to be comforted on reunion. Bids for contact/proximity may be weak (ambivalent) or accompanied by signs of anger.
Disorganized (D)	Temporary disruptions in behavioural strategy such as freezing, or inconsistencies. Disoriented or unusual behaviour which may be subtle to detect.
Cannot classify (CC)	Elements of two or more attachment categories are displayed in the absence of substantial disorientation or disorganised behaviour. Does not fit any single category.

Information adapted from (Hesse, 2008).

Infants are classified as insecure-avoidant (Type A) when they fail to display attachment behaviour during the *Strange Situation Procedure*. Avoidant infants ignore or actively avoid the parent throughout the procedure "by moving away, turning away, or leaning out of arms when picked up" (Hesse, 2008, p. 569). The child's behaviour does not substantially alter regardless of whether the parent is present, leaving, or returning after an absence, in fact, avoidance may be more pronounced in the second reunion than the first. There is "[l]ittle or no proximity or contact seeking, distress, or expression of anger", only an unemotional

response to the caregiver and an inflexible focus on toys or other aspects of the environment (Hesse, 2008, p. 569). Infants who are labelled avoidant may seem independent or self-reliant, but research measuring heart rate shows that these children still become physiologically aroused during the SSP – they just don't show it (Sroufe & Waters, 1977). Children are thought to develop avoidant behaviour when their 'tender needs' are consistently rebuffed by a particular attachment figure (Sroufe, 2016). This might occur, for example, when a parent re-enacts an emotionally-insensitive pattern of caregiving they learned during their own infancy. Experiencing their child's need for comfort when distressed as aversive leads them to reject close contact and kindness in precisely the moments their child most sorely requires them. Avoidant relationships, like all attachment patterns, are adaptations to the caregiving provided. By dampening their overt response to distress, the child is able to maintain a moderate level of proximity and avoid antagonising their parent – increasing the chances they will be cared for day-to-day and rescued in the case of true danger. The cost is a lack of balance between dependence and independence – the developmentally appropriate use of the parent as a 'secure base' is lost from the behavioural repertoire.

Infants are classified as insecure-resistant (or 'ambivalent', Type C) when they remain focused on the parent throughout the SSP, unwilling to play or otherwise explore the environment (Sroufe & Waters, 1977). Such children tend not to engage meaningfully with the toys provided, "[m]ay be wary or distressed even prior to separation" and remain preoccupied with their caregiver throughout, but are unable to be comforted effectively following reunions (Hesse, 2008, p. 569). Instead, children display anger or passivity. Crying may continue long after the parent returns. Bids for contact with the parent are either mixed with anger, or are markedly weak (Hesse, 2008). Infants labelled resistant or ambivalent display neither the effective attachment behaviour that would suggest an appropriate dependence on their caregivers, nor any signs of independence. Their behavioural strategy does not allow for a balance between exploration and emotional safety. They are not confident in their parent's availability and thus don't explore. The 'secure base' is again lacking for these infants.

Infants are classified as disorganized (Type D) on the *Strange Situation* if their parent's presence is associated with lapses in their usual attachment strategy, lack of a consistent attachment strategy, or signs of fear or apprehension relating to their attachment figure (Main & Solomon, 1990). For instance, the infant "may freeze with a trance-like expression, hands in air; may rise at parent's entrance, then fall prone and huddled on the floor; or may cling while crying hard and leaning away with gaze averted" (Hesse, 2008, p. 571). Infants labelled disorganized "exhibit unusual behaviors that seem to represent breakdowns in the organization of attachment behavior, or that reflect striking episodes of disorientation" (Weinfield et al., 2008a, p. 81). A secondary organised strategy (either secure, avoidant, or resistant) is also assigned where possible. There has been some confusion regarding how disorganized infants should be assigned in two-way attachment classifications, but such children are usually considered to be insecurely attached (Main & Solomon, 1990; Weinfield et al., 2008a). No subtypes have been developed and found stable for the disorganized category (Hesse, 2008).

If an infant does not fit any category they are placed in the *cannot classify* group. The child may display behaviour indicative of multiple categories, without any other signs of disorganization or disorientation (Hesse, 2008). For instance, they may appear to fit the

avoidant category on the first reunion of the *Strange Situation*, but the resistant category the second time their parent returns after a brief absence. In two-way classifications such an infant could at least be labelled insecure, but three-way classification is complicated by the mix of attachment strategies. The principle of logical discontinuity suggests that an infant's pattern of attachment will eventually change if their caregiving circumstances change (Sette et al., 2015; Sroufe et al., 2005a). Transition from one attachment category to another is a possible cause of classification difficulties.

In summary, the *Strange Situation Procedure* produces several levels of classification, the simplest of which is a 'two-way' classification of secure versus insecure. Early attachment research tended to utilise 'three-way' (ABC) classifications of secure (B), avoidant (A), or resistant (C). Later research identified an important fourth category which was labelled disorganization (D). There is a growing consensus that it is more appropriate to label babies with high levels of disorganization as insecure. Interpretation of earlier studies is complicated by the inclusion of some disorganized children in the secure group, or by failure to identify disorganized children at all. Subcategories of attachment are also produced in the SSP, and reported in some research including the present project.

Measuring Adult Attachment

Caregivers have their own patterns and understandings of relationships. The *Adult Attachment Interview* (AAI) was developed in 1984-1985 by Main, Kaplan, Cassidy and George (Hesse, 2008) to assess adults' 'state of mind with regards to attachment'. This is a more complex construct, as individuals may have passed through multiple stages of attachment with various significant figures and reflected thoughtfully on or emotionally 'processed' those experiences. Early relational patterns are considered influential, but not exclusively so, in developing adult attachment: The AAI does not assess "the way we were" but rather "measures an adult's current mental representation of (past and present) attachment experiences and relationships, particularly with his or her parents" (van IJzendoorn, 1995b, p. 1). The AAI is a standardised interview which takes about an hour and follows a set pattern of 20 questions and follow-up prompts. It is transcribed verbatim, including pauses, which are timed (Hesse, 2008).

Respondents are asked about their childhood (who was in their immediate family, where they lived) and relationships with their parents from as far back as they can remember (Hesse, 2008). The interviewer asks for five adjectives or phrases that would best represent the relationship with each parent, beginning with the mother. The respondent is asked for specific memories or experiences that illustrate why each word or phrase was chosen. This process is then repeated for the father and any other significant attachment figures (e.g., stepfather or nanny). Next the interviewer asks "which parent the speaker felt closer to and why; what the speaker did when emotionally upset, physically hurt, or ill; and how the parents responded at such times", as well as separations from their parents and other kinds of loss during their life to date, feelings of being rejected or threatened, and how they understood these experiences (Hesse, 2008, p. 554). Perceived impacts on development and adult personality are explored, along with the perceived motivations of the respondent's parents, with opportunities to talk about changes that occurred over time in their relationship with their attachment figures, as

well as the status of their current relationship.

The key challenge for respondents during the AAI is (1) to produce and reflect on memories relating to attachment "while *simultaneously* (2) maintaining coherent, collaborative discourse with the interviewer" (Hesse, 1996; Hesse, 2008, pp. 554–555 emphasis in original). The intention is "to bring into relief individual differences in what are presumed to be deeply internalized strategies for regulating emotion and attention" during discussion of attachment-related experiences (Hesse, 2008, p. 555). Characteristics of an individual's language during the AAI appear to be indicative of the kind of working model that has been developed, or what Hesse calls "different 'proximate working strategies' manifested in language responses to questions about early attachment-related experiences and their effects" (Hesse, 2008, p. 562). Scoring is based on the quality of the answers (coherence, relevance of content, appropriateness of length, etc) and the function of a speaker's discourse.

The AAI produces five major attachment classifications,[33] summarised in Table 6. Information from the AAI may also be analysed in terms of continuous rating scales, which increases statistical power without compromising the strength of the analysis (Fyffe & Waters, 1997; Roisman, Fraley, & Belskey, 2007, cited in Hesse, 2008). At least four studies have found significant correlations between subclassifications of the AAI and SSP (incl. Behrens, Hesse, & Main, 2007; Hesse, 2008). The 'organised' categories of the AAI are those assigned when the transcript suggests a consistent strategy throughout the interview: either secure or insecure ('dismissing' or 'preoccupied'). The remaining AAI categories ('unresolved/disorganized' and 'cannot classify') lack this organisation, and are sometimes referred to as 'unorganised' (Hesse, 2008), presumably to distinguish this term from the infant 'disorganized' category.

Table 6.

Adult Attachment Classifications Based on the Adult Attachment Interview (AAI)

AAI Classification		Description
Secure/autonomous (F)		AAI suggests attachment is valued, and respondent is able to discuss early relationships in a credible, coherent way. Answers are appropriate in length and content and feel 'fresh' rather than rehearsed. Infants tend to be secure in the Strange Situation.
Insecure:	*Dismissing* (Ds)	Discourse is inflexible and 'blocked' (either consciously or unconsciously) as respondent refuses to discuss potentially distressing experiences. Does not provide evidence to support claims regarding parents. Infants tend to be insecurely attached (avoidant) in the Strange Situation.
	Preoccupied (E)	Responses on the AAI are confused and inflexible when discussing attachment figures or distressing experiences. Some of the content may not be relevant to the question asked. Infants tend to be insecure

[33] These five AAI classifications can be further subdivided into 12 subclassifications, but this level of detail is not required for the present project.

	in the Strange Situation – ambivalently preoccupied with parents, either angrily (resistant) or passively (ambivalent).
Unresolved/ disorganised (U)	Momentary collapses in discourse or reasoning may be apparent during discussion about potentially frightening experiences, or the individual may present as somewhat dissociative regarding some topics.
Cannot Classify (CC)	The respondent does not display a single organised strategy (*secure, dismissing, or preoccupied*), but rather some combination. Alternatively, periods of incoherence may appear consistently, going beyond discussion of particular painful topics, or the speaker attempts to frighten the listener (e.g., suddenly describing a murder in detail).

Note. Information adapted from Hesse (2008). Likely infant classifications refer to respondents' children.

Adults whose AAI transcripts suggest a secure-autonomous representation of attachment are able to discuss their early experiences – whether positive or negative – in a balanced and coherent way. Even serious losses or traumatic experiences during childhood are expressed in a relatively clear, internally-consistent narrative. Those who recall inadequate parenting but are nevertheless able reflect on their childhood openly and coherently and value attachment experiences are sometimes referred to as 'earned secure' (Saunders et al., 2011). The discourse of secure-autonomous individuals demonstrates self-awareness and an ability/willingness to reflect on and discuss painful topics (Hesse, 2008). These respondents are easy to follow, and their answers are neither too short nor too long. Although the individual may seem to have pondered some of the questions previously, their answers feel 'fresh' rather than rehearsed (Hesse, 2008). Later answers build on earlier answers, suggesting the speaker is able to maintain an overview of what has been said rather than getting distracted by the emotional content. They provide good quality, specific examples in support of their descriptions of their parents, stay on topic, and 'just answer the question' (Hesse, 2008).

In contrast, adults classified as insecure-dismissive may describe their parents in glowing terms, but fail to provide evidence in support of this. Answers may be overly succinct – providing too little information and perhaps suggesting a strategy of orienting "*away from"* the topic (Hesse, 2008, p. 558, emphasis in original). Alternatively, the information provided by insecure-dismissive individuals may be "inflexibly focused away from" and "dismissing of" the parent under discussion or attachment relationships in general, as for a speaker who describes their mother as follows: "Troublesome. Weak, cried. Fell apart at funerals". Following the interviewer's invitation to provide a specific memory, the speaker might continue: "Sobbed though her aunt's funeral. Embarrassing. Couldn't wait to get away from her. Next question?". This response would likely be placed in the 'derogating' subcategory, because the mother is belittled in a way that cuts off further discussion (Hesse, 2008, p. 560).

A respondent may be classified as insecure-preoccupied on the basis of an AAI transcript that is confused with regards to particular relationships or attachment-related experiences. Responses may focus on irrelevant information (e.g., about current relationships rather than childhood ones, or people other than the parent under discussion), or include seemingly contradictory information (Hesse, 2008). Some speakers use vague statements ("this, that, and the other. Really special sorts of things, just me and her, grateful for all she did for me")

or nonsense words ("dadadada") rather than providing coherent answers to the AAI questions (Hesse, 2008, p. 559).

Adults classified as disorganised/unresolved on the AAI can be distinguished by brief "'lapses in the monitoring of reasoning or discourse' during discussions of potentially traumatic experiences", including unresolved loss (Hesse & Main, 1999, 2000, cited in Hesse, 2008, p. 570). Such lapses "are suggestive of temporary alterations in consciousness or working memory, and are believed to represent either interference from normally dissociated memory or belief systems, or unusual absorptions involving memories triggered by the discussion of traumatic events" (Hesse & Main, 1999, 2006; Hesse & Van IJzendoorn, 1998, 1999, cited in Hesse, 2008, p. 570). For example, respondents may appear momentarily confused about whether the person they are talking about is living or dead, or a speaker may shift "from his or her ordinary conversational style into a eulogistic or funereal manner of speaking" (Hesse, 2008, p. 570). It seems that the questions on the AAI may trigger "momentary but qualitative changes in consciousness" or even "partially dissociated states of mind (Hesse, 2008, p. 570). Normally, the speaker will fit into one of the organised categories of the AAI based on the rest of their transcript.

The cannot classify category is assigned where features of two conflicting classifications are present ("contradictory strategies"), including if the individual seems to fit equally well into both secure and insecure categories (Hesse, 2008, p. 571). AAI responses are also given this classification if the speaker seems to try and frighten the listener, for example by suddenly describing a murder in detail. Cannot classify may also be used if the confusion in a narrative is not linked to specific, potentially painful topics, but rather occurs more generally: "In rare and extreme cases, the transcript as a whole may be so incoherent as to be difficult to follow" (Hesse, 2008, p. 571). Finally, this category would be utilised if an individual refused to speak during the interview "without responding that memories are unavailable or are too painful to discuss" (Hesse, 2008, p. 571). Those placed in the cannot classify category should be defined as insecure as they share low coherence (Hesse, 2008).

The AAI is the preeminent measure of adult attachment. AAI classifications are assigned on the basis of consistent patterns of responding throughout the interview. The AAI appears to challenge respondents in a way that reveals important differences in their understandings of attachment and of themselves and their way of interacting with others. Individuals who initially use similar words to describe their parents (e.g., 'loving') may end up in different categories based on their ability to maintain this description over the course of the interview (Hesse, 2008). Reliability of the AAI is established by high stability (Bakermans-Kranenburg & van IJzendoorn, 1993; Benoit & Parker, 1994; Sagi, van Uzendoorn, et al., 1994). Evidence of the AAI's validity comes from studies showing adult attachment classifications are not explained by IQ, memory, discourse style, and social desirability (Bakermans-Kranenburg & van IJzendoorn, 1993; Crowell et al., 1996; Sagi, van Uzendoorn, et al., 1994; Watson, 2009) and robustly predict intergenerational transmission of attachment security (Kondo-Ikemura et al., 2018; van IJzendoorn, 1995a; Verhage et al., 2016).

Tūhono: Attachment Within Te Ao Māori

I move now to considering the appropriateness of attachment theory to Māori. Few studies of attachment have taken place in Aotearoa New Zealand. To my knowledge, mine is the first to use the *Strange Situation Procedure* with a New Zealand sample. Nevertheless, important theorising has taken place from within Te Ao Māori, with researchers noting that attachment theory has ramifications for child placements as well as ties to deep connections between people, whenua (land), and wairua (the spirit or essence of people and other things). The kupu (word) 'tūhono' can be translated as the verb 'to join, bond, attach, connect' and the noun 'bonding' (Moorfield, 2011), and is used to speak about Māori views on attachment relationships between tamariki and their multiple caregivers (Mikahere-Hall, 2019, 2020). Several studies using Kaupapa Māori methodology have referenced and examined the concept of tūhono, and these are summarised here. They identify areas of commonality with and difference from Western views of attachment.

In keeping with the theme of this chapter, overemphasis on a single dyadic relationship between mother and child is described as problematic for Māori, because alloparenting is usual: "The traditional Māori caregiving system is based upon the care of many different people. It includes grandparents, older siblings, aunts and uncles, each with their protective and nurturing responsibilities to the child. The multi-caregiving system differs from the monotropy parenting view promoted by Ainsworth (1967). From a Māori perspective, attachment and emotional security is not invested solely in the mother-child relationship" (Mikahere-Hall, 2019, p. 55). Tamariki develop/ed within a stable network of mutually-supportive relationships: "In Te Ao Māori, parent and child relationship were held in the context of the community, with extended family members such as grandparents, aunties and uncles being significant in the upbringing of a child. The idea that children do not belong solely to their parents but to their whānau is a significant one, and one where belonging is seen in terms of developing a sense of identity within the collective, rather than as [an] act of possession" (A. Fleming, 2016, pp. 4–5, citing Metge, 1995, p. 140). These relationships extended to the tribal connections of hapū and iwi, with knowledge of ancestry and other links contributing to wellbeing: "Māori concepts such as whangai [gifting of a child within their whānau/hapū/iwi] emphasise the need for children to understand their whakapapa fully and to have access to information from both their biological and whānau histories. Transmission of these values, beliefs, stories and knowledge also provide safety to the developing child" (A. Fleming, 2016, p. 17, my translation of whangai).

Tūhono is a concept that extends beyond interpersonal relationships. Fleming writes that "Indigenous Māori attachment perspectives have always included vital connections to cultural and collective concepts such as whānau, whenua, and wairua" (2016, p. 2), and notes that connectedness is central to health (A. Fleming, 2016, p. 20; Ratima, 2010). Kaupapa Māori conceptualizations of attachment are both similar and different to those of Bowlby and Ainsworth. A critical review of the attachment literature with a Kaupapa Māori methodology notes that early experience is considered to be formative within traditional attachment and Indigenous Māori understandings, which both acknowledge "the importance of early familial and maternal attachment relationships" (A. Fleming, 2016, p. 16). Fleming recognises a shared emphasis on "the importance of safe, reliable, consistent, attuned and responsive adults being available to children, particularly in infancy" (2016, p. 50). Interviews with extended whānau conducted by Mikahere-Hall led her similarly to conclude that "A young child's sense of security develops through sensitively attuned, reliable and available

caregivers who are not overburdened by economic hardship, housing, food and health insecurities" (Mikahere-Hall, 2019, p. 55). While the emphasis on sensitive attunement echoes generally accepted ideas about the development of attachment, the focus on adversity and connections to land and spirit go wider. This has implications for accountability, as "Local councils, national boards and government institutions are the structures that set the society-wide conditions for what is experienced at the personal level as either emotional security or emotional insecurity. Our capacity to love is therefore shaped by the social conditions in which we live" (Mikahere-Hall, 2019, pp. 55–56).

While acknowledging the importance of stable and sensitively responsive care, and the seriousness of losing your biological mother as an infant even within the supportive context of Te Ao Māori, Fleming also suggests that the "transparency of the whangai process coupled with the ongoing links to whānau, hapū and iwi structures goes some way to mitigating the effects of this separation (2016, p. 50). Whangai allows the child to remain connected to their whānau and wider cultural heritage. It is also an open and transparent process in which both the child and whānau are aware of the child's biological and whānau connections" (Fleming, 2016, p. 74). The value of close dyadic relationships with caregivers was also stressed by Waiti and Kingi (2014), who emphasise that these relationships exist within a wider system of whānau support (cited in A. Fleming, 2016, p. 63). Crucially, these nested levels of relationship (dyadic, whānau network) impact each other in both directions, so that the individual fares "better than expected" (Waiti & Kingi, 2014, p. 130) in ways that also contribute to whānau strength and resilience (cited in A. Fleming, 2016, p. 63). Whānau structures are themselves nested within the larger groups of hapū and iwi, providing "a wider network of belonging, cohesion and safety" (Herbert, 2011, cited in A. Fleming, 2016, p. 63).

Further critiquing the similarities and differences between Kaupapa Māori and Western conceptualisations of attachment, Mikahere-Hall questions the applicability of a hierarchy of relationships, claiming "A Māori perspective of attachment encompasses the view that a child can be *equally attached* to more than one central parenting figure such as the mother. A mother has a special and specific caregiving role, as do other members of the whānau. The differing roles and responsibilities of people in the shared whānau caregiving system will reflect the quality of interactional experiences and shape the emotional ties the child will develop with each whānau member" (Mikahere-Hall, 2019, p. 55, my emphasis).

An examination of scholarship on Tūhono Māori suggests that the theory of attachment has utility for tangata whenua, with several caveats. The normality of multiple caregivers must be acknowledged, and discourses reifying mothering at the expense of other relationships should be critiqued. A focus on the quality of caregiving is appropriate however, and sensitive attunement is considered important by Māori as it is by other Indigenous and non-Western peoples, but wider societal structures and issues must also be examined for their impact on the development of tamariki and mokopuna (Mikahere-Hall, 2019). This is consistent with the latest research on the importance of 'place' in child outcomes (National Scientific Council on the Developing Child, 2023). These ideas – particularly the emphasis on alloparenting - were incorporated into the *Parenting From the Start* workshops to improve cultural-appropriateness for Aotearoa.

Attachment in Alloparenting Contexts

Cross-cultural research sheds further light on maternal bonds and the relevance of sensitive responsiveness in contexts involving alloparenting. Studies of hunter-gatherer groups provide evidence that attachment is universal, challenge the idea that multiple attachment relationships interfere with a primary maternal bond, and support the concept of sensitive responsiveness as a determinant of infant attachment patterns in non-Western cultures (Mesman et al., 2016). For example, Konner (1976, 2009) described highly responsive caregiving among the !Kung involving breastfeeding on demand, co-sleeping, and infant carrying in a sling which provided constant access to the mother's breast and necklaces. Despite the alloparenting context and multi-age peer groups from age 2-3 years, mothers were the most responsive caregivers – feeding whenever babies cried and reached for the breast and consistently responding to distress lasting longer than 30 seconds (Konner, 2009). In a similar vein, the extensive support provided by other Efé adults does not prevent 6-12 month old infants beginning to show preference for their biological mothers, and to protest potential separations, just as attachment theory predicts (Mesman et al., 2016).

The finding that alloparenting is consistent with close bonds between mothers and their children has been replicated in other groups. While Hadza mothers were willing to share care, "the child was not always equally willing, signifying a preference for mothers as primary attachment figures" (Mesman et al., 2016, p. 793). Marlowe (2005) found that "mothers held infants more often than all other caregivers combined" (cited in Mesman et al., 2016, p. 793). Neither did sensitive responsiveness appear to suffer as a result of multiple caregivers. Although "all caregivers seemed to be equally sensitive to fussing and crying… mothers, compared with other caregivers, were generally much more effective at soothing and calming their child", and children who protested being handed to an alloparent were usually returned to their mother (Mesman et al., 2016, p. 793).

Of additional importance are studies in which attachment behaviour was assessed with standardized tools. These provide further evidence that multiple caregiving is consistent with a unique bond between mother and baby, and additional detail regarding the function of multiple attachments. Kermoian and Leiderman (1986) studied 26 infant–caretaker dyads among the Gusii of Kenya, where mothers care for infants physically and take responsibility for their health, but alloparents take part in playful/social interactions (cited in Mesman et al., 2016, p. 794). Modified *Strange Situation Procedures* were implemented outside each mother's hut with two separation-reunion episodes each for the mother, an alloparent, and the Stranger. Additional separations were intended to compensate for the lack of the 'strange place' common to laboratory SSPs. The standard greetings by Gusii caregivers towards infants are handshakes, and these were anticipated by the infants in the same way infants in Western cultures expect a hug: "The secure Gusii infants would reach out to an adult with one arm, to receive the handshake enthusiastically, whereas the insecure infants would avoid the adult or reach and then pull away after the adult approached. The distribution of patterns of attachment was comparable with Western findings: Secure attachment was found in 61 and 54% of infants to mothers and to nonmaternal caregivers, respectively" (cited in Mesman et al., 2016, p. 794). Domain-specific outcomes for the two classes of caregivers included in this study suggest a degree of independence in attachment relationships which allows children to benefit from the strengths and experience offered by each caregiver. Consistent with the

fairly strict division of labour by mothers and other caregivers, infants' positive nutritional or health status was related to security of attachment with their mother (who provided physical care), while cognitive development was related to security of attachment to alloparents (who engaged in play and provided social experiences).

Constraints on Parenting

While sensitive responsiveness and autonomy support may contribute to optimal development, they are not evolutionary bottom-lines. The parent's needs and the child's needs will not always align: at times an adult must prioritise more urgent requirements for food or safety, or spread their attention across multiple dependents (Cassidy, 2008). It is worth remembering that being sensitive and responsive is not the most fundamental requirement of parenting: "from an evolutionary perspective, maternal insensitivity to a particular child may be useful to the mother if it maximises the total number of surviving offspring" (Main, 1990, cited in Cassidy, 2008, p. 11). These kinds of tensions may be more common in modern than ancestral caregiving relationships.

Both secure and insecure attachment patterns are adaptive in the sense they maximise proximity to caregivers (Weinfield et al., 2008a). That is, they are strategies that 'make the best' of available (and imperfect) caregivers. Secure infants, able to depend on relatively high levels of sensitivity and responsiveness, maximise proximity simply by signalling when they require/desire more closeness. Insecure infants cope with their less responsive parents in several ways. Some become angry: "a normative reaction to inaccessibility of caregivers" that Bowlby (1973) suggested may have evolved "to discourage caregivers from further unresponsiveness" (cited in Weinfield et al., 2008a, p. 80) and/or make constant, low-level bids for attention despite a lack of danger in the environment – reflecting ongoing anxiety about the caregiver's availability, and creating multiple opportunities for caregivers to meet their needs. Others cease showing distress when their attachment system is triggered. Weinfield sees this as a kind of learned helplessness, but it can also be understood as a way of maximising proximity to a caregiver who finds overt distress aversive.

Sroufe (1988) claims that neither secure nor insecure attachment representations should interfere with reproductive success, and later scholars have suggested that resistant and avoidant patterns may in fact be better suited to maximising the chance of passing on one's genes in harsh environments such as war zones and the chronic stress of poverty (Simpson & Belsky, 2008). Nevertheless, insecurity denotes a compromise: "Although insecure attachments may emerge to the benefit of inclusive fitness, the long-term costs for "the individual's psychological and physical wellbeing might be considerable" (Mesman et al., 2016, p. 791). Given the positive outcomes associated with secure attachment in infancy and later childhood, and the correlations between insecure attachment and various undesirable outcomes, it seems the ideal would be for *every* child to be securely attached. It is on this basis that developing a secure attachment relationship has been described as "the essential task of the first year of human life" (Schore, 2012, p. 50). Aotearoa is not a war zone, and as a country contains sufficient resources to ensure no child grows up in poverty. If given political priority, secure attachment is a realistic goal for all children, and was therefore the key outcome of interest in the present project.

In evaluating and applying attachment theory it is crucial to acknowledge that families facing racism, poverty, and other chronic stress and risks need to 'adaptively calibrate' their caregiving behaviour to the developmental context in order to deal with these additional threats (Stern et al., 2022, p. 407). These kinds of challenges disproportionately affect Indigenous and minority cultures. I follow Stern and others in advocating for a theory of early relationships that acknowledges histories of colonialism, interpersonal and structural racism in the present, and the intersectionality of race, sex, socio-economic status, and other variables in creating experience. This perspective was a crucial part of *Parenting From the Start*, which included multiple opportunities to discuss barriers to responsive parenting.

Conclusions

Attachment theory was explicitly evolutionary from the start – acknowledging the intimate biological relationships between humans and other species. Early theorizing was also cross-cultural, with Ainsworth's detailed studies in Uganda being particularly influential. Despite this, a 'mother-centric' bias is evident. Shared care by a number of adults and older children – termed 'alloparenting' – is largely absent from the attachment literature despite being our evolutionary norm as a species. This is problematic. While Māori researchers accept attachment bonds and maternal relationships as important, they form part of a wider network of relationships contributing to holistic health in socio-geographical context (A. Fleming, 2016; Mikahere-Hall, 2019, 2020). This is consistent with the responsive alloparenting practiced in other Indigenous cultures around the world.

In hunter-gatherer societies alloparenting is normative and high levels of social support supplement, rather than replace, maternal care. Far from constituting a 'trade-off' with maternal investment, infants in hunter-gatherer societies are held more by alloparents than their Western counterparts while *also* receiving more direct care from their mothers. The evolved developmental niche (EDN), which will be discussed further in subsequent chapters, is a broader theory of cross-cultural child development incorporating alloparenting and high social support as key elements. I argue that these and other features make the EDN more appropriate than attachment theory as a foundation for parenting interventions in Aotearoa New Zealand. The following chapter considers which aspects of attachment theory remain relevant within the evolved developmental niche.

CHAPTER FOUR

Improving Attachment in Aotearoa: Lessons From the Cross-Cultural Literature

He hono tangata e kore e motu; ka pa he taura waka e motu
Unlike a canoe rope, a human bond cannot be severed

The previous chapter began arguing for the adoption of the evolved developmental niche (EDN) as a more accurate and complete conceptualisation of child development than attachment theory (AT). Incorporation of alloparenting and social support as important beneficial elements of ancestral human caregiving make the EDN a better fit with Mātauranga Māori (Māori knowledge) and multi-disciplinary Western science. Nevertheless, the EDN remains heavily influenced by attachment theory, and it is necessary to clarify what remains in the approach used in this project. Forty years of cross-cultural research generally support the four key tenets of attachment theory: That attachment is universal, that secure attachment is the norm, that it results from sensitively responsive caregiving, and that securely attached children are rated as more competent across multiple domains (Van IJzendoorn & Sagi-Schwartz, 2008). Attachment classifications are linked to outcomes in both the short- and long- term (Cassidy & Shaver, 2008; Sroufe et al., 2005a). Longitudinal research suggests both insecure and disorganised attachment increase the risk of anxiety disorders, depression, angry and aggressive behaviour, and other mental health problems (Bakermans-Kranenburg, van IJzendoorn, and Juffer 2003). Secure attachment, on the other hand, is associated in prospective studies with better relationships with peers, teachers, parents, and future partners, fewer behaviour problems, fewer mental health problems, and higher academic achievement (Cassidy & Shaver, 2008; Sroufe et al., 2005a). I suggest that establishing and protecting early relationships with parents and other caregivers should remain a priority across settings, and that intervention research can usefully expand on the best ways to do this. Measures of caregiver characteristics such as sensitivity and responsiveness require further thought however, with prior research suggesting missing links in explaining the intergenerational transfer of attachment. This has implications for the evaluation of the *Parenting From the Start* antenatal workshop intervention.

In this chapter I review the literature on how attachment develops, the extent to which is it stable and capable of change, and how it is transferred across generations. Then I summarise core elements of attachment theory that are retained within the evolved developmental niche (EDN) and compare rates of attachment across cultures to justify secure attachment as the key goal of the *Parenting From the Start* intervention in Aotearoa. Several weighty critiques have been levelled at AT, and resolving these issues was part of the design of the intervention. I conclude that different ratios of avoidant and resistant attachment across cultures make sense in light of the different styles of caregiving in particular times and places. Thus, the chapter presents a conceptualisation of attachment theory that is consistent with,

and part of, the evolved developmental niche. The product is a framework more suitable to local application in Aotearoa NZ and global application across cultures.

The Development of Attachment

All neurologically normal babies have the capacity to form attachment relationships, but the relational patterns they develop depend on environmental factors (Bakermans-Kranenburg & van IJzendoorn, 2016). Ainsworth believed sensitivity was key, defining this as the extent to which caregivers are (a) aware of their baby's signals, (b) able to interpret them accurately, and able to respond (c) appropriately and (d) promptly (Ainsworth, 1969). The development of attachment patterns appears to be only minorly impacted by genetics (Bakermans-Kranenburg & van IJzendoorn, 2016). Attachment theory predicts that infants develop a secure attachment orientation and the self-efficacy to communicate their needs when caregivers are consistently attuned and responsive and meet those needs promptly and consistently (Ainsworth et al., 1978). Children develop 'insecure' attachments when they are rejected or their needs are not met consistently (Hesse, 2008). Whereas securely attached children feel safe because they have learned that their attachment figure can be depended upon, "an insecurely attached person may have a mixture of feelings towards their attachment figure: intense love and dependency, fear of rejection, irritability and vigilance" (Holmes, 1993, p. 67). Insecurely attached children have learned *not* to trust, because their needs have been met inconsistently or not at all (Weinfield et al., 2008a). Most writers agree that quality of the interactions is more important than the quantity (Holmes, 1993), but operational definitions of caregiver sensitivity vary considerably.

The concept of sensitivity (also referred to as 'responsiveness', 'attunement', 'congruence', and 'interaction quality') has yielded multiple descriptions and a growing number of measures across studies related to caregiving quality. Bohr et al note that the concept "remains poorly defined… and lacks grounding in universally accepted, clearly delineated, and specific behaviors" (Bohr et al., 2018, p. 732). The frequent melding of the terms 'sensitivity' and 'responsiveness' makes unclear the extent to which psychometrics aim to measure parental awareness of child needs, willingness to prioritise them, and/or active behavioural steps to meet those needs promptly and consistently. Confusing the ability to 'read' an infant (a narrower definition of 'sensitivity') with the ability and willingness to act on that understanding to meet the identified needs (a behavioural understanding of 'responsiveness') prevents more detailed research into components of caregiving which may in fact be somewhat separate. It is likely the *response*, not (just) the attunement, that matters to babies in terms of development. To the extent an infant remains unaware of parental thoughts and intentions, it is the *expression* of caregiver awareness in the form of appropriate concrete behaviour that is pertinent to the development of trust in that specific relationship, positive expectations of others generally, and a sense of psychological safety. I use the term 'sensitive responsiveness' to cover all parts of Ainsworth's definition (prompt, consistent, appropriate responsiveness). Where other definitions are involved the term 'sensitive and/or responsive' seems more applicable, and this is what is meant when I use the more general construct of 'sensitivity' commonly found in the literature.

A significant correlation between sensitive and/or responsive parenting and secure

attachment has been found in numerous studies, but is only moderate in size (Hesse, 2008). A meta-analysis of 1,099 dyads obtained an overall correlation of r = .24 between maternal sensitivity and infant attachment security in nonclinical samples using the *Strange Situation Procedure* and observational sensitivity measures (k = 21; De Wolff & van IJzendoorn, 1997). This is modest compared to the original findings of Ainsworth and colleagues' (1978), and there have been occasional nonreplications (e.g., Seifer et al., 1996). Nevertheless, De Wolff and van IJzendoorn note that this correlation "represents an improvement in security from 38% to 62%; that is, infants whose mothers respond sensitively to their signals improve their chance of developing a secure attachment from 38% to 62%" which "can hardly be considered trivial in a theoretical or practical sense" (1997, p. 584). Hesse (2008) highlights the range of sensitivity measures (at least 54 different ones) and very short observations (well under an hour) used in most studies, and subsequent authors have echoed the idea that brief laboratory-based observations of play "may not be sufficient to capture the complexity of mother–child relations on which the formation of attachment relations is based" (Aviezer et al., 2003, p. 296). Simple frequency measures of responsiveness are less strongly related to attachment security than global measures of sensitivity, and the difference is statistically significant (De Wolff & van IJzendoorn, 1997).

A number of researchers have called for refined definitions of sensitivity to clarify the relationship with infant attachment security: suggesting that "parsing those aspects of maternal interaction that contribute to attachment security from those that do not (i.e., identifying a definition of sensitivity specifically relevant to attachment) may improve prediction" (Atkinson et al., 2005, p. 50). A secondary meta-analysis which recombined 55 published and unpublished studies on stronger theoretical and statistical grounds (N = 3,963) found that redefining sensitivity as "reciprocal, synchronous behavior" (emphasising "responsiveness, timing, and appropriateness" in line with Ainsworth's descriptions) showed the construct predicted attachment security significantly better (weighted average = .30, 95% CI = .24 to .36) than did other types of maternal behaviour (weighted average of .14, fixed effect CI = .10 to .17; Nievar & Becker, 2007, pp. 109 & 110). Related constructs such as autonomy support, affect attunement,[34] and caregiver beliefs about child care which influence infants' physical environments have also been proposed as relevant to attachment outcomes (Atkinson et al., 2005).

Further evidence of the link between sensitivity and attachment comes from intervention studies. Meta analysis of 51 randomized controlled trials to improve maternal sensitivity (N = 6,282 mothers-child dyads) found interventions were significantly and moderately effective in enhancing maternal sensitivity (d = 0.33, *p* = .001), with a fail-safe number of 913.[35] Interventions focusing on sensitivity alone were more effective than those which targeted the mental representations of parents, aimed to increase community support such as access to clothes and food, or combined these aims with targeting caregiver sensitivity (Bakermans-

[34] Affect attunement is "typically measured only implicitly in the assessment of sensitivity" but "[m]ay be prerequisite to (or part of) sensitivity by definition, as it is hard to imagine sensitive response that is asynchronous with the infant's emotional signals" (Haft & Slade, 1989; Milligan, Atkinson, Trehub, Benoit, & Poulton, 2003, cited in Atkinson et al., 2005, p. 49).

[35] More than 900 unpublished studies without intervention effects would be required to cancel out the combined effect size of these randomized studies (Mullen, 1989, cited in Bakermans-Kranenburg et al., 2003).

Kranenburg et al., 2003). The most effective interventions studied to date combined this focus on improving maternal sensitivity with brevity. Interventions consisting of fewer than 5 sessions and 5-16 sessions were equally effective, but longer interventions were less effective (Bakermans-Kranenburg et al., 2003). For this reason, the *Parenting From the Start* intervention was designed to be brief, and to focus on behaviours over which caregivers have control, termed parenting 'strategies' or 'approaches' in this project.

In summary, research to date suggests sensitivity (variously defined) plays a causal but not exclusive role in the development of attachment (De Wolff & van IJzendoorn, 1997; Verhage et al., 2016). Ongoing research needs to simultaneously honour existing constructs, interrogate and extend current understandings of sensitivity, and investigate other variables which may be relevant to attachment outcomes.

Attachment Stability and Change

The need for attachment relationships continues throughout the lifespan, with romantic partners and other significant others taking on the role of primary attachment figure in adulthood. Both the stability and flexibility of attachment patterns have been emphasised. On the one hand, attachment is sensitive to the physical, social, and caregiving context in which a child grows (van IJzendoorn, 1995b), showing 'logical discontinuity' in the face of major changes such as improved family income or the addition of a supportive step-parent. Without some kind of contextual change, attachment patterns tend to remain stable both longitudinally (throughout an individual's life) and across generations. Parents seem to pass their attachment classification on to their own children in up to 75% of cases (Sette et al., 2015). However, both therapy and later positive relationships can help us heal from those past experiences (Saunders et al., 2011), and significant life events including becoming a parent may prime us for brain reorganisation (P. Kim et al., 2010; Rilling, 2013) and more coherent mental representations of attachment (Howes & Spieker, 2008).

Attachment is thought to be transmitted across generations by way of internalized working models, which are cognitive schemas of self and others in relationships based on "real-life experiences of day-to-day interactions" between children and caregivers (Bowlby, 1988, p. 146). When attachment figures are "available and responsive in times of distress", babies develop positive expectations about other people being "sensitive and protective", and come to think of themselves as "valuable, and worthy of care", whereas when "attachment figures are rejecting or inconsistently available, it is more likely that children will develop an internal working model of others as unavailable and a representation of the self as unlovable" (Sette et al., 2015, p. 2). These internal working models are thought to operate outside of our awareness, but impact our interactions with significant others (Bowlby, 1988). Initially attachment describes a specific relationship, but over time that security or insecurity takes root so that the associated beliefs and patterns of behaviour increasingly become a property of the child themselves. In more recent conceptualisations, the internal working models of both infants and parents have come to be understood more explicitly in neuropsychological terms, as hormonal systems and networks involving multiple regions of the brain which are developed during our early years in response to experience and which go on to influence our own caregiving (Coan, 2008; Cozolino, 2006; Hughes & Baylin, 2012; S. Kim et al., 2014;

National Center on the Developing Child, 2004a; Rilling, 2013; Strathearn et al., 2009). This neuropsychological approach is adopted in the present study, with the *Parenting From the Start* workshop emphasising the impact of experience on early brain development and patterns of attachment, as well as longer-term physical and mental health outcomes.

Intergenerational Transmission of Attachment

As discussed in Chapter 3, adult representations of attachment are measured by the *Adult Attachment Interview* (AAI). Each major AAI category except 'cannot classify' has repeatedly been associated with the attachment status of respondents' children (Hesse, 2008). Adult attachment classification is also consistently related to parental behaviour and the mental wellbeing of caregiver and child. For example, prospective research suggests unresolved/disorganized parents display substantially more frightened, frightening, and dissociative behaviour than other parents (Jacobvitz et al., 2006). Mothers with an insecure representation of attachment are more likely to have a diagnosis of depression, and current state of mind with respect to attachment moderates the relationship between postnatal depression and the child's security to their mother on the *Strange Situation* (McMahon et al., 2006).

The association between caregiver and child attachment is large – with meta-analyses yielding effect sizes of d = 1.09 (van IJzendoorn, 1995a) and d = .74 (Verhage et al., 2016). The more recent meta-analysis found intergenerational transmission of attachment was inhibited in higher risk samples. Unpublished studies and those conducted more recently had smaller effect sizes than older and published studies. Both meta-analyses found evidence of a moderate to small but robust mediation effect of sensitivity that appears to have declined in size over time. This decline cannot be entirely explained by the greater diversity within research samples (such as more with high risk status and non-biological relationships), but Verhage and colleagues point out that 80 of the 97 samples they assessed were likely underpowered to detect secure/insecure transmission, and only one study to date (Haltigan et al., 2014) had a sample size large enough to expect sufficient statistical power to examine the transmission of unresolved representations.[36] Bernier and colleagues argue that the regression method used in early studies does not formally test the significance of the mediated pathway between adult and infant attachment, has limited statistical power, and is vulnerable to both Type I and Type II errors. Prior research may therefore have under- or over-estimated the mediating role of maternal sensitivity (Bernier et al., 2014). In addition, sensitive responsiveness is not be the only mechanism through which maternal attachment contributes to infant attachment, and may have a somewhat independent effect on infant attachment status (Raval et al., 2001).

[36] "With the current effect sizes, substantial samples are required to show the intergenerational transmission effects. For example, to be able to show secure/insecure transmission (r = .31) with a power of .80, samples should consist of roughly 80 child–caregiver dyads. To investigate transmission of unresolved representations (r = .21), an even larger sample of 180 child–caregiver dyads is required. Moreover, still larger samples are required when researchers want to look at transmission of the full range of attachment classifications instead of an isolated examination of autonomous/nonautonomous and/or unresolved/not unresolved representations contrasts, or when studying at risk samples" (Verhage et al., 2016, p. 358).

A study of attachment transmission using better statistical techniques to examine two aspects of secure-base behaviour – sensitivity and autonomy support – found that together they fully mediated the relationship between maternal attachment representations on the AAI and child attachment measured with the ASQ across timepoints (Bernier et al., 2014). Autonomy support refers to caregiving behaviour that directly facilitates exploration and a child's ability to do things themselves (Cimon-Paquet et al., 2020; Regueiro et al., 2020; Sirois et al., 2022; Whipple et al., 2011), and may constitute a missing link in the attachment literature. In the present research, autonomy support – although not named – was a theme incorporated into the *Parenting From the Start* workshop in multiple ways. Babies were conceptualized as able to express needs such as hunger and the desire to eliminate from birth, as evidenced by body language such as rooting for the breast, and vocalisations including grizzling when they need a toileting opportunity. Caregiver insight – the "ability to see various experiences through their children's eyes" and articulate plausible motives underlying child behaviour has also been identified as a variable explaining variance in attachment outcomes beyond sensitivity alone. Depending on the maternal behaviours affected, the capacity for insight may or may not be experienced by the child as sensitivity (Koren-Karie et al., 2002, p. 535). Insight may be a broader, foundational ability. Caregiver beliefs about babies and optimal care were captured with the purpose-designed *Parenting Beliefs Scale* (PBS), discussed further in Chapters 7 and 8, but my failure to identify this study earlier prevented any direct assessment of insight.

Despite remaining gaps in our knowledge of how and why attachment relationships develop, the importance of early caregiving is well-established. Attempting a bicultural parenting intervention involving attachment ideas requires a degree of clarity about which parts of the the theory are likely to be valid for New Zealand parents of varying ethnicity and background. I turn my attention next to the evidence-base for core elements of attachment theory across cultures. While local research is lacking, the evolutionary position I adopted required proof of validity in multiple communities around the world (and no major challenges) before an attachment claim could be considered appropriate for the *Parenting From the Start* workshop.

Core Elements of Attachment Theory

Van IJzendoorn and Sagi-Schwartz (2008) define the foundational ideas of attachment theory in terms of four claims. First is the 'universality hypothesis', which states that "all infants – when given any opportunity at all – become attached to one or more specific (parental or non-parental) caregivers, except perhaps in the most extreme cases of neurophysiological impairment" (Van IJzendoorn & Sagi-Schwartz, 2008, p. 881). Second, the 'normativity hypothesis' is that the majority of infants will be classified as 'securely' attached. Thirdly, the 'sensitivity hypothesis' is that attachment security depends on the quality of caregiving – particularly prompt and sensitive responsiveness. Finally, the 'competence hypothesis' claims that attachment security leads causally to improved capacities and outcomes across a variety of domains. These foundational hypotheses apply "within contexts that are not inherently threatening to human health, survival, and successful reproduction" (Mesman et al., 2016, p. 791). Bowlby suggested that "the further the *rearing environment* departs from that of

evolutionary adaptedness the more likely are that individual's behavioural systems to develop atypically" (1991b, p. 106, emphasis in original).

When infants develop in a context fairly similar to the environment of evolutionary adaptedness, secure attachment is adaptive because the personal history of exploration with the support of a caregiver who provides a 'secure base' at times of increased risk facilitates physical and psychological health (Mesman et al., 2016). As noted in the previous chapter, not all children have the opportunity to grow and learn in safe environments. The modern world provides a greater range of dangers than the natural world in which ancestral hominins[37] were selected. While predation is reduced in some geographical regions, starvation and physical dangers remain prevalent to varying degrees. Added to these are human-induced risks such as violence and neglect that may have been less common in hunter-gatherer communities. It is only since the introduction of agriculture that babies have been able to survive in suboptimal circumstances such as the absence of committed caregivers (Narvaez & Gleason, 2012). Rather than "rigid behavioral strategies that would have made it difficult to adapt to changing environments", human infants and their caregivers have evolved conditional strategies which develop based on the context in which they find themselves (Hinde, 1982; Simpson & Belsky, 2016, cited in Mesman et al., 2016, p. 791). While secure attachment optimizes child outcomes where the social environment is sufficiently supportive, insecure attachments may occur where conditions are suboptimal. Further, research suggests physiological changes accompany these different life experiences. For instance, childhood adversity such as maltreatment, harsh maternal care, and lower family income-to-needs ratios prior to age 6 predict earlier puberty/menarche among girls, although secure infant-mother attachment reduces this impact of early life stress (Sung et al., 2016). Attachment security is desirable, and provides some protection in the face of adversity, but is ultimately secondary to survival and reproduction.

With these caveats in mind, and the qualification that maternal sensitivity is only one of the variables contributing to attachment outcomes, reviews of the cross-cultural literature have supported all four foundational hypotheses of attachment theory (Mesman et al., 2016; Van IJzendoorn & Sagi-Schwartz, 2008). The much larger research base relating to North American and European samples is also supportive, as outlined by Fearon & Belsky; Thompson; Lyons-Ruth & Jacobvitz; DeKlyen & Greenberg; and Chase, Stovall & Dozier (in Cassidy & Shaver, 2016), but I focus here on non-Western studies. The latest review of cross-cultural attachment research examined four studies of African hunter-gatherer societies. These cultures are given particular attention as they are the best approximations for the "original environment" in which humanity spent 95% of our evolutionary history (Mesman et al., 2016, p. 792).

Rates of Attachment Across Cultures

Approximately 65% of children are classified as securely attached, and this remains surprisingly steady across a variety of cultures (Prior & Glaser, 2006). The proportion of children classified as securely attached to their primary caregiver is lower in stressful contexts involving poverty, discrimination, and lack of social support (Lyons-Ruth & Jacobvitz, 2008).

[37] Humans and their immediate ancestors.

For example, control group mothers in the experimental intervention study by Anisfeld et al (1990),[38] 70% of whom were receiving public assistance, ended up with secure attachments to their 13-month-olds only 38% of the time. The malleability of attachment rates (83% of intervention group babies in this sample developed secure attachment patterns) suggests that contextual factors are critical, and that low-income families could achieve good attachment outcomes with sufficient support. With only two thirds of one-year-olds from middle class samples achieving secure attachment, and half this number in contexts of financial stress, there is considerable room for improvement in the caregiving provided in modern industrial societies. Increasing rates of secure attachment was therefore a primary goal of the *Parenting From the Start* study.

Secure attachment has sometimes been interpreted as a construct only relevant to Western parents, but international research does not support this. Studies in Africa, China, Israel, Japan, Germany, Indonesia, Britain and the United States have produced similar dichotomous splits of secure versus insecure attachment, although the subcategories of insecure (avoidant or resistant/ambivalent) attachment vary proportionally across cultures. Rates of secure attachment are high in traditional African cultures with high levels of alloparenting such as the Dogon, Efe, and Gusii. Kermoian & Leiderman's (1986) study of 26 Gusii infants between 8 and 27 months old found 61% were securely attached to their mothers. True's (1994) study of the Dogon of Mali reported 69% of infants were securely attached, 23% were disorganised, and 8% were insecure-resistant (Neckoway et al., 2007). This was replicated in a later study (N = 42) which found 67% securely attachment, 8% insecure resistant, no avoidant classifications, and a similarly high rate (25%) of disorganized attachment (True et al., 2001). Neckoway and colleagues (2007) interpret these findings as inconsistent with the predictions of attachment theory because the ratio of avoidant and resistant categories differs from Western populations, and I return to this point shortly. However all of these studies found rates of secure attachment near or above the norm for wealthy middle-class Western populations. This is remarkable for subsistence lifestyles associated with high mortality and loss as well as increasingly impacted by colonialism. It is noteworthy that modern hunter-gatherer communities match wealthy Western populations in rates of secure attachment, when poorer groups within the Global North do not.

Where rates of security differ from the 65% norm there are reasons why this might be the case. For instance, lower rates of secure attachment were found in both East German (50%) and West German (49%) Berlin in the mid to late 1980s, which may be related to childrearing approaches emphasizing compliance and early independence from bodily contact, and devaluing emotional expression and tenderness (Ahnert & Lamb, 2001; Grossmann et al., 1985). Attachment outcomes worsened in the social turmoil of reunification around 1990-1991 (East Berlin = 36% secure, West Berlin = 38% secure) before recovering to the earlier level, at least in East German Berlin (Ahnert et al., 2000; Ahnert & Lamb, 2000, 2001). Research in Israel has focused on kibbutzim (socialist farm communities), which are unique in their communal ideals de-emphasising parents as caregivers, and the only group where children are routinely isolated from family at night in preference for supervision by non-kin

[38] Participants in this study were low-income urban mothers. 62% of the control group were Black, 38% Hispanic; 61% were married or living with the infant's father; 31% were living in extended families; 70% were receiving public assistance; Approximately 30% did not have a telephones.

(Neckoway et al., 2007). Sagi, van IJzendoorn, Aviezer, Donnell, & Mayseless (1994) found that only 44% of infants within the kibbutz were classified as securely attached, and 37% were rated disorganised. A closer examination of the infants revealed that 60% of the infants who slept at home with their families (n = 25) were securely attached, closer to the international norm, compared with only 26% of the infants who slept in the kibbutz (n = 23). Rates of disorganization were very high in both groups, but higher amongst those who remained in the kibbutz at night: 44% compared with 32% in the home-based group (Neckoway et al., 2007). These findings were consistent with an earlier (1985) study by the same authors which found that 41% of kibbutz infants were insecurely attached to their mothers (Oppenheim, 1998, cited in Neckoway et al., 2007). It is worth noting that the communal ideals associated with kibbutzim are very different from the communalism of gatherer-hunter groups, and must be distinguished from true alloparenting relationships. Unless parents are dead or otherwise unavailable, alloparenting in traditional foraging societies involves a web of relationships that *support* and *compliment* caregiving by the biological parents. Most of the adults the child interacts with are stable, loving members of their group, and many are kin. No attempt is made to remove infants from their parents or close family members at night or to otherwise replace them. Co-sleeping with parents or alloparents is the norm. The kibbutzim, in contrast, appear to have idealised communal living at the expense of stable relationships. Neckoway et al (2007, p. 69) note that, "The intention of this arrangement was to socialize children for communal life and to create a sense of group cohesion and, thus, people who could socially and emotionally function within the community. This would mean that if a secure attachment was formed it would have been secondary to the core goal of the community". This idealogical displacement of caregivers appears detrimental to parent-child relationships, and potentially to infant development.

Of the cultural contexts examined to date, the only groups with rates of secure attachment below 57% were low-SES American infants (38%), German babies around the time of reunification (36-50%), and Israeli babies who slept communally in kibbutzim. Ainsworth's original sample in Uganda (N=28) and Indonesian children in West Java (N=46) are borderline (57% in both cases, Ainsworth, 1967; Zevalkink et al., 1999). In contrast, other African sampes including Gusii (N=26; Kermoian & Leiderman, 1986), Dogon (N=26, True, 1994; True et al., 2001), and Khayelitsha (N=98, Tomlinson et al., 2005) have rates of secure attachment between 61-69%. A Chinese sample were classified with 68% secure attachment relationships (N=31; Hu & Meng, 1996). Japanese samples ranged from 61-70% secure (N=39, Durrett et al., 1984; N=60, Takahashi et al., 1986; n=40, Behrens et al., 2007). Combining nine samples from Western Europe yielded a rate of 66% (N=510, van IJzendoorn & Kroonenberg, 1988), and the 21 samples from the United States (N=1,584) combined to give a rate of 67% securely attached (van IJzendoorn et al., 1992). Table 7 summarises rates of secure and insecure attachment across cultures. The results do not support a view that Western parenting is better suited to the establishment of secure attachment relationships than Eastern or Indigenous cultural settings.

Table 7.

Rates of Attachment in Non-Western Cultures Using Ainsworth's Strange Situation Procedure (SSP)

Country (source)	**Securely attached to mother** (B)	**Insecurely attached to mother** Avoidant (A)	Resistant (C)	Disorg-anized (D)	**Cannot classify** (CC)	***N* dyads**
Africa						
Uganda (Ainsworth, 1967)	57%	18%	25%	-	-	28
Gusii (Kermoian & Leiderman, 1986)	61%	*a*	*a*	-	-	26
Dogon (True, 1994; True et al., 2001)	69% (88%)	0% (0%)	8% (12%)	23%	-	26
Khayelitsha (Tomlinson et al., 2005)	62% (72%)	4% (17%)	8% (11%)	26% -	-	98
Papua New Guinea						
Trobriand Islands (Grossmann et al, 2005)	80%					20
China						
Published in English:						
Beijing (Hu & Meng, 1996)	68%	16%	16%	-	-	31
(Archer et al., 2009)	57% (62%)	13% (15%)	16% (23%)	13%	-	62
(Ding, Xu, Wang, Li & Wang, 2012)	68%	7.5%	21.8%	2.5%	-	
Published in Chinese:						
(Gu et al., 1997)	67%	6%	23%	4%	-	
(Liang, Chen, & Chen, 2000)	73%	11%	7%	9%	-	
(Hu & Meng, 2003)	53%	13%	27%	7%	-	
(Li et al., 2004)	65%	17%	13%	4%	-	
(Ding et al., 2008)	68%	6%	26%	0%	-	
(Yue, Zhang, Chen, Liang, & Zhang, 2010)	72%	10%	10%	8%	-	
Japan						
Tokyo (Durrett et al., 1984)	61%	13%	18%		8% other	39
Sapporo (Takahashi et al., 1986)	68%	0%	32%	-	-	60
Sapporo (Kondo-Ikemura et al., 2018)	69%	2%	16%	13%	-	45
Israel						
Family-based kibbutzim	80%	0%	20%	-	-	25

(Sagi et al., 1995)						
Communal kibbutzim (Sagi et al, 1985, 1995)	56%	7%	37%	-	-	104
Jewish-Israeli (Sagi et al., 2002)	70%	3%	19%	8%	3% other	758
Jewish-Israeli (Koren-Karie et al, 2002)	66%	4%	21%	9%		131
Arab-Israeli (Zreik et al, 2017)	67%	3.5%	12.9%	16.5%		85
<u>Indonesia</u>						
West Java (Zevalkink et al., 1999)	57%	7%	33%		4% other	46
<u>Western Europe</u>						
9 samples combined (van IJzendoorn & Kroonenberg, 1988)	66%	28%	6%	-	-	510
<u>United States</u>						
21 samples combined (van IJzendoorn et al., 1992)	67%	21%	12%	-	-	1,584

Table information taken from (Van IJzendoorn & Sagi-Schwartz, 2008, p. 899), and updated with (Kondo-Ikemura et al., 2018) and Mesman (2016).
a = no differentiation between avoidant and resistant attachments
b = second statistic underneath shows 'forced' SSP, where D infants are 'forced' into A, B, or C
c = of the Chinese studies, only the coders in Archer et al (2009) were trained by attachment experts

East Asian studies using the *Strange Situation Procedure* (SSP) and *Attachment Q-Sort* (AQS) illustrate this point. 18 studies of East Asian populations using standardized measures were included in the latest review of attachment across cultures, covering Papua New Guinea, China, Taiwan, Japan, South Korea, and Indonesia (Mesman et al., 2016, p. 796). East Asian cultures have been described as collectivist, valuing interdependence rather than independence and placing importance on social harmony rather than individual needs and preferences (Kağıtçıbaşı, 1997; Oyserman et al., 2002). Nonparental care is common, although usually undertaken by grandparents, who often form part of an infant's household and care for them while parents engage in paid work (Nauck & Suckow, 2006 cited in Mesman et al., 2016). Low fertility rates in Japan, Taiwan, and South Korea, and China's one-child policy mean that sibling care is uncommon (Mesman et al., 2016). Studies utilising the *Strange Situation Procedure* are included in Table 7 as these are most relevant to *Pakiaka Tupuora*. Nine SSP studies have sampled mother-baby dyads from urban China (3 published in English) although only Archer et al (2009) utilised coders who had completed official training by attachment experts (Mesman et al., 2016). The Chinese studies provide support for the universality and normativity hypotheses because all children were successfully classified as B (securely attached), A (insecure avoidant), C (insecure resistant) or D (disorganized), and secure attachment to mothers was the norm (Mesman et al., 2016). Consistent with other non-Western cultures (but not Western norms), most of the Chinese studies found relatively low rates of avoidant attachment to mothers (Mesman et al., 2016). All but one household in Hu and Meng's (1996) study included one or more grandparents, leading the authors to note

that the biological mother may not always have been the primary caregiver in the infant's attachment hierarchy. This could explain the higher rate of avoidance and "indifference" towards the mother during the SSP in this study (cited in Mesman et al., 2016, p. 797). Attachment research in China has also provided support for the competence hypothesis, finding that securely attached children exhibit better self-regulation, fewer behavioural problems (Gu et al., 1997), fewer internalizing and externalizing problems (both concurrently at age 2 years and 2- and 5-years later; Yue et al., 2010), and more advanced cognitive skills (but not physical development) (Ding, Wang, Li, Chi, & Xu, 2008, all cited in Mesman et al., 2016, p. 798).

Although geographically proximate and culturally similar to China, low fertility rates in Taiwan are not due to a one-child policy (Mesman et al., 2016). AQS ratings of secure-base behaviour based on 3-hour home visits with mothers and 4-year olds found average security scores of .32 for Taiwanese children (N = 68; Posada et al., 2013), similar to those of other countries (.31; see van IJzendoorn et al., 2004).

Several studies three decades apart provide evidence of the applicability of attachment theory in Japan. The most recent SSP study also incorporated the AAI to investigate intergenerational transmission, finding relationships between maternal and infant attachment categories similar to those obtained elsewhere in the world (Kondo-Ikemura et al., 2018, p. 2007): Mothers with secure attachment representations on the *Adult Attachment Interview* were more likely to have children classified as securely attached to them in the *Strange Situation Procedure* (Pearson $\chi^2(1) = 15.8$, $p < .001$ and likelihood-ratio $\chi^2(1) = 16.7$, $p < .001$, Cramer's $v = .59$) and the strong association between mothers unresolved state of mind with regards to attachment and disorganization in their infants was also replicated (Kondo-Ikemura et al., 2018).

A multi-site study of attachment in Canada, Colombia, France, Italy, Japan, Peru, Portugal, Taiwan, and the United States found secure base behaviour was present in all nine countries, with child development experts providing similar descriptions of well-functioning mother-preschooler relationships across cultures (Posada et al., 2013). This consistency across cultures, based on a behavioural observation measure (the AQS) which does not assume the existence of attachment concepts, supports the hypothesis that secure base behaviour is universal and considered optimal within diverse cultural contexts.

It seems, on the basis of the available evidence, that secure attachment relationships are normative and desirable across a range of cultural contexts. The finding that infant-caregiver dyads from non-Western cultures can be classified in the *Strange Situation Procedure* using the usual ABCD categories supports the claim attachment is a universal phenomenon (Mesman et al., 2016). Lower rates of secure attachment are found in some populations, but this may be explained by socio-historical factors including poverty, caregiving ideology devaluing parent-child relationships, and massive cultural change.

Remaining Cultural Critiques of Attachment Theory

The chapter so far has considered how attachment develops and is passed down generations, and whether Indigenous and non-Western cultures are disadvantaged in the assessment of attachment using the *Strange Situation Procedure*. Cross-cultural rates of attachment suggest high rates of attachment in cultures with more alloparenting. Nevertheless, other critiques of attachment theory need to be resolved in order to design a parenting intervention to improve infant attachment in Aotearoa New Zealand. This section discusses three major cultural critiques levelled at attachment theory and the extent to which they can be accommodated by my EDN-congruent conceptualisation. The first critique relates to the goals of caregiving, while the second and third critiques relate to caregiving processes.

Childcare practices vary widely across historical and geographic space as well as within cultures and subcultures. The question is whether these differences and the resulting local outcomes make sense within attachment theory. Some authors have taken cultural differences in the rates of insecure resistant versus insecure avoidant attachment as evidence attachment theory is not universally applicable. This issue is examined with particular reference to the claim Japanese mothers are too sensitive, and that mothers in some Indigenous cultures are insufficiently sensitive. In both cases the concern is that diversity in caregiving goals and realities does not 'fit' within attachment theory, given the prominence given to sensitivity within the attachment paradigm, or may lead to racist outcomes if caregivers are judged to fall short. As Morelli and colleagues state: "Our conclusion is that children are cared for in culturally defined and ecological responsive ways, and this care is the basis for the relationships they develop. Attachment theory and research must be nimble enough to accommodate the diversity in the realities of children's lives. As long as attachment theory does not take this imperative seriously, real-world application of attachment theory is deeply concerning" (Morelli et al., 2017, pp. 141–142).

Independence, Interdependence and the 'Ideal Child'.

The first criticism I consider is that attachment theory promotes "individuality and independence" at the expense of the "collective responsibilities" valued by Ngā Iwi Māori and other cultural groups (Herbert, 2001, p. 25). Ironically, attachment theory was the first Western theory of child development to stress the appropriateness of (inter)dependence in relationships, and the key measure of infant attachment (the SSP) was initially developed in Uganda (Africa) rather than in Britain or the United States as is commonly assumed (Mesman et al., 2016). Studies of 'collectivist' cultures conducted to date suggest that secure attachment is considered desirable within these contexts. For instance, the goal of parenting in China is 'interdependence' rather than 'independence' (Kağıtçıbaşı, 1996, cited in Van IJzendoorn & Sagi-Schwartz, 2008), but Gao and Wu found that 41 Chinese mothers who were asked to sort 90 behavioural descriptions to describe their "ideal child" produced descriptions that were highly correlated with Chinese experts' descriptions of an "optimally secure" child. Furthermore, Chinese mothers' descriptions of their own child (using the same Chinese version of the *Attachment Q Sort*) were no more related to one another than descriptions by parents in Germany, Norway, Colombia, Japan and the United States (Posada et al., 1995). In

Japan, a similar study yielded a correlation of r = .86 between Japanese mothers' rating of their "ideal child" and Japanese experts' ratings of a securely attached child.

The available evidence suggests that even in cultures where interdependence and responsibility towards others are highly valued, secure attachment is considered a desirable outcome of parenting (Posada et al., 2013; Van IJzendoorn & Sagi-Schwartz, 2008). The lack of conflict may be because independence and interdependence are not actually opposites. A securely attached child has the capacity for more independent action *and* improved interdependence and responsibility in a network of important relationships. This interpretation is congruent with evidence that securely attached children in Western longitudinal research are more competent relational participants than those whose relationships were classified as insecure regardless of whether the 'other' is a parent, teacher, peer, or romantic partner many years later (Sroufe, Egeland, Carlson, & Collins, 2005). Evidence also supports the relationship in the other direction. Children growing up in cultures prioritising interdependence appear to be more independent than those in from individualistic Western cultures. For example, !Kung children aged 2 to 5 years old range further from their mothers than same-age children in London, even though the English children were observed in safe, familiar outdoor spaces in good weather (Blurton Jones & Konner, 1973, cited in Konner, 2009). There is no need to choose between the goals of independent and interdependent childrent – it is a false dichotomy, and secure attachment supports both.

Japanese 'Hypersensitivity'

Despite concerns that Japanese mothers are "hypersensitive" - anticipating rather than responding to infant needs (Neckoway et al., 2007), Japanese infants do not exhibit lower rates of secure attachment. Takahashi's (1986) study of 60 Japanese mother-infant dyads living in Sapporo found that 68% of infants were classified as securely attached on the *Strange Situation Procedure*, and 32% were classified as insecure-resistant. This rate of secure attachment is slightly higher than that usually obtained for middle-class samples of Western dyads, perhaps as a result of the close physical contact and prompt attention to infants' needs. What is noteworthy is the high proportion of resistant relationships in the insecurely attached infant-mother dyads, as this differs markedly from Western populations. Similarly, a study of 39 middle-class families in Tokyo found 61% were securely attached, 18% insecure-resistant, 13% insecure-avoidant, and 8% unclassifiable. Focusing on a two-way attachment classification, neither distribution of infant classifications conflicts with global attachment findings. The normal rates of secure attachment in these Japanese samples are not what we would expect if Japanese dyads were being unfairly penalised by a theory and culturally-specific assessment procedure that was inappropriate in this cultural environment.[39]

[39] Although Japanese research using the *Strange Situation Procedure* has yielded consistent results, Behrens et al.'s (2007) study of older children in Sapporo found more avoidant children in the insecure group. The measure in this study was the Main-Cassidy 6th-year reunion system. Longitudinal research is necessary to explore this finding, and the suggestion Japanese children may move from resistant to avoidant attachment patterns due to increased expectations relating to autonomy between the ages of 1 and 6 (Kondo-Ikemura et al., 2018). As my focus is on infant attachment measured by the SSP, this finding is less relevant to the present project.

Differences in the rates of insecure attachment categories (resistant and avoidant) are important however. More recent SSP studies in South Korea (Jin, Jacobvitz, Hazen, & Jung, 2012), and China (Archer et al., 2015), and a careful replication of the Japanese research by Kondo-Ikemura and colleagues (2018, N = 45) which ruled out methodological problems, all found higher proportions of children with resistant compared with avoidant attachment, supporting the interpretation that East Asia has "undeniable cultural influences on parental behaviors that are likely to promote C type behaviors among children who have not developed secure attachment toward their caregivers" (Kondo-Ikemura et al., 2018, p. 2008). Following Takahashi (Takahashi, 1986, 1990), Neckoway and colleagues (2007) suggest that the different proportions of resistant and avoidant infants are problematic for attachment theory. An alternative explanation comes from reassessing our cultural baseline. Further examination of the cross-cultural rates of attachment in Table 7 suggests that only in the US and Western Europe is avoidance consistently more common than resistance. It is perfectly in line with attachment theory to predict that higher proportions of resistant infants result simply from cultural contexts in which sensitive responding, autonomy support, and other antecedents of secure attachment are not able to be achieved consistently enough. In contrast, avoidant attachment patterns are to be expected where attuned emotional support is consistently unavailable and a child develops mechanisms to cope with reliable rejection or chronic delays in responding. Echoing Takahashi (1986), Jin et al. concluded that "Caregiving customs that encourage such close infant-mother relationships and discourage separation of mother and infant are very unlikely to result in avoidant attachment" (p. 41, cited in Kondo-Ikemura et al., 2018, p. 2011). What is likely is exactly what we find – high rates of resistant attachment. The dominance of resistant attachments over avoidant attachment relationships has been found in many East Asian studies utilizing the SSP, as well as in other cultural groups, including Israeli (Koren-Karie et al., 2002; Sagi et al., 2002) and Arab–Israeli participants (Zreik et al., 2017). Diverse cultural norms explain these differences – an interpretation that does not invalidate attachment theory or measures (Kondo-Ikemura et al., 2018).

Indigenous 'Hyposensitivity'

A further argument is that attachment theory may not be appropriate to Indigenous parenting because the latter is often characterised by alloparenting (Red Horse, Lewis, Feit, & Decker, 1978, cited in Neckoway et al., 2007). Acknowledging the diversity of Indigenous Canadian communities, they note that Indigenous families "do not adhere to the linear sequence of the mother as the sole contributor to the child's physical and emotional well-being" and no pressure is placed "on the sole relationship between mother and infant" (Weaver & White, 1997; Report of the Aboriginal Committee, 1992, cited in Neckoway et al., 2007, p. 70). Rather, among communities such as the Saulteaux (Ojibwe),

> *[M]embers all share a collective responsibility for the caring and nurturing of the child (McShane & Hastings, 2004) and keep a watchful eye on young children in the community (Lame Deer & Erdoes, 1994). The bond between the child and the parent and other caregivers in Aboriginal culture, therefore, is multi-layered rather than dyadic. The effect of these diverse, overlapping bonds is to create a dense network of relationships within which sharing and obligations of mutual aid ensure that an*

effective safety net is in place (Brendtro & Brokenleg, 1993, cited in Neckoway et al., 2007, p. 70).

The authors critique attachment theory because it does not cover wider social relationships "except to suggest that the mother infant relationship becomes a template for all future relationships (Lewis, 2005)" (p. 70). They argue that "attachment theory, therefore, does not fully reflect the reality of an Aboriginal infant's life and socialization experiences" (Neckoway et al., 2007, p. 71). Neckoway et al go on to argue that "the qualities that emerge from the mother-infant relationship do not necessarily transfer to other relationships because the roles others play in the child's life take on a different meaning" (Neckoway et al., 2007, p. 71). The authors suggest that Indigenous mothers may be less sensitive to their infants than Western mothers, because "In a context of multiple caregivers living in the same household, the mother can afford to be less vigilant and can have an expectation that someone will be available to attend to the infant's signals and needs" (Neckoway et al., 2007, p. 71). This is a claim that can and should be considered carefully. I approach it both theoretically and empirically.

If Indigenous mothers are in fact less responsive to their infants because they are used to forming part of a caregiving team rather than the whole of it, *and infants perceive maternal care the same regardless of the presence of other caregivers,* then alloparenting should be associated with reduced maternal sensitive responsiveness and lower rates of secure attachment. The research relating to hunter-gatherer alloparenting cited above does not support this, and the further claim that children raised by alloparents might be classified as insecure-avoidant when seen alone with their mothers in the *Strange Situation Procedure* (Neckoway et al., 2007) can be challenged on several grounds. Firstly, as noted in the previous chapter, the evidence suggests that mothers living with extended groups of allocarers are generally *more* responsive, not less. Contrary to the arguments made by Neckoway and colleagues (2007), alloparenting contexts may increase maternal sensitive responsiveness when the biological mother is assessed alone with her infant. Regular assistance by others invested in her child's wellbeing reduces the burden of caregiving while increasing social support. Both of these actions are expected to increase the mother's health and functioning. Presumably, most infants would be classified as insecure if tested with adults who did not usually care for them in any meaningful way, but members of an alloparenting team are quite different. A baby who is cared for by multiple adults and older children can receive highly sensitive and responsive care from each of them at different times. As Neckoway and colleagues have noted, the biological mother is free to relax, knowing that others are available to meet her child's needs. Sensitive responsiveness in an alloparenting context must be examined moment-by-moment from the *child's* point of view. Are their needs met promptly and accurately? Do they feel understood and make real connections with others? If so, the child will presumably learn that others can be trusted and that the world is a pretty nice place. This kind of positive working model should predict *secure* attachment behaviour on the *Strange Situation*.

A key issue is whether mothers who share the care of their infants with others respond similarly or differently depending on whether those others are present, and whether children under one year of age are attuned to the variety of caregivers available to them moment-by-moment. The assumption that a mother who can rely on alloparents to respond to her baby

at home will be neglectful when alone with her infant may be inaccurate, as may the assumption that an infant will expect the same response from their mother whether or not other alloparents are present. The evolved developmental niche suggests the opposite hypothesis. A child that is used to having their needs met by one or other of their regular caregivers develops high self-efficacy. They have learned that it is worthwhile communicating their needs because such signals usually get them what they want. I expect this infant to provide clear communication with their mother when alone, and the mother to respond. Alloparenting may increase opportunities for mothers to observe sensitive responsiveness by others towards her infant – useful modelling if she is new in her role. Further, mothers in alloparenting contexts may be more rested, less stressed, supported to breastfeed (increasing close physical proximity), and so on.[40] Such a mother, when alone with her infant, can be expected to be sensitive and responsive even if she is not required to be so when other alloparents are present. On the *Strange Situation*, this mother could be considered a *sample* of an alloparenting context that is characterised by high levels of nurturing. The child, expecting comfort from the member of the alloparenting team who is currently present, will use their mother as a 'secure base', and seek her out after separation. The mother, used to seeing her child happy because needs are tended to, is likely to take her turn at comforting. In this kind of well-functioning alloparenting context, a classification of *secure* on the *Strange Situation Procedure* is the most likely outcome. This interpretation is consistent with the available cross-cultural research.

Ecological Constraints

This final section concerns instances where the usual processes of attachment do not take place. While the existing cross-cultural literature provides substantial support for attachment theory, it is important to examine studies where links between maternal sensitivity and attachment are not present, intergenerational transmission is absent or reduced, and the relationship between infant attachment to a particular caregiver and later functioning is not observed. It has become increasingly clear that intergenerational transmission can be disrupted by ecological factors. Socio-economic status has emerged as a significant moderator of the relationship between sensitivity and attachment security, with lower correlations in studies involving lower-income participants than in studies with middle-class participants (Nievar & Becker, 2007). Regardless of skill level, a caregiver who is tired, stressed, or distracted may be less attuned, and a caregiver who is physically absent can be neither sensitive nor responsive to their child's cues. Physical proximity is a prerequisite for sensitive responsive care, and too much separation may be problematic. Caregivers under financial stress have a harder job parenting, and fewer opportunities to be with their children.

Questions remain about other elements of the sociocultural context which prevent or reduce the correlation between sensitivity and attachment. For instance, the first study of Arab-Israeli attachment relationships (N = 85) found similar ratios of two-way secure/insecure attachment to Jewish-Israeli, Western, and non-Western samples on the SSP, supporting the normativity hypothesis. Evidence for the sensitivity hypothesis was mixed however. While maternal sensitivity was higher for securely attached infants than for insecurely attached

[40] See Chapters 2 and 3 on the benefits of alloparenting and social support.

infants among Christian mothers, the link between sensitivity and attachment was absent for Muslim dyads (Zreik et al., 2017). The authors note that "Muslim mothers scored lower on sensitivity than did Christian mothers, even when controlling statistically for years of education, number of children in the family, and the type of care children received (maternal or nonmaternal), all variables on which Muslim and Christian mothers differed", yet the percentage of children who were securely attached to their mother did not differ by religion – Muslim infants were just as likely to be classified secure (Zreik et al., 2017, p. 1346). The non-stressful circumstances in which sensitivity was observed are proposed as a possible part-explanation for this finding, along with cultural and contextual differences. While the measurement of attachment appears fairly robust across cultural contexts, measures of sensitivity may be less flexible. The lack of research attention to other variables makes interpretation difficult, given so much of the variance in attachment remains unexplained by maternal sensitivity. Attachment of Arab-Israeli babies within Muslim families may result from other maternal capabilities/practices such as insight, autonomy support, or thus-far unstudied variables, which were not measured in this research. Alternatively, sociocultural factors may prevent maternal sensitivity from impacting child development in some circumstances. This unexpected result is also observed among Jewish-Israeli families whose infants live and sleep in communal kibbutzim for all but a few hours a day. Mothers of infants who sleep in these 'infant houses' are just as sensitive, and just as likely to have secure (autonomous) representations of attachment on the *Adult Attachment Interview* (AAI) as those with infants who spend the day in kibbutzim but sleep at home with their parents, but maternal sensitivity is only correlated with infant attachment in the home-sleeping group (Aviezer et al., 2003). Similarly, comparison of Jewish-Israeli children in low quality daycare settings (8-10 hours per day, with 8 children per teacher) and infants cared for at home found that regardless of observed maternal behaviour, the correlation between maternal sensitivity and attachment security was only present for children in home-based care (Aviezer et al., 2003). Extensive low quality daycare, care where no parents or alloparent are available at night, and other difficult circumstances which fall outside the human evolved developmental niche may constrain the development of primary attachment relationships (Aviezer et al., 2003).

Consistent with these ideas, intergenerational transmission is also impacted by ecological circumstances. Secure attachment patterns seem to be passed down more reliably than insecure patterns, perhaps due to the many other factors influencing parenting in groups with low socio-economic status and elevated rates of insecure attachment (Bowlby, 1991a; Verhage et al., 2016). Nocturnal caregiving and sleeping arrangements are relevant factors here. Mesman and colleagues suggest that "From the perspective of attachment theory, the night may be an especially stressful time, during which infants need a protective caregiver the most" (2016, p. 793). Low rates of attachment security (26%) and high rates of disorganization (44%) have been observed among Jewish-Israeli infants raised communally and sleeping in kibbutzim without a primary caregiver or substitute (Sagi, Van IJzendoorn, et al., 1994). From a few months of age, kibbutzim babies receive shared care by their mothers and two metaplot (assigned primary caregivers) during the day, returning home with their parents from 4 to 8pm each evening. Those in communal sleeping groups then return to their kibbutz where a rotation of unfamiliar women (around 50 in total, working for one week each) act as 'watchwomen' during the night. Children raised in this way show much lower intergenerational transmission of attachment. Sagi and colleagues (1997) found the

correspondence between maternal representations of attachment on the AAI and infant attachment on the SSP was only 40% among communally-sleeping infants. In contrast, infants who spent the nights with their families, but had otherwise similar experiences of kibbutzim care (9 hours per day, 6 days a week) showed the usual relationship between maternal and child patterns of attachment, with a more usual correspondence of 76% between the AAI and SSP[41] (Sagi et al., 1997; Sagi, Van IJzendoorn, et al., 1994).

All studies of Israeli participants, whether the Jewish majority or the Arab minority, have found higher rates of resistant than avoidant attachment in the insecure group. Insecure resistant attachment is significantly higher among kibbutz-sleeping infants (30%) than among home-sleeping infants (8%) (Aviezer et al., 2003). It has been argued that sleeping in kibbutz, where caregivers are not well known to infants and are unable to provide sensitive or responsive nighttime caregiving, creates a situation of inconsistent responding (Aviezer et al., 2003). No matter how sensitive parents are during their day-time visits, they are unavailable during the night, and no stable alloparent is available to replace them. Additional detail on this cultural context supports this interpretation. Mothers of communally-sleeping kibbutz infants were just as sensitive as mothers of kibbutz infants who slept at home with their families, and they were just as likely to be classified as secure-autonomous on the AAI. Kibbutz themselves are of fairly consistent quality when it comes to providing for the emotional needs of infants, so the groups were also equivalent in this respect (Aviezer et al., 2003). Separation from parents during the night may be a key factor responsible for lowering rates of secure attachment to mothers and preventing the transmission of secure attachment across generations.

If infants require caregiving during the night as well as during the day,[42] this may be facilitated by co-sleeping. There are further hints of this within the cross-cultural literature. Ding and colleagues (2012) found that Chinese infants in their sample who were classified as insecurely attached to their mothers were more likely to co-sleep with nonmaternal caregivers during the night, although unfortunately base rates of co-residence with grandparents are not provided (Mesman et al., 2016). Descriptions of hunter-gatherer parenting suggest important interactions may occur during the hours of darkness. Among the the Efé, where mothers provide all nighttime care, “sleep was regularly interrupted by episodes of playful interaction exclusively between infants and their mothers” (Morelli & Tronick, 1991, cited in Mesman et al., 2016, p. 793). Breastfeeding is another dyadic activity that occurs during the night, with circadian fluctuations in composition which may be important for training the infant biological clock (Caba-Flores et al., 2022; Italianer et al., 2020). These findings have implications for research on the evolved developmental niche, which includes close proximity at night (co-sleeping) as a caregiving element infants have evolved to expect (Narvaez, Wang, et al., 2013). No observational studies of parental behaviours such as sensitive responsiveness have taken

[41] While this was not a randomized design, care was taken to ensure the groups were similar. Variables measured included in terms of maternal age, education, professional training, childhood experiences of kibbutz, current job satisfaction, anxiety about separation from their infants, attitudes towards their infants’ houses, and number of children. Infant characteristics such as age, sex, perceived temperament, and early life events such as illnesses and separations were also assessed. Mother-infant interaction was also assessed in a play session (Sagi, Van IJzendoorn, et al., 1994).

[42] This is absolutely my experience as a mother, with all four of my tamariki requiring breastfeeds, comforting, and toileting assistance at night for several years each.

place at night, or even asked about nighttime parenting. Given that actions at this time may be particularly important, the *Observational Measure of Sensitivity and Responsiveness* used in the present study was designed to assess both daytime and nighttime parenting.

Updating Attachment Theory

This chapter reviewed the literature on how attachment develops, the extent to which is it stable and capable of change, and how it is transferred across generations. Cultural critiques that have been levelled at attachment theory were considered, along with the extent to which the evolved developmental niche provides resolution. A remaining issue concerns the real-world applications of attachment ideas, which were not reviewed here, but which certainly have the potential for harm (Morelli et al., 2017). The evolved developmental niche may reduce this risk by acknowledging the importance of non-maternal caregivers and community to child outcomes, but racist outcomes of poorly-considered attachment-based decisions remain a real concern.

Infants and their caregivers build particular kinds of relationships based on their reciprocal interactions. Sensitive responsiveness – long considered a key factor in the development of attachment relationships – was overviewed, and attempts made to move research in this complex area forwards. Parenting that is more sensitively responsive is consistently associated with higher rates of secure attachment, although the correlation with existing sensitivity measures is modest, and there are situations in which the relationship is absent. Clearly the formation of a secure attachment involves more than daytime maternal sensitivity to a single caregiver. Autonomy support and maternal insight are complementary concepts facilitating infant exploration and security which appear important and were therefore built into the *Parenting From the Start* antenatal workshops. The limitations of an exclusive focus on daytime interactions was remedied in the present research by incorporating the purpose-designed *Observational Measure of Sensitivity and Responsiveness*, which also allows for a range of caregiving approaches, from monotropic to shared care.

Rates of attachment across cultures were compared, to calm concerns about the use of attachment concepts and measures with diverse populations. Key tenets of attachment theory appear to be valid cross-culturally, and I argue that the time is right to update attachment theory and place it at the heart of a broader conceptualisation of human development which acknowledges the importance of alloparenting and social support. The evolved developmental niche is such a theory. In Chapter 5 I consider child development and the evolved developmental niche in more detail, highlighting the impact of early experience on long-term outcomes.

CHAPTER FIVE

Growing Up in the Evolved Developmental Niche: The Impact of Early Experience

Nā te moa i takahi te rātā
The rata which was trodden on by a moa when young will never grow straight

The previous chapters synthesised cross-cultural research relating to early parenting – concluding that the evolved developmental niche (EDN) offers a more appropriate theoretical base for parenting interventions in Aotearoa than traditional attachment theory (AT). This chapter widens the focus to consider why else parenting matters. Parenting impacts a variety of outcomes beyond attachment. Adverse childhood experiences (ACEs) including abuse, neglect, discrimination, and poverty predict physical and psychological pathology down the track. Meanwhile, nurturing care builds healthy bodies and brains – establishing a foundation for lifelong resilience (National Scientific Council on the Developing Child, 2015, 2020). My goal was to use research & theory on supportive and adverse childhood experiences as a basis for optimising child development (Tarsha & Narvaez, 2022). The evolved developmental niche brings these research literatures together to explain why children benefit from certain kinds of caregiving and suffer from others. Disseminating this information about the roots of healthy development formed the foundation of the *Parenting From the Start* workshops.

Why Parenting Matters

Childhood experiences influence future mental and physical health (National Center on the Developing Child, 2004b, 2004a, 2005, 2008, 2009, 2011, 2012, 2013; National Scientific Council on the Developing Child, 2007b, 2010, 2015, 2023; Shonkoff et al., 2012). In addition, inadequate caregiving contributes to societal problems such as violence and other criminal behaviour by affecting the development (or not) of children's cognitive and emotional skills such as empathy, compassion, and impulse control (Gonzalez-Liencres et al., 2013; Hosking & Walsh, 2010; Nelson, 2012). Inadequate childhood experiences contribute to the development of mental illness and antisocial behaviour because infant brains are highly malleable (Cassidy & Shaver, 2008; Hughes & Baylin, 2012; National Center on the Developing Child, 2012; National Scientific Council on the Developing Child, 2010). Not only does parenting have serious long-term consequences, but it also tends to be passed down through families (Barrett & Fleming, 2011; A. S. Fleming et al., 2002; Narvaez et al., 2012a; Prior & Glaser, 2006), meaning that problems re-occur generation after generation. The positive flip-side of this is that providing effective support for parents can break this chain, provide immediate benefits for children, and alter their own future parenting for the better. Thus, "[t]he quality of parenting/care is the key to a successful society" (Hosking & Walsh, 2010, p. 8). The best results are likely to be obtained by intervening early, before problems have a chance to develop (Hosking & Walsh, 2010). Experimental animal research and non-

experimental human studies suggest the first three years of life include many sensitive periods for healthy development (National Scientific Council on the Developing Child, 2007b). The most cost-effective and ethical interventions would support families by ensuring they had the information and resources they needed *before* their baby was born. This was the aim of the *Parenting From the Start* antenatal workshops.

Conclusions about the causal effects of parenting are complicated by genetic factors. Behaviour genetics research suggests genetic make-up affects relationships between caregiving and child outcomes (Baldwin et al., 2022), but the size of these genetic confounds in the correlational literature currently appear small.[43] For instance, when polygenic scores for education were computed by summing the influence of many genetic variants from genome-wide association studies (GWASs)[44] and controlled in 860 families from a prospective longitudinal study in the UK, the associations between children's educational achievement at age 18 and caregiving variables measured during home visits prior to adolescence were only reduced by about 8% (Wertz et al., 2020). This replicated findings from the prospective Dunedin longitudinal study (N = 702; Wertz et al., 2019). After adjusting for both maternal and child genetic factors, children who grew up in safer, tidier home environments, with less household chaos, more warm, sensitive parenting and cognitive stimulation still went on to complete significantly higher levels of education than children subject to lower parental investment. The interactions between genes and environment are complex (for examples, see Kong et al., 2018), and "over and above a persons' own genetics, their development will be shaped by the genetics of significant others" (Wertz et al., 2020, p. 1757). Whatever challenges relate to these gene x environment interactions, children still need to be parented. Genetics may impact how we parent, and how our children respond to parenting, but parenting remains the most sensible locus of intervention. To illustrate this, parenting behaviour, particularly exposure to cognitively stimulating activities, explained more than 70% of the correlation between maternal education-associated genetics and the subsequent educational attainment of children, controlling for child genetics. This example of 'genetic nurture', where genes appear to act *via* the environments parents create (Kong et al., 2018; Wertz et al., 2020), provides theoretical justification for interventions seeking to extend the benefits of optimal parenting to families where such supportive experiences are not present.

Protecting children from harm is both a moral and practical goal. The incidence of violence towards children is particularly high in New Zealand. Compared with 40 other OECD countries, New Zealand has the 7th highest rate of child homicide, and ranks 35th for child wellbeing outcomes (Smith & Stevens, 2022). A meta-analytic review of prospective studies (N = 18 studies, 39,271 participants) found that adults who experienced childhood maltreatment have increased chances of perpetuating violent behaviour relative to those who were not maltreated (Fitton et al., 2020). Similarly, longitudinal research on the 1958 British birth

[43] This may change over time, with predictions that current GWASs are only capturing one third of relevant genetic variants (Wertz et al., 2020).

[44] The authors used publicly available GWAS data on single nucleotide polymorphisms (SNPs) relating to educational attainment (Lee et al., 2018) which were based on analyses of around 1.1 million people from 71 European cohorts covering multiple countries (e.g., UK, USA, Iceland). This information was matched with SNPs in the database for study participants: "For each SNP, the count of education-associated alleles was weighted according to the effect estimated in the GWAS. Weighted counts were averaged across SNPs to compute polygenic scores" (Wertz et al., 2020, p. 1752).

cohort (N = 8,088) found people exposed to prospectively measured neglect and retrospectively reported abuse consistently exhibited modestly higher average levels of antisocial behaviour over 7 timepoints from age 7 to age 50, after accounting for a range of possible confounding factors (Degli Esposti et al., 2020). To the extent these relationships reflect causal processes, supporting better caregiving and protecting children from harm benefits everyone.

A causal relationship between supportive caregiving and biological outcomes among children is suggested by effective interventions assessed in randomised controlled trials with longitudinal follow-up. For instance, examination of a random sample of 25-year-olds (N = 116) from the *Strong African American Families* (SAAF) prevention trial showed reduced amygdala and hippocampal volumes[45] on MRI[46] were predicted by a longer duration of living in poverty during adolescence, as expected, but only in the control group. The intervention group, whose families had been randomly assigned to a 7-week (total 14 hour) supportive family-based parenting intervention when children were 11 years old did not demonstrate the expected neurological correlates of growing up with financial adversity (Brody et al 2017). Experimental and single-case research also provides evidence that caregivers can externally regulate their child's stress response in the short term. This buffering effect is expressed as a dampening of cortisol reactivity when the caregiver is present compared to when they are not (Hostinar et al., 2015) and amygdala reactivity when viewing the face of their mother or a stranger (Gee et al., 2014),[47] replicating findings in rodents and macaques (Moriceau & Sullivan, 2006; Sanchez, 2006). The following sections summarise early brain development and impacts of early experience on subsequent health, which are consistent with the theory of the evolved developmental niche.

Early Brain Development

The current state of knowledge in neuroscience suggests that experiences early in life impact future functioning by providing a strong or weak foundation for socialisation, learning, and health (National Center on the Developing Child, 2004a; National Scientific Council on the Developing Child, 2020). During the first few years of life, our brains produce many more neurons and connections than we're going to need: up to 1,000 new connections a second. Those neurons form slightly random networks, and our experiences dictate which networks and connections are retained. Although genes provide the 'recipe' for development, the final functional organisation of the brain, and many cases of gene expression, depend on experience (Belsky, 2008; Fearon & Belsky, 2011; National Center on the Developing Child, 2004b; National Scientific Council on the Developing Child, 2010). Connections which are not used do not receive neurotrophins,[48] so the routes weaken and disappear (Kalat, 2013).

[45] The amygdala and hippocampus are temporal lobe structures involved in various kinds of social and academic functioning, supporting "learning, memory, mood, and stress reactivity" (Brody et al., 2017, p. 2).
[46] MRI = Magnetic Resonance Imaging
[47] Interestingly, both these buffering effects are present in children but not adolescents (Gee et al., 2014; Hostinar et al., 2015).
[48] Neurotrophins are chemicals that promote the survival and growth of neurons such as nerve growth factor (NGF) and brain-derived neurotrophic factor (BDNF).

Early experiences have been linked with structural and functional changes in the brains of children and adults (National Center on the Developing Child, 2005, 2009, 2011, 2012, 2013; National Scientific Council on the Developing Child, 2010; Shonkoff et al., 2012). In general, positive experiences during the first few years are associated with improved outcomes and increased resilience. Conversely, negative early experiences are associated with poorer outcomes and decreased resilience. Research to date "suggests that early negative experiences alter plasticity processes during developmentally sensitive time windows and affect the regular functional interaction of cortical and subcortical neural networks. This, in turn, may promote a maladapted development with negative consequences on the mental and physical health of exposed individuals" (Holz et al., 2023, p. 430). Unpredictability of caregiving quality and of life experiences more generally (e.g., unstable housing, variable access to food) constitutes one characteristic of early adversity that is associated with poorer development in humans as well as other mammals, while threat is another (Gee, 2021). A degree of specificity in the neurodevelopmental and behavioural impact of adversity depending on the type (e.g., physical abuse, emotional abuse, sexual abuse, neglect) and timing (e.g., developmental age) reduces the plausibility of third variables as adequate explanations for these correlations (for examples, see Gee, 2021). The ability to cope with and recover from stress and trauma is related to multiple protective factors including stable and supportive relationships, positive experiences, and opportunities to develop adaptive skills (National Scientific Council on the Developing Child, 2015). Parents and other caregivers are the most direct, and perhaps the most important actors contributing to this early experience (National Center on the Developing Child, 2004a; Swain, 2011), with longitudinal studies assessing caregiving and imaging limbic structures suggesting "even normative variation in early infancy care may influence neurodevelopment" (A. Lee et al., 2019, p. 7).

Although we can adapt throughout life, our brain plasticity declines as we age (National Scientific Council on the Developing Child, 2020). It is always possible to learn and grow, but brains get less malleable (flexible) as they get older and the effort required to change them increases. Declining plasticity means it is much easier (and cheaper) to get things 'right' from the start: influencing a baby's developing brain architecture rather than rewiring parts of its circuitry in the adult years. If we want the best outcomes for tamariki we should be getting in as early as possible and setting families up for success. Luby and colleagues note that: "The finding that human brain development is strongly influenced by the environment, particularly during early-life sensitive periods, has important global mental and public health implications" (Luby et al., 2020, p. 745). Large bodies of work highlight the damaging effects of adverse childhood experiences and the "central importance of early-life nurturance for healthy social and emotional development" (Luby et al., 2020, p. 745). Positive and negative parenting behaviours can be passed down through families by epigenetic[49] means (A. S. Fleming et al., 1999, 2002; Meaney, 2010; Swain, 2011). That is, the parenting behaviours we absorb as children can interact with our genes to influence our own caregiving. Cross-fostering studies in rodents have confirmed that good/poor parenting can account for 'personality'-style outcomes in the absence of genetic relationships between mothers and infants (Champagne & Curley, 2005; Meaney, 2001), at least in rats and mice. Similar brain networks and physiological processes are impacted across species. For example, accelerated

[49] The term 'epigenetic' refers to interactions between our genetic make-up ('nature) and the physical and social contexts in which we grow and develop ('nurture'), such as methylation of genes depending on environmental exposures.

maturation of corticolimbic circuitry is found in both rodents and humans exposed to early adversity (Gee, 2021; A. Lee et al., 2019).

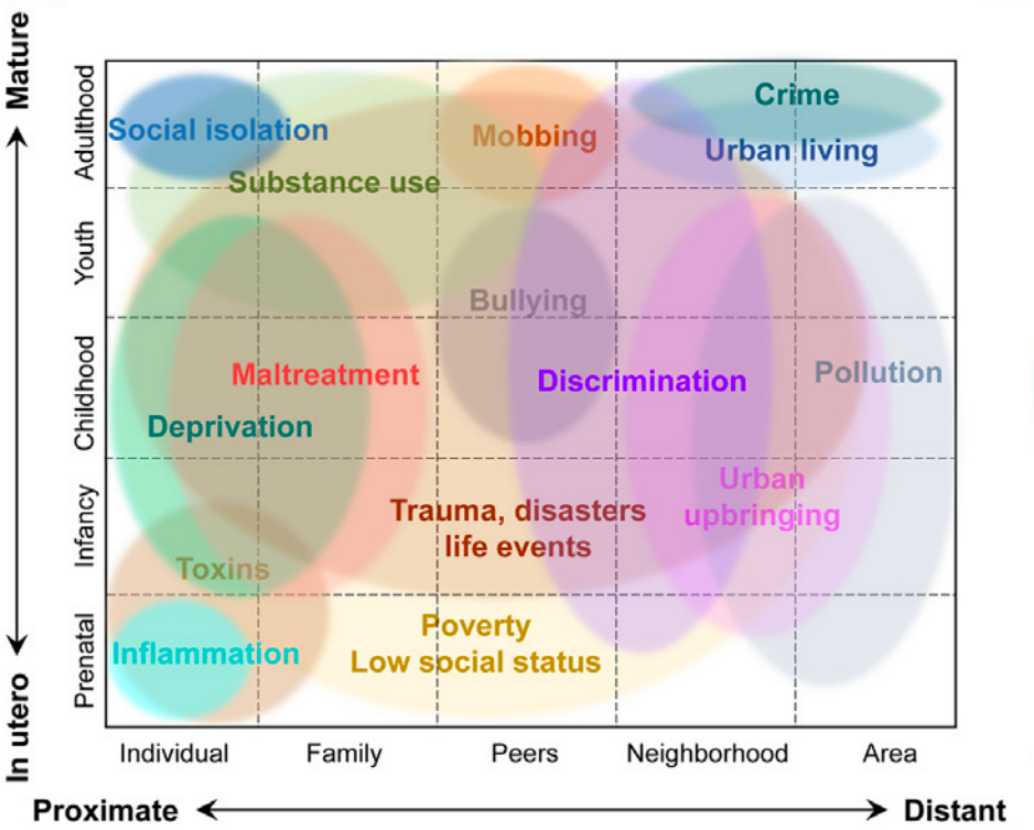
The repeated presence of responsive 'serve and return' interactions reflecting moment-by-moment attunement to, and engagement with individual children is one of the caregiving practices believed to influence later functioning via neurological development (National Center on the Developing Child, 2004b; National Scientific Council on the Developing Child, 2007a). In sharing this information with caregivers and their support people during the *Parenting From the Start* workshops my hope was to increase attention to early life experiences; motivating parents to make decisions which minimised harm and promoted infant wellbeing. I acknowledged at the outset that this is a difficult subject to talk about. Not all of us got the parenting we deserved, and not all of us have been able to do the parenting we would have liked. We do the best we can with the information and support we have at the time. Although improved parenting knowledge cannot remove structural barriers to positive caregiving such as poverty, it does provide additional choices.

Adverse Childhood Experiences

Adverse childhood experiences (ACEs) such as abuse, neglect, and family dysfunction are linked to significantly increased risk of heart disease, cancer, autoimmune disease, chronic lung disease and other physical health problems, substance abuse, depression, anxiety, schizophrenia and early death, among other negative health consequences (Kalmakis & Chandler, 2015; Karatekin & Almy, 2019; Lopes et al., 2020). Operational definitions of ACEs vary from study to study, but the most commonly studied include physical abuse (e.g., hitting), psychological abuse (e.g., insults, humiliation), sexual abuse (e.g., inappropriate touching), physical neglect (e.g., lack of food or care), psychological neglect (e.g., lack of love or attention), witnessing violence or domestic abuse, living with someone who misuses alcohol or drugs, living with someone suffering from mental illness, and having a family member who is in prison or who has attempted suicide. These ten categories were used to create the original 10-item CDC-Kaiser *ACE scale*, which was used in the present study (summarised in Petruccelli et al., 2019; Zarnello, 2023). Other ACEs assessed in some studies include discrimination (e.g., on the basis of sex, ethnicity, gender, or sexual orientation), low socioeconomic status/living in poverty, bullying, and witnessing community or collective violence/war (WHO, 2014, cited in S. Sulaiman et al., 2021). Holz and colleagues (2023) offer a conceptual representation of ACEs which is reproduced in Figure 2. Child maltreatment (CM) is a narrower concept referring to abuse (sexual, physical or emotional) and/or neglect (physical or emotional) prior to age 18, usually perpetrated by a caregiver or family member (Cooke et al., 2023).

Figure 2.

Schematic Definitions of Early Adversity Differing in Breadth, Age of Impact, and Proximity to the Individual



Note. This image shows "[s]chematic representation of frequently named and often overlapping constructs of early adverse exposures studied in imaging research. Keywords are mapped to the approximate period of exposure during brain development (y-axis, from prenatal to early adulthood) and the spatial extent of exposure (x-axis, from person level to area level)" (Holz et al., 2023, p. 431, Reproduced without modification under the terms of the open access license CC BY-NC-ND http://creativecommons.org/licenses/by-nc-nd/4.0/.).

People who are exposed to adverse childhood experiences are more likely to have a range of problems in adulthood. The original ACE study of 9,508 American adults found that people who reported four or more adverse childhood experiences were twice as likely to smoke, 7.4 times as likely to consider themselves an alcoholic, 10.3 times as likely to have injected drugs, 3.2 times as likely to report 50 or more sexual partners, 2.5 times as likely to have ever had a sexually transmitted disease, 1.3 times more likely to be physically inactive, 1.6 times more likely to be obese (BMI > 35), 4.6 times as likely to report depressed mood during the past year, and 12.2 times as likely to have ever attempted suicide. Graded (dose-response) relationships were also found between number of ACEs and negative health outcomes (cancer, ischemic heart disease, chronic lung disease, skeletal fractures and liver disease), even after controlling for age, sex, ethnicity and educational attainment (Felitti et al., 1998). The general finding that ACEs are cumulatively associated with poorer physical and psychological health outcomes was replicated in all of the 42 studies summarised in the review by Kalmakis and Chandler (2015), although different studies have focused on different health variables and some have used different measures of childhood adversity.

Earlier iterations of these outcomes appear in children. A nationally representative sample of US children 18-71 months old who were investigated by child welfare (N = 912) found nearly all (98.1%) were reported to have one ACE in their lifetime, and the average number was 3.6 ACEs (Kerker et al., 2015). Children exposed to more kinds of adversity were more likely to develop mental health problems and chronic health conditions such as depression, aggression, poor sleep, and immune dysfunction (Kerker et al., 2015; Rariden et al., 2021). Each additional reported ACE was associated with 32% increased odds of having a problem score on the *Child Behavior Checklist* (CBCL; odds ratio [OR] 1.32, 95% confidence interval [CI] 1.14, 1.53) and 21% increased odds of caregivers reporting the child had a chronic medical condition (OR 1.21, 95% CI 1.05, 1.40). Social development was also affected among 3 to 5 year olds, with every additional reported ACE having a 77% increased odds of a low *Vineland Socialization Scale* score (OR 1.77, 95% CI 1.12, 2.78) (Kerker et al., 2015). Researchers advocate for early intervention to investigate the possibility of reducing these harms (Kerker et al., 2015). Anticipating concerns that caregivers may find questions about childhood adversity invasive, Conn and colleagues conducted in-depth interviews and found parents strongly support ACE screening and "trauma-informed" care (Conn et al., 2018, p. 1). The authors note that "parents understood the intergenerational impact of ACEs and expressed a desire to break the cycle of adversity", seeing "their child's pediatrician as a potential change-agent who could provide support to meet their parenting goals" (Conn et al., 2018, p. 1). It seems reasonable to assume these perceptions apply to psychologists too.

Current evidence, although not conclusive, suggests the relationships between adverse childhood events and poor outcomes are causal – resulting from neurobiological changes to the brain, immune system, and endocrine stress response system (Danese & McEwen, 2012). Research on mediating and moderating variables remains limited however (Hales et al., 2023). Behavioural genetic studies suggest associations between ACEs and outcomes may be partially confounded by genetic influences, meaning studies which do not control for genetic effects could overestimate the effects, but the size of this attenuation appears to be small to moderate depending on the ACE studied[50] (Baldwin et al., 2022). For example, correlations between adult mental health and a history of being adopted as a child were reduced by 3% (for bipolar disorder) to 18% (for life satisfaction) when polygenic scores were controlled in a study of 243,797 UK Biobank participants (Baldwin et al., 2022; n adopted = 3151; Lehto et al., 2020). The most consistent neurobiological findings among people who have experienced childhood adversity are of (1) a smaller prefrontal cortex, (2) chronic activation of the HPA axis, and, (3) elevated levels of inflammation in the immune system (Danese & McEwen, 2012). More detailed findings are summarised in Table 8.

[50] And likely also on the method used for estimating and controlling genetic effects. GWAS and twin studies typically produce very different estimates of heritability (Friedman et al., 2021).

Table 8.

Impact of Maltreatment on the Developing Brain Described in Studies of Children and Adults

Area	Assessed as children	Assessed as adults
Brain & behaviour	**Smaller prefrontal cortex**, poorer executive function. Amygdala possibly larger Poorer attention, greater activity levels, impaired emotion regulation and self-regulatory behaviours	**Smaller prefrontal cortex.** Amygdala possibly smaller. Greater startle response. Smaller hippocampus, deficit in declarative memory Depression, PTSD, substance abuse
Stress response system	**Chronic activation of HPA axis** (higher basal cortisol levels, flatter cortisol profile) Blunted cortisol response to psychosocial stressors	**Chronic activation of HPA axis** (higher basal CRH levels) Blunted cortisol response to psychosocial stressors (no mental illness), heightened cortisol response (with mental illness)
Immune system	*Innate immunity*: **elevated inflammation levels** (in depressed+maltreated) *Acquired immunity*: poorer response to latent HSV infection	*Innate immunity:* **elevated inflammation levels** *Acquired immunity*: High T-cytotoxic/T-helper ratio. Greater type-IV hypersensitivity response

Note. Table adapted from (Danese & McEwen, 2012, p. 36).

More recent evidence from both cross-sectional and longitudinal studies continues to support associations between childhood maltreatment/ACEs and physiological changes in the human body and brain (Cooke et al., 2023). A systematic review of 199 biological studies published between 2010 and 2020 found that childhood maltreatment was associated with altered levels of biomarkers related to the functioning of the nervous and endocrine systems, higher levels of inflammation, and dysregulation of biomarkers associated with the metabolic system, allostatic load (a cumulative measure of multiple biomarkers), and other biological systems in comparison to nonmaltreated individuals (Cooke et al., 2023). In terms of brain structure and functioning, individuals reporting childhood maltreatment demonstrated heightened activity in limbic structures, reductions in cortical white matter volume, and increases in grey matter volume compared to matched controls, as well as reduced communication between cortical structures and the limbic system (Cooke et al., 2023).

Biological research relating to adverse childhood experiences echoed these negative associations. Increased exposure to ACEs was associated with dysfunctional activity in biomarkers of nervous and endocrine system functionality: reductions in cortisol reactivity, brain-derived neurotrophic factor (BDNF), and soluble intercellular adhesion molecule-1 (SICAM-1), as well as resistance to insulin in diabetic participants (Cooke et al., 2023). Markers of inflammation were also increased among those exposed to childhood adversity relative to controls. Specifically, there was evidence of increased C-reactive protein (CRP), E-selectin,

interleukin-6 (IL-6), cytokine tumor necrosis factors-alpha (CTNFα), and fibrinogen. Increased childhood adversity was also related to increased allostatic load, higher blood pressure, higher body mass index (BMI), and metabolites, as well as decreased telomere length[51] (Cooke et al., 2023). People exposed to adverse childhood experiences may also demonstrate general reductions in the volume of the amygdala (Herzog & Schmahl, 2018) and orbitofrontal cortex (Holz et al., 2015, cited in Cooke et al., 2023).

Correlations with psychological and physical ill-health have also been replicated. The latest systematic review and meta-analysis found a non-linear relationship between exposure to ACEs and a higher risk of depression, with odds ratios (OR) ranging from 1.34 to 3.17 (Tan & Mao, 2023). A systematic review and meta-analysis of 25 studies (N = 15,253 participants) with non-clinical samples found all kinds of childhood abuse (sexual, physical, and emotional) and neglect (physical and emotional) were significantly associated with higher scores on psychometrics measuring schizotypal traits[52] (Toutountzidis et al., 2022). The strongest associations were between schizotypal traits and childhood emotional abuse (r = .33). The relationship between early adversity and symptoms of psychosis in clinical populations is also well-established (Read, 2011; Toutountzidis et al., 2022). A systematic review of the relationship between childhood adversity prior to 18 years old and the diagnosis of psychiatric disorder in adulthood (N = 39 studies) found bullying, physical abuse, emotional abuse, neglect, parental loss, and general maltreatment were significant predictors of adult mental disorder, with odds ratios between 1.24 and 2.09 (McKay et al., 2022). Participants exposed to multiple ACEs had more than two and a half times the odds of developing a mental disorder in adulthood (OR 2.59). This study included only prospective (or semi-prospective) data on childhood adversity, and adult (≤ 18 years) psychiatric diagnoses (McKay et al., 2022). In addition, people exposed to ACEs are more likely to engage in antisocial, violent, and criminal behaviour (Moreira et al., 2020). A meta-analytic review of 18 studies (N = 39,271 participants found childhood maltreatment increased the chance of violent outcomes with an overall odds ratio of 1.8 (Fitton et al., 2020).

There is a dose-response relationship between ACEs and chronic illnesses so that increased exposure to adverse experience increases the risk of conditions such as diabetes, cardiovascular disease, and cancer (Rariden et al., 2021, p. 98), as well as "respiratory distress, sleep problems, ischemic heart disease, GI disease, somatic pain/headache, and memory impairment" (Petruccelli et al., 2019, p. 6). A meta-analysis of 19 studies (N = 276,975 participants) found statistically significant relationships between ACEs and lung diseases in general (OR = 1.41), as well as asthma (OR = 1.32) and COPD (OR = 1.44) separately (Lopes et al., 2020). Similarly, meta-analysis of 18 studies (N = 406,210) found increased risk of cancer in people reporting 2 or 3 kinds of ACEs (OR = 1.35) and 4 or more ACEs (OR = 2.17) compared with the group not exposed to childhood adversity (Hu et al., 2021). The risk of being diagnosed with any cancer was increased by the following kinds of adversity alone: childhood physical abuse (OR = 1.23), sexual abuse (OR = 1.26), exposure to intimate partner violence (OR = 1.26) and financial difficulties in the family (OR = 1.16) (Hu et al., 2021). In addition, a

[51] A biological measure of early aging.

[52] Schizotypal traits refer to less-distressing "schizophrenia-like" symptoms which occur in the general population (Toutountzidis et al., 2022, p. 2). They may be described within the *positive* domain (e.g., paranoid ideation, ideas of reference), *negative* domain (e.g., anhedonia, no close friends), and *disorganised* domain (e.g., odd behaviour or speech).

systematic review of 14 studies with sample sizes ranging from 394 to 79,810 found that early life trauma[53] increases risk of ischemic heart disease, specifically myocardial infarction (MI), although the mechanisms remain speculative (Jacquet-Smailovic et al., 2021).

Exposure to a greater variety of adverse childhood experiences is also associated with health risk behaviours such as smoking, drinking, drug use, and risky sexual behaviour (Petruccelli et al., 2019). These behaviours are associated with further negative outcomes as well as providing a plausible explanation for some of the correlations mentioned previously. For example, drinking during pregnancy can lead to foetal alcohol syndrome if it happens to occur at a time when the developing brain is particularly vulnerable. Risky sexual behaviour may result in unplanned pregnancies. Smoking during pregnancy increases the chances of having a child with attention problems, and may also mediate the relationship between ACEs and chronic lung diseases in adulthood (Lopes et al., 2020). In understanding why people who experience childhood adversity are more likely to behave in ways that further increase their risk it is notable that many health risk behaviours (e.g., smoking, binge drinking) are 'self-soothing' - they can reduce stress or dull pain for a while (Hu et al., 2021). In the long-term, however, they make things worse. Potential side-effects such as addiction and further ill health make them problematic coping behaviours.

Not only can childhood adversity impact the course of an individual's life, there is a possibility of intergenerational effects. A systematic review of 9 birth outcome studies (N = 6,087 women from a range of sociodemographic and ethnic backgrounds) found seven of the nine showed significant relationships between maternal exposure to adverse childhood experiences (measured using a variety of psychometrics) and infant preterm birth (PTB) (S. Sulaiman et al., 2021). Further research is needed to investigate potential mechanisms and the possibility of genetic confounding. Around 15 million infants are born pre-term each year (that is, before 37 weeks' gestational age; Blencowe et al., 2013). Pre-term birth (PTB) is associated with significantly higher rates of neonatal mortality (22.9 per 1,000 PTB vs. 0.6 per 1,000 term births), as well as increased morbidity and long-term neurodevelopmental impairment (S. Sulaiman et al., 2021).

Importantly, adverse childhood experiences are common. Data from the original ACE study found that 25-30% of a mostly middle-class sample of adults in California had experienced adverse caregiving: 26% reported substance abuse in the family, 22% reported sexual abuse, 13% reported domestic violence, 12% reported psychological abuse, and 11% reported physical abuse (Saunders et al., 2011, p. 405). The extent to which these experiences account for the approximately one third of middle-class children classified as insecurely attached is worthy of serious consideration.

Based on these findings there is consensus that "ACEs represent a global public health crisis" (Karatekin & Almy, 2019, p. 93) and necessitate the development of preventative and supportive interventions (Hu et al., 2021). It is this former goal that was tackled in the present research. As with information about parenting and early brain development, an overview of the ACE literature was provided to participants in the *Parenting From the Start* workshops in the hope it would raise awareness about the importance of protecting children from early

[53] Measured in a number of different ways including the ACE Scale (Jacquet-Smailovic et al., 2021).

trauma. Childhood adversity has multiple interrelated causes at the societal, community, family, and individual levels, and the solutions are equally numerous. Experts note that "[a]ctive, long-term engagement with the political process is necessary to work toward a world that minimizes ACEs" (Karatekin & Almy, 2019, p. 93). Following Metzler et al (2017), they explain that "ACEs can to be addressed via broader systems that affect well-being (e.g., education, health care, justice, law enforcement, welfare, immigration, public transportation) and conditions that enable good employment, housing, childcare, recreational opportunities, access to nutritious food, a healthy environment, and a sense of belonging" (2019, p. 91). They argue that minimising adverse childhood experiences is facilitated when the institutions families interact with, such as schools, workplaces, and jails are 'trauma-informed': trustworthy, collaborative, emotionally and physically safe, empowering, and mindful of intersectional oppressions and privileges (Karatekin & Almy, 2019). While *Parenting From the Start* acknowledged wider structural issues, the focus was on prevention via psychoeducation and gifted parenting tools. The workshop intervention was trauma-informed according to Karatekin and Almy's definition. Intentionally multi-modal in terms of presentation, outcomes were expected to differ from family to family. This issue is explained next.

Differential Susceptibility

Researchers studying gene-by-environment interactions have proposed a 'differential susceptibility' model to explain why some children are more affected by contextual factors than others (Belsky, 1997; Belsky & Pluess, 2009). This is fundamentally different from the older 'diathesis stress' model where certain genes are considered risk factors that increase vulnerability but have no upside (Bakermans-Kranenburg & Van IJzendoorn, 2007). Children with higher susceptibility to environmental influences do worse if they are exposed to trauma or sub-optimal caregiving, but can also outperform less malleable children when they are given what they need to thrive. Within the differential susceptibility model, specific genotypes previously considered to confer risk can be re-assessed for the potential to outperform 'safer' genes in supportive environments (van Ijzendoorn & Bakermans-Kranenburg, 2015).

The first differential susceptibility study of 47 preschoolers found that the specific allelle of the DRD4 gene the children possessed and their mother's sensitivity interacted to predict externalising behaviour. Children without the 7-repeat allele were relatively well-behaved regardless of their mother's sensitivity rating. Those who had the 7-repeat allele were more affected by the quality of parenting they received: lower ratings on the *Ainsworth Sensitivity Scales* (ASS) were associated with high levels of externalising behaviours, whereas high maternal sensitive responsiveness was associated with the lowest levels of externalising behaviours in the study – better even than the average for children without the 7-repeat allele (Bakermans-Kranenburg & Van IJzendoorn, 2006). These genetic differential susceptibility results have now been replicated in many studies and several meta-analyses. A meta-analysis of correlational studies (k = 15, N = 1,232) considering dopaminergic genotypes found those conferring risk of behaviour problems in adverse contexts also allowed children to benefit more from support (Bakermans-Kranenburg & Van Ijzendoorn, 2011). A larger meta-analysis (k = 77, N = 9,361) of correlational differential susceptibility studies relating to the serotonin-system (particularly serotonin transporter gene 5-HTTLPR) found that children with the short

5-HTT alleles had higher rates of negative outcomes in adverse contexts than children homogenous for the long allele, but no evidence of benefits in supportive caregiving environments when the whole sample was analysed together (Van IJzendoorn et al., 2012). Further examination, however, suggested ethnicity may be an important moderator of these gene x environment (G x E) relationships. Re-analysis for Caucasian participants (k = 52, N = 6,626) showed clear evidence of differential susceptibility, with carriers of short alleles more sensitive to both positive and negative environmental influences than children with two long alleles. The most recent meta-analysis (k = 22, N = 3,257) considers experimental studies of G x E relationships in *nanotrials* (investigating mechanisms of change by looking at, for example, immediate neural or behavioural responses), *microtrials* (in which specific ingredients of the environment such as stress or rejection are manipulated), and *macrotrials* (field trials of broad interventions such as parent training programmes), to examine this much stronger evidence for differential susceptibility of certain genotypes to particular kinds of intervention (van Ijzendoorn & Bakermans-Kranenburg, 2015). The genotypes studied varied (e.g., DRD4, 5HTTLPR, MAOA), as did the trial outcomes, which included both internalising and externalising problems including alcohol use, and academic/cognitive factors (literacy, IQ). Clear evidence of differential susceptibility was obtained, with carriers of susceptibility genes (n = 1,228; 38% of the total sample) showing a large average effect size (*r* = .33), while the group hypothesised to carry nonsusceptible genotypes were unaffected by the interventions (*r* = .08). The difference was significant, and similar results were found for the 14 studies with largely (>80%) Causasian participants (van Ijzendoorn & Bakermans-Kranenburg, 2015). Macrotrials[54] (n = 11) were significantly more effective for carriers of the more malleable genotypes (*r* = .34) than carriers of less malleable genotypes (*r* = .04). In terms of behavioural outcomes, the interventions targeting externalising behaviours and alcohol abuse (n = 12) were significantly more effective for susceptible (r = .31) than nonsusceptible (*r* = .01) genotypes. Interventions targeting internalising behaviours (n = 4) were effective in both the susceptible (*r* = .40) and nonsusceptible (*r* = .26) groups (this was a nonsignificant difference). Academic/cognitive interventions demonstrated larger effects in susceptible (*r* = .30) than nonsusceptible (*r* = .10) groups, and the difference was significant. These randomised controlled GE trials provide causal evidence that interventions and caregiving more generally may be more or less impactful depending on the genetic phenotype of participants and the target outcome (van Ijzendoorn & Bakermans-Kranenburg, 2015).

The Human Evolved Developmental Niche

Bringing these ideas together under the theoretical umbrella of the evolved developmental niche (EDN) makes sense of the early adversity literature and integrates it with the more aspirational goal of optimising infant wellbeing. As mentioned in previous chapters summarizing the cross-cultural literature relating to parenting, the evolved developmental niche is a recent trans-disciplinary theory of child development which makes claims about what human infants have evolved to expect. Theorists claim that human beings, like all animals "evolved a developmental system for raising their young that matches the

[54] The difference between hypothesised susceptible and non-susceptible genotypes was not significant in microtrials, and couldn't be tested for the small number of nanotrials (van Ijzendoorn & Bakermans-Kranenburg, 2015).

maturational schedule of the offspring", with this human 'niche' supporting the growth of healthy neuropsychological and biological architecture (Tarsha & Narvaez, 2022, p. 488). The evolved developmental niche is consistent with the key tenets of attachment theory discussed in Chapter 4. Where it diverges, it incorporates additional research and thinking that was not available to Bowlby and other early attachment theorists. One example is the incorporation of neuroscience and biology as explanatory factors (for example, see Narvaez et al., 2016). Another point of difference is that the evolved developmental niche acknowledges the human tradition of shared care or alloparenting (Hrdy, 2009), as discussed in Chapter 3. Another is the greater breadth of the theory – with richer detail about why infants benefit from the conditions common to hunter-gatherer lifestyles across continents: natural birth,[55] high social support, and sensitive responsive caregiving characterized by close physical proximity, multi-age interaction in nature, co-sleeping, and extended breastfeeding. Some of these topics have already been covered in Chapter 2, and others are expanded on below.

The EDN is evidence-based and transdisciplinary – bringing together study findings from psychology, neuroscience, biology, anthropology, and related areas (Tarsha & Narvaez, 2022). While evaluation of the theory as a whole dates back just over a decade, it is built on the foundation of research from many disciplines which suggests that the presence or absence of particular parenting practices during early childhood influence physiological and psychological outcomes throughout life (Narvaez, Gray, et al., 2014). Components of the EDN are thought to promote a well-functioning autonomic nervous system (sympathetic and parasympathetic) as described by Porges (2011), healthy endocrine systems (e.g., oxytocin; Carter, 2019), secure attachment (Schore, 2019), and a regulated stress-response system (Tarsha & Narvaez, 2022). The present project is the first intervention study based on the EDN, and my approach was to overview the theory and then examine elements of the EDN individually as a psychoeducational tool for expectant parents. I considered this promising for altering the course of early human development to increase rates of secure attachment and impact other mental and physical health outcomes. Several cross-sectional studies have examined multiple elements of the evolved developmental niche simultaneously and found that modern use of ancestral parenting practices is associated with positive child sociomoral outcomes, more prosocial behaviour, increased cognitive ability, and fewer behavioural problems over the first three years of life in both American and Chinese children (Narvaez, Gleason, et al., 2013; Narvaez, Wang, et al., 2013). More recent research has found that parent reports of higher frequency EDN-consistent experiences (over the past week) predict social thriving among 3-5-year-olds in American, Swiss, and Chinese samples (Narvaez, Woodbury, et al., 2019; Narvaez, Arrows, et al., 2019). In addition, a study of adult women (N = 113) suggests that species-typical nurturing (reported EDN history) buffers the impact of adversity (ACEs) on physiological regulation (respiratory sinus arrhythmia; RSA) to support vagal adaptability[56] across several stress and relaxation conditions (Tarsha & Narvaez, 2022). In light of this support, disseminating relevant research to parents to highlight the

[55] That is, unmedicated and physiologically-normal vaginal birth. While I recognise the word 'natural' can be problematic, it is widely used and appropriate to a theory focused on the conditions under which humanity evolved and to which we are adapted as a species.

[56] A measure of physiological adaptability which is foundational for physical and psychological wellbeing as well as resilience (Tarsha & Narvaez, 2022).

evolutionary value of nurturing caregiving seemed a sensible first effort towards increasing EDN-consistent practices and outcomes in Aotearoa.

In addition to psychophysiological effects, the nurturing, responsive experiences of our human evolved developmental niche have been associated with moral development. Preliminary research has been retrospective and cross-sectional, with an anonymous online study of US adults (N = 606) finding that EDN-history (assessed by a questionnaire) predicted three ethical orientations via positive or negative pathways (Narvaez et al., 2016). The authors predicted that EDN-consistent experiences during childhood would facilitate secure adult attachment, noting that this "influences psychopathology, which in turn affects sociomoral capacities that influence ethical orientation" (Narvaez et al., 2016, p. 299). Mediation models suggested that social engagement (the extent to which a participant describes themselves as caring, compassionate, merciful, and cooperative) resulted from a pathway through secure adult attachment, mental health, and perspective taking. In contrast, social opposition (the extent to which participants rated themselves as combative, vigilant, belligerent, and fierce) was predicted by low ratings on the single-item secure attachment question and poor mental health, mediated by low perspective taking. Social withdrawal (described as submissive, yielding, timid, and unassertive) was similarly associated with low secure attachment and poor mental health, but mediated by personal distress. These links between reports of early childhood experience and current moral functioning may constitute a missing link in understanding the impact of adversity on antisocial behaviour.

Childhood maltreatment and adversity fall outside the sensitive responsive caregiving human infants have evolved to expect. Thus the EDN was used as a framework to encapsulate all the different topics covered in the *Parenting From the Start* workshop. Karatekin and Almy (2019) highlight the need for interventions which improve parenting, reduce risk, and bolster protective factors – aims that were already underway in the present project at the time they were writing. The first goal of the *Parenting From the Start* antental workshop was to prevent or minimise harm by making caregivers aware of the potential damage associated with adverse childhood experiences. The second goal was to provide caregivers with evidence-based information which would support healthy infant development.

Preventing Harm

Child maltreatment is the result of complex interactions between risk and protective factors (Cooper & Wharewera-Mika, 2009). Table 8 summarises research examining risk factors. For the purposes of the present discussion these have been split into those that are and are not realistically modifiable via a parenting intervention. Modifiable factors were those targeted in *Parenting From the Start*.

In terms of contextual factors, isolation and a lack of social support could be alleviated by shared care of children, and the first step towards this is to make expectant parents aware that alloparenting is the norm for our species[57] (Hrdy, 2009), meaning it is reasonable to

[57] *Parenting From the Start* workshops reinforced the point that only some paid childcare arrangements can be defined as 'alloparenting' (stable, loving care by well-known others). Childcare work tends to be low paid, with

expect help. Further, antenatal education has the potential to offer alternative understandings of children/tamariki, which may be valuable if participants are situated within social and cultural groups where children are not currently cherished. Although these may be small steps towards reducing risk, they are in the right direction.

Characteristics of the parent can potentially be modified by offering information which increases their understanding of child development and facilitates realistic expectations of babies and children. Effective education can increase parenting competence and confidence. *Parenting From the Start* focused on what babies need and various options for meeting those needs – information intended to increase parental knowledge and self-efficacy and make parenting more rewarding for both parties. Although an antenatal intervention is too late to prevent a pregnancy being 'unplanned', it could conceivably prevent the child from being 'unwanted'. An expectant parent who is empowered by the sense they have the information and resources to parent effectively is more likely to have a positive emotional response to pregnancy and their child than someone who feels unsupported and unprepared.

Parenting From the Start was intended to provide sufficient information to support informed decision-making regarding caregiving, and the tools necessary to carry children whenever desired. The intervention was also expected to affect the ease with which parents bond with their child – that is, the attachment relationship. Although somewhat speculative, it may also be that when early relationships are seen as important, parents choose to increase child spacing, with possible implications for (subsequent) family size, which was therefore considered a modifiable risk factor. Finally, I hoped the workshop would impact the parents' perception of their child and lead to more respectful strategies for coping with challenges such as a 'difficult' temperament or challenging behaviour, while also leaving participants feeling affirmed and with a positive cultural identity. Thus, *Parenting From the Start* targeted modifiable risk factors identified in the research literature, with the aim of reducing risk.

Table 8.

Risk Factors for Child Maltreatment Divided Into Potentially Modifiable and Unmodifiable Factors

Unmodifiable	Potentially modifiable
Contextual factors • Family violence or partner conflict • Community tolerance or glorification of • violence • Easily available alcohol or drugs • Gender and/or social inequality • Poverty or financial difficulties • High unemployment • Inadequate housing • Lack of access to social and health • services • Exposure to racism and discrimination • Stress	• Social isolation • Lack of support • Social and cultural norms in which children are seen as unimportant

high child-staff ratios, and limited continuity for individual children, and under these conditions carers do not usually form part of an extended family or community.

Characteristics of the parent	
• Young • Low education • Mental or physical illness. • Maltreated as a child • Poor impulse control • Low tolerance for frustration • Whānau connections are absent or problematic	• Lacks awareness about child development • Inadequate parenting skills • Unrealistic expectations about child • Negative cultural identity
Characteristics of the family	
• Unplanned pregnancy • Premature baby • Low birthweight baby • Multiple-birth (e.g., twin or triplet) • Baby with chronic or serious health • problems/disability	• Unwanted pregnancy • Difficulty bonding with child • Large family, children close together • in age • Child perceived negatively by • parents or seen as having 'difficult' • temperament (e.g., hard to soothe) • Challenging behaviour (e.g., • impulsiveness, aggression, hyperactivity)

Note. Information taken from *Māori child maltreatment* (Cooper & Wharewera-Mika, 2009).

One final category of harm deserves special mention due to its relevance to parenting. Postnatal depression is a risk factor for poor infant outcomes. Rates of postnatal depression usually fall within the range of 10 to 15%, and can be as high as 25% for women embarking on motherhood with inadequate social support, past or current mental illness, or the added challenges of low socioeconomic status or concurrent adolescence. Recent studies suggest the COVID-19 pandemic may have worsened maternal mental health, with self-reported symptoms of postnatal depression and anxiety in a Canadian sample (N = 900) recorded as 40% and 72% respectively (Davenport et al., 2020). Prior to the pandemic, a self-selected New Zealand European sample (N = 60) assessed with a modified structured clinical interview (SCID-I; First, Spitzer, Williams, 2002) for DSM-IV mood disorders resulted in 8.3% of the new mothers being formally diagnosed with major depression and 25% of the classified as experiencing 'mild depression' (White, 2008, p. 30). Infants exposed to maternal depression have exhibited lower growth, behavioural disturbances, and cognitive defects (McBride et al., 2014). A meta-analysis of 46 observational studies found mothers suffering from depression engage in significantly more negative/coercive behaviours (irritability, hostility), more disengagement, and fewer positive behaviours (play/social interactions) towards their babies/children than mothers who have never been depressed (Lovejoy et al., 2000). Effect sizes for negative/coercive behaviour are significantly larger in samples of current compared with lifetime depression. The *Edinburgh Postnatal Depression Scale* (EPDS; Cox et al., 1987) is the most widely used screening tool for postnatal depression internationally and has been translated into multiple languages for use across cultures (Boyd et al., 2005).

Postnatal depression may be influenced by past and current life experiences. Exposure to adverse experiences (ACES) during childhood is related to increased risk of maternal mental

health difficulties both during pregnancy and after birth (Racine et al., 2020, 2021; Wajid et al., 2020). A meta-analysis of 15 studies (N = 7,788) found small to moderate but significant links between adverse childhood experiences and maternal depression (prenatal *r* = .19, postnatal *r* = .23), and ACEs and anxiety (prenatal *r* = .14) (Baumeister et al., 2014). Adult mental health is also strongly correlated with socio-cultural factors including poverty, devaluing of social roles, and gender-based violence. Ongoing low income may worsen the impact of early trauma, moderating the relationship between ACEs and maternal mental health problems (Racine et al., 2021). In addition, there is a well-documented relationship between low social support and postnatal depression and anxiety (Biaggi et al., 2016; Boury et al., 2004; Harrison et al., 2020; Harrison et al., 2021, cited in Ryan & Barber, 2022).

These relationships between postnatal depression and adversity, combined with the negative consequences for child development, meant postnatal depression was an important variable to measure as part of *Pakiaka Tupuora*. The EPDS was added to the home visit to assess new mothers for symptoms of low mood, and enable referral to appropriate support services. It was hoped the intervention might reduce rates of postnatal depression among mothers who attended the *Parenting From the Start* workshop*,* and this was pre-registered as a hypothesis for the study.

Promoting Wellbeing

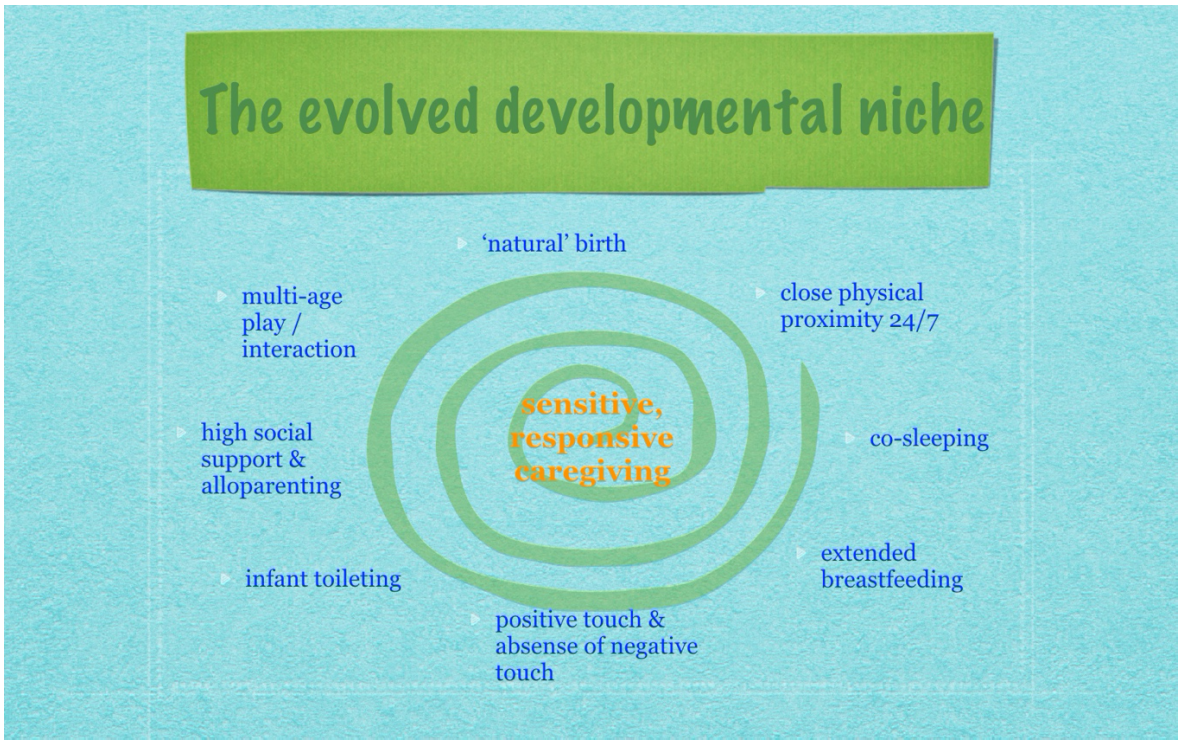
The second goal of the *Parenting From the Start* antenatal workshop was to promote wellbeing through two specific mechanisms: healthy brain development and secure attachment. Caregiving affects the structural and functional organisation of the brain (National Center on the Developing Child, 2011, 2012, 2013; National Scientific Council on the Developing Child, 2020). It also affects the quality of the relationships that develop between pēpi (babies) and their caregivers, and the expectations about others that babies internalise (Cassidy & Shaver, 2008). As a project, *Pakiaka Tupuora* was about creating a preventative parenting intervention that moved beyond risk factors to embrace the complementary idea of optimising healthy infant development. Narvaez and Gleason (2012, p. 308) proposed research into 'developmental optimization', suggesting the ancestral practices of the evolved developmental niche as a baseline for studying "complex interactions among genes, environment, critical periods, and the timing, intensity, and duration of experiences and their contexts… for their interrelationships and effects on the functioning of brain and body systems and implicated in child and adult outcomes". Other authors similarly advocate for "a concept and data-driven approach to neurodevelopmental optimization to enable enhancement programs promoting optimal cognitive and emotional outcomes in early childhood", noting that these "need to incorporate basic principles of brain development" (Luby et al., 2020, p. 749). These goals form part of the rational for the present study. The *Parenting From the Start* antenatal workshop pre-empted calls for "neurodevelopmental optimization research programs utilizing randomized enhancement trials in early childhood to inform public health strategies on prevention and early intervention" (Luby et al., 2020, p. 744).

What would optimal care look like? The first prerequisite is an absence of maltreatment, but the evolved developmental niche goes further in suggesting a range of parenting practices

whose absence may "impede wellbeing" (Narvaez, Gray, et al., 2014, p. 8). Studies of hunter-gatherer groups on multiple continents have established features common to this lifestyle which are likely to constitute elements of the human evolved developmental niche. These include physiologically-normal vaginal birth, continuous close physical proximity between infants and caregivers, co-sleeping, extended breastfeeding, infant toileting (caregiver support for babies to eliminate in a suitable place), high social support, alloparenting, and multi-age play in nature (Narvaez, Gray, et al., 2014). As discussed in previous chapters, interactions with children are characterised by attention to meeting their needs, positive (kind and appropriate) touch, and the absence of negative touch (maltreatment). A detailed description of the *Parenting From the Start* intervention is provided in Chapter 6, but Figure 3 shows the antenatal workshop slide used to summarise these elements, which contribute to sensitive, responsive nurturing of babies within the human evolved developmental niche.

Figure 3.

Slide 49 from Parenting From the Start Showing Elements of the Human Evolved Developmental Niche



Cultures vary in their adherence to this adaptive approach to child development, and many modern Western parenting strategies diverge strongly from the evolved developmental niche (Narvaez, Gray, et al., 2014). Isolating babies for 'sleep training', parenting tools such as baby 'walkers' and 'jumpers' and 'play pens', artificial breastmilk substitutes, bottles, and cots all encourage a hands-off approach to caregiving. Some, such as 'dummies'[58] serve multiple purposes at odds with the EDN: preventing infants from communicating vocally while also replacing breasts as the main source of suckling. EDN theorists note that recently-invented infant care practices such as feeding formula, laying infants prone to sleep, and using a

[58] The local colloquial term for 'pacifiers': small rubber or silicone sucking objects designed to quiet infants.

'nursery' or solitary sleep space, have all proved to be independent risk factors for an emergent epidemic of sudden unexplained death in infancy (Narvaez, Gray, et al., 2014, p. 7). It has been argued that the parenting practices of White Americans and mainstream US culture generally are historically and cross-culturally abnormal as well as environmentally destructive (Narvaez & Gleason, 2012, p. 319).

Other authors make the point that divergent strategies with regards to caregiving and reproduction demonstrate mammalian plasticity (Thompson, 2012). Where young are raised in nurturing circumstances, their own parenting is likely to be similarly nurturing, but low levels of care may be adaptive where the environment is harsh. Studies with smaller mammals illustrate this point. Licking/grooming (LG) of pups is a primary form of tactile stimulation among rats, but varies between lactating dams. Maternal licking and grooming is enhanced when laboratory rats are raised in 'enriched' conditions with large social groups and opportunities to explore, and suppressed in circumstances of social isolation or stress during pregnancy (Champagne & Meaney, 2007). Maternal licking and grooming is also higher in communal nests than in individual nests. Pups who receive low maternal LG become mothers who demonstrate less licking and grooming of their own young, and have heightened responsivity to stress, but their reproduction may also be improved by increased sexual receptivity and improved cognitive performance during stressful conditions (Champagne, 2014). Young people may also demonstrate this plasticity, with short-term adaptations to adversity damaging health but increasing fertility. A review of the literature notes that:

> When stress responses are activated frequently, intensively, and persistently during early childhood, the systems involved can become permanently calibrated to activate more easily and may not turn off as readily as they should. From a biological perspective, this is essential for survival. If the world is a dangerous place, the internal systems designed to protect us need to develop in a way that anticipates frequent threats. Yet over time, these repeated activations lead to greater risk for stress-associated diseases well into the adult years—conditions such as cardiovascular disease, obesity, type 2 diabetes, respiratory and immunological disorders, and a range of mental health problems. That's the trade-off of adapting to significant early adversity (National Scientific Council on the Developing Child, 2020, p. 5).

Belsky and colleagues have proposed divergent reproductive strategies based on the caregiving environment experienced (Belsky, 2012; Belsky et al., 2010). High-quality caregiving is associated with delayed puberty, later sexual activity, and the related benefits of optimal development, while accelerated maturation maximizes opportunities for reproduction where environmental conditions undermine parental functioning and investment to make ongoing development of sociocompetitive competencies unlikely (L. Zhang et al., 2019). Within human samples, socioeconomic status and exposure to childhood adversity (particularly father absence, sexual abuse, and family dysfunction) are correlated with the timing of female puberty (L. Zhang et al., 2019). While early puberty/early sexual activity adaptation may improve reproduction in the face of tough conditions, this evolutionary strategy comes at a cost to the individual. The final sections of this chapter explain how the cooperative and egalitarian lifestyle of hunter-gatherers result in a supportive, nurturing caregiving context which allows children to flourish to the extent the

physical and political environment allows. Known and suspected consequences of deviation from the EDN are described.

How the EDN Contributes to Child Development

Measuring the evolved developmental niche in modern populations requires consideration of which elements within the caregiving ecosystem have positive effects on child development. Following earlier studies (Narvaez, Gleason, et al., 2013; Narvaez, Wang, et al., 2013), I assumed it was not necessary to abandon technology and adopt a hunter-gatherer lifestyle, despite these being the contexts of ancestral caregiving. The following elements, however, were theorized to have functions of protecting babies and optimizing child development which transcend time and place: healthy pregnancy, natural birth, close proximity, responsiveness to infant sleep, feeding, and toileting needs, overall positive care and an absence of negative care, and a context of high social support involving alloparenting. The final sections of this chapter summarise previous research suggesting how these variables might contribute to the EDN.

Healthy Pregnancy

Healthy pregnancy was conceived as a drug-free period where expectant mothers eat well, exercise regularly, and are protected from stress. General dietary recommendations were largely outside the scope of the project, while the importance of exercise and limiting maternal stress are outlined in Chapter 6. The present focus is therefore on exposure to non-prescription drugs and alcohol during pregnancy. An initial concern with considering modern scientific research on toxins is that it may not be relevant to ancestral circumstances. Evidence from anthropology, archaeology and biology suggests that humans have been exposed to potent psychoactive substances for hundreds of millions of years and that our ancestors may have used them to self-medicate as well as for ritual and recreation (Hagen & Tushingham, 2019). The question arises of whether or not these substances form part of the evolved developmental niche. Our physiological adaptations to substances include a multi-layer defence system which allows us to identify plant neurotoxins by their bitter taste, metabolise and excrete them, expel them by vomiting (which also triggers operant condition to avoid them in future), and/or block them from entering the brain. Nevertheless, ingesting some quantity of substances such as nicotine, THC and other cannabinoids, opioids, amphetamine, cocaine, and alcohol may have allowed earlier *Homo sapiens* to enhance performance, treat infections, and benefit from food sources involving fermenting fruit and grains (alcohol). This kind of self-medication has been documented in a range of nonhuman species including insects, birds, and mammals (Hagen & Tushingham, 2019). In humans, a longitudinal study of tobacco use and helminthiasis among Aka hunter-gatherers (N = 206) found a significant negative correlation between cotinine (a nicotine metabolite) and intestinal worm burden, that treatment of helminths with albendazole (a commercial anthelmintic) reduced cotinine concentration a fortnight later compared with a placebo control group, that higher continine concentration over the following year predicted less reinfection of treated participants by year 2, and that people with genotypes (CYP2A6 alleles) leading to slower nicotine-metabolizing had lower worm burdens than those with extensive metabolizing alleles

(Roulette et al., 2014). These results provide evidence that humans may use tobacco to treat parasites in contexts where these are endemic, suggesting this may have occurred in our evolutionary past.

Despite this preliminary evidence for drug use as self-medication in environments such as the ones our ancestors evolved in, some studies suggest patterns of use may have nevertheless differed for pregnant adults and children for whom harms would likely outweigh benefits (Hagen & Tushingham, 2019; Roulette et al., 2016). While research on hunter-gatherer groups undergoing socio-cultural transition to more sedentary lifestyles indicates high levels of problematic alcohol use, including during pregnancy and breastfeeding (Knight et al., 2021), this may not be representative of traditional use patterns or ancestral patterns over evolutionary history. A study of egalitarian hunter-gatherers (Aka) in the Congo basin found a large gender bias in tobacco use consistent with maternal adaptations to protect their children. The very low use by women (confirmed by salivary cotinine) was explained in terms of aversion to tobacco, concerns about negative impacts on fetal health, and a desire to attract husbands. The cultural preference for nonsmoking wives is particularly striking in light of the reverse preference (by mostly non-smoking women) for husbands who smoke (Roulette et al., 2016). Where toxic substances are a stable part of the cultural environment, use may be adjusted based on individual needs, whether physiological or cultural. This is visible in modern smokers, who alter their behaviour to titrate the nicotine dose (and therefore blood concentration of nicotine) in response to changes in nicotine content of cigarettes (Scherer & Lee, 2014). Global patterns of drug use provide further support for the hypothesis that females evolved to avoid toxic substances to protect infants before and after birth, with much lower prevalence among women of childbearing age, and lower female smoking rates in developing countries (3.1%) than in developed countries (17.2%) despite male rates being similar (32% vs 30.1%; Ng et al., 2014). Further, countries with higher total fertility rates (TFR) have lower rates of female smoking when gender inequality and per capita income are controlled. Smoking prevalence is higher in older, postmenopausal women than in younger women, with more substantial differences in countries with high TFR (Hagen et al, 2016, cited in Hagen & Tushingham, 2019). Social learning and cultural restrictions are likely important in avoidance of dangerous substances. In addition to their caution regarding new foods, human infants aged 8 to 18 months engage in more social looking at adults on encountering plants than other objects, and do so before touching them (Elsner & Wertz, 2019), while mothers and grandmothers in traditional societies share knowledge about which foods to avoid during pregnancy (Henrich & Henrich, 2010; Placek et al., 2017; Placek & Hagen, 2015). Based on this evidence, I assumed substance use would not have formed a regular part of the evolved developmental niche of babies, whether born or unborn, and exposure to such substances was therefore tracked as part of the present study and assumed to represent digression from the EDN.

Substance use is relatively common in modern Aotearoa New Zealand. More than a quarter (28.7%) of women who were pregnant in the three years preceeding the 2007-2008 *New Zealand Alcohol and Drug Use Survey* reported that they had consumed alcohol while pregnant, although 68% said they had been advised not to (Mason, 2009). Rates were highest for Pākehā (European/Other = 31.6%) and Māori (31.8%) women, and significantly lower for Pacific and Asian women. In the same survey, one in six (16.6%) New Zealand adults had used recreational drugs in the past year, with cannabis the most common (14.6%), followed by BZP

party pills (5.6%), ecstasy (2.6%), amphetamines (2.1%) and LSD and other synthetic hallucinogens (1.3%). Use was more common among young people (16-34 years) – the group most likely to be pregnant – people of Pākehā (European/Other) and Māori ethnicity, and respondents living in more deprived neighbourhoods (Manatū Hauora/Ministry of Health, 2010). Although use of tobacco in New Zealand has been falling in the last decade, 14.2% of respondents to the 2019/2020 *New Zealand Health Survey* reported they were current smokers. Rates were much higher for Māori (34.0%) and Pasifika (24.4%) respondents. Adults living in the most socioeconomically deprived areas were 3.6 times as likely to smoke as those living in the least deprived areas after adjusting for age, gender, and ethnicity (Manatū Hauora/Ministry of Health, 2019).

Maternal use of these substances during pregnancy can cause lasting harm to the developing fetus. In terms of short-term outcomes, a review of Australasian research suggested that maternal use of cannabis, opiates and alcohol (heavy consumption) during pregnancy is significantly associated with low infant birthweight[59] (Oni et al., 2019). Meta-analysis based on 5 studies in Australia and New Zealand (N = 160,247) found substance use during pregnancy was significantly related to preterm birth (pooled OR = 2.02), and to small-for-gestational age (pooled OR = 1.92) based on 6 studies (Oni et al., 2019). Four studies in the review reported significant links between prenatal substance exposure and low Apgar scores (<7 at 5 min post birth), while eight studies found significant associations with between prenatal substance use and admission to neonatal intensive care units or special nurseries. Infants exposed to cannabinoids were twice as likely to be admitted to such facilities, babies exposed to multiple substances (polysubstance use) were four times as likely, while those exposed to opioids during pregnancy were six times as likely to be admitted (Oni et al., 2019). As well as indicating health concerns and increased risk of neonatal death, admissions to NICU tend to involve lengthy separations from caregivers over many days. With regards to longer-term outcomes, fetal alcohol spectrum disorder (FASD) affects 7.7 per 1000 children globally (95% confidence interval = 4.9–11.7; Lange et al., 2017), with rates 10-40 times higher among children in care and special education programmes, adults in correctional facilities, and Indigenous populations suffering the ongoing effects of colonialism (Popova et al., 2019). In Aotearoa New Zealand, the rate was 21 children per 1000 in 2012 (Lange et al., 2017, eTable 4, supplementary material). An initial meta-analysis of 14 studies comparing 3,114 children with neuroblastoma to case controls suggests there are also significant increases in this childhood cancer among those exposed to alcohol (OR 1.26), tobacco (OR 1.22) and illicit drugs during pregnancy (Müller-Schulte et al., 2018).

Natural Birth

Natural birth facilitates breastfeeding and bonding via a cascade of physiological processes associated with unmedicated delivery, which are interrupted by medical environments and interventions (Buckley, 2009; Gaskin, 2008). Spontaneous vaginal birth was the norm for the

[59] A global meta-analysis of 38 studies (N = 497,023 women) found maternal alcohol consumption was associated with low birth weight of infants (LBW) among retrospective cohort studies (relative risk [RR] = 1.37, $p < 0.01$) but not retrospective cohort studies (RR = 1.11; 95%CI: 0.98–1.25; I2 = 81.5%; $p < 0.01$) or case-control studies (odds ration [OR] = 1.16; 95%CI: 0.68–1.97; I2 = 61.2%; $p = 0.05$), however only dichotomous measures of alcohol use were considered (P. P. D. S. Pereira et al., 2019).

majority of our history as a species, and is associated with a range of adaptive physiological and psychological changes that are interrupted when we interfere with the timing or manner in which labour occurs. Trevathan (2012) suggests five aspects that were likely present in ancestral environments: support during labour and birth,[60] birthing in an upright position,[61] allowing time for the infant's blood to return through the umbilical cord before it is cut or clamped, uninterrupted close proximity between mother and infant during the first postnatal hour, and initiation of breastfeeding soon after birth. Noninstitutional vaginal birth colonises the infant microbiome with safe bacteria, with growing evidence of long-term health consequences (Harman & Wakeford, 2016). Birth experiences in modern Aotearoa New Zealand often diverge from these evolutionary norms. Bergman and Bergman note that "childbirth often becomes a medicalized event with many interventions and less than ideal outcomes. In many instances, the choices are made to suit health professionals and hospital routines rather than the mother... based on ideas and assumptions which predate evidence-based medicine and recent neuroscience" (2013, p. 8). They suggest that "the perspective which has been lacking is what is best for the baby; our choices should be primarily based on the basic biological needs of the infant" (J. Bergman & Bergman, 2013, p. 8). This baby-centred perspective was the approach taken within *Parenting From the Start*, with information about birth and other parenting topics presented in terms of the possible impacts on infants, especially where this might conflict with the convenience of parents. The history of birth in Aotearoa New Zealand was introduced in Chapter 1, and studies comparing planned place of birth follow in Chapter 6, as they were the topic of specific workshop activities. Within *Pakiaka Tupuora,* birth experiences were conceptualized as more consistent with the evolved developmental niche when labour started naturally (without the use of medications), mothers remained upright and moved around during labour, gave birth at home or in a birthing centre rather than hospital, gave birth in the place of their choice,[62] birthed their baby vaginally, and did not receive surgery or medications.

Close Proximity

Human infants are dependent on their caregivers for years, with the majority of body and brain growth occurring postnatally (Narvaez et al., 2016). It is likely that ancestral mothers

[60] Traditional birth usually involved continuous emotional support during labour, and modern research has found that having a non-medical support person (or 'doula') present improves birth outcomes. Randomised controlled trials have found that birth supporters are associated with shorter labours (Campbell et al., 2006), increased breastfeeding success, higher satisfaction, a 30% reduction in medication use, 60% reduction in epidurals, and a 40% reduction in forceps use. Birth supporters also reduce caesarean rates by about half compared with routine care alongside the support of a male partner, in both lower and middle income samples (N. Bergman, 2016; Kennell, 1991; McGrath & Kennell, 2008). In addition to replicating these birth and feeding outcomes, the latest reviews of doula involvement in perinatal care find it predicts fewer preterm births, decreased rates of intrapartum maternal fever and gestational hypertension, and reductions in maternal anxiety and stress during labour (Crawford et al., 2023; Sobczak et al., 2023).

[61] Birthing in an upright position utilises gravity more effectively and reduces pressure on the mother's blood vessels (Gaskin, 2008). Squatting, in particular "widens the birth canal in several dimensions" and "[T]he upright position is associated with shorter second stage labor, less pain, and lower use of fetal heart monitors, forceps, and vacuum extractors" (W. R. Trevathan, 2012, p. 228).

[62] Hunter-gatherer societies (which most closely approximate our human EDN) are egalitarian, so preferences seem more likely than compulsion as rationales for particular locations and birth practices.

and their babies remained together and undisturbed immediately after birth. Following Klaus and Kennell (1997), Trevathan suggests several species-specific behaviours that human mothers birthing in non-hospital settings exhibit in the first postnatal hour: holding the infant close on the left side (regardless of maternal handedness) and stroking/massaging, talking to the infant in a high-pitched voice, gazing into the infant's eyes, and breastfeeding (2012). Barrett and Fleming state that "[i]n most cultures mothers provide kinesthetic stimulation by stroking and rocking the baby and respond contingently to infant cries and other indices of distress, often by vocalizing 'in response'" (Barrett & Fleming, 2011, p. 369). These behaviours serve to soothe the infant, to regulate temperature and other bodily systems through skin-to-skin contact (SSC), and to stimulate breast milk production (J. Bergman & Bergman, 2013).

The value of close physical proximity has been investigated in several research literatures. Firstly, small intervention trials have assessed outcomes when newborns are kept skin-to-skin (SSC) on their mother's chest, with only a nappy, hat and blanket over the back, as a standalone intervention. Bergman and colleagues (2004) found that premature babies (N = 34) with low birthweight (1200 to 2199g) kept skin-to-skin with their mothers from birth were more physiologically stable than those who were randomly assigned placement in incubators. Stability was measured (1) using heart rate, oxygen saturation, and respiratory rate (breathing), & (2) BAILOUT points, which included very low temperature, abnormal heart rate, failure to breathe, low oxygen saturation, and low blood glucose. (The points at which you would 'bail out' on whichever stabilisation method a baby had been assigned to and provide medical assistance). Almost all of the babies in incubators (92%) became disregulated (unstable), requiring a doctor to be called, and eight of the 13 experienced hypothermia. In contrast, 83% of the babies kept skin-to-skin care with their mother (83%) remained well. A larger study of low birthweight infants (1500-2500g) randomised at birth to incubator or skin-to-skin care (N = 100) replicated these results, with significantly higher Stability of Cardio-Respiratory system in Preterms (SCRIP) scores over the first 6 hours of life among SSC compared with separated infants, along with significantly lower need for respiratory support, intravenous fluids, and antibiotic use during the remainder of the hospital stay, which the authors note could be "life-saving in low-income countries with lower access to medical treatment (Chi Luong et al., 2016, p. 1). Another small RCT (N = 37) from Sweden comparing continuous SSC with standard care found that preterm infants kept skin-to-skin following birth had significantly lower salivary cortisol reactivity in response to handling at one month than controls, and concordance with mothers' cortisol levels which was absent in the control group (Mörelius et al., 2015). A quasi-randomised study in which two Canadian hospitals were assigned to SSC and standard care and then swapped halfway through the study (N = 90) found long-term effects of skin-to-skin care (6hrs per day for the first week, then 2hrs per day to 1 month). Mothers encouraged to practice SSC reported fewer depressive symptoms and showed larger reductions in salivary cortisol in the early weeks post birth, and were more likely to continue breastfeeding to three months, than those in the standard care group (Bigelow & Power, 2020). At 9-year follow up mothers in the SSC group demonstrated more engagement and reciprocity in conversations with their children than control group mothers. A large correlational study of all mothers (N = 21,842) of singleton term infants in 19 California hospitals found dose-response effects, with longer skin-to-skin contact during the first 3 hours following birth predicting increased odds of exclusive breastfeeding during maternity hospitalisation (Bramson et al., 2010). A Cochrane Review of randomised controlled trials (k = 34, N = 2,177) found significant positive effects of early SSC on breastfeeding at one to four

months post birth, decreased infant crying, better cardio-respiratory stability among late pre-term infants, and higher blood glucose compared with standard hospital care, with no evidence of negative effects (E. R. Moore et al., 2012). These kinds of findings have led Uvnäs-Moberg and others note that "skin-to-skin contact immediately after birth, with its potent anti-stress effects may be regarded as part of the normal birth process" (2020, p. 3).

A second research literature which provides stronger support for close physical proximity uses the term kangaroo mother care (KMC) to encompass multifaceted interventions combining exclusive breastfeeding with early, continuous, and prolonged skin-to-skin care of newborns and timely (early) discharge from hospital with close follow-up. A Cochrane Review of RCTs assessing KMC interventions with low birth weight infants (k = 16, N = 2,518) found reduced mortality (typical risk ratio (RR) 0.60, 95% CI 0.39 to 0.93; seven trials, 1614 infants), as well as lower risk of nosocomial infection/sepsis (typical RR 0.42, 95% CI 0.24 to 0.73), and hypothermia (typical RR 0.23, 95% CI 0.10 to 0.55), and shorter hospital stays (typical mean difference 2.4 days, 95% CI 0.7 to 4.1), among kangaroo infants, along with improved growth, breastfeeding, and mother-infant attachment in some studies (Conde-Agudelo et al., 2012). A later meta-analysis of 124 randomised and correlational studies comparing outcomes found kangaroo care was associated with 36% lower mortality in low birthweight newborns compared with conventional hospital care (RR 0.64), reduced risk of neonatal sepsis (RR 0.53), and protected against hypoglycemia (RR 0.12), hypothermia (RR 0.22), and hospital readmission (RR 0.42) (Boundy et al., 2016). KMC also predicted increased ongoing exclusive breastfeeding (RR 1.50), lower mean respiratory rate and pain measures, and higher oxygen saturation, temperature, and head circumference growth. Twenty year follow up of 494 participants (69%) from a randomised controlled trial conducted in Columbia from 1993 to 1996 (N = 716) found evidence of a long-term impact on child development. As well as significantly reduced mortality, the lowest birth weight babies from the original study (n = 264, ≤1800g) who received KMC had better neuropsychological and behavioural outcomes as young adults than controls who received standard care, with fewer externalising problems, less antisocial behaviour, and significantly larger volumes of total grey matter, cerebral cortex, and left caudate nucleus[63] on neuroimaging, while KMC parents appeared more invested and nurturing (Charpak et al., 2017). Linear regression 20 years post birth found associations between the volume of the left caudate nucleus and fragility at birth (the lower the fragility index, the larger the volume), duration of skin-to-skin care (the longer the time in the kangaroo position, the larger the volume), and fine motor skills (the better the performance on this aspect of neuropsychological assessment, the larger the volume).

Within the evolved developmental niche, proximity to caregivers and responsiveness to infant cues continues through the first year post-birth and includes co-sleeping, where mother and child share a sleep space. In modern Western culture a distinction is made between two kinds of co-sleeping: bedsharing, and room-sharing, so both were assessed in the present study.

[63] The caudate nucleus is a brain structure sensitive to premature birth (Charpak et al., 2017).

Responsive Infant Feeding

Breastfeeding is our evolutionary norm as *Homo sapiens*, with numerous benefits for the infant, the breastfeeding parent, and their relationship. Archaeological evidence and meta-analysis of studies in modern non-industrialised contexts suggests breastfeeding would have been almost universal in the EDN, with durations much longer than those in contemporary industrialised societies (M. Fox et al., 2021). Chemical analysis of 47 adult and 46 subadult skeletal remains of Jomon hunter-gatherers in eastern Japan (dated approximately 4000-2300 years before the present) suggest children were breastfed to around 3.5 years (2.3-5.5 years in 95% credible interval), with a subsequent transition to adult food sources rather than special weaning foods (Tsutaya et al., 2016). The shift in female reproductive life history consisting of earlier age at menarche, fewer pregnancies, and reduced breastfeeding in modern industrialised countries relative to previous historical and pre-historical norms has been described as "profound", and has physiological implications for women and babies (M. Fox et al., 2021, p. 328).

Human breastmilk is "a complex biofluid that contains myriad nutritive and non-nutritive components" including ratios of water, carbohydrates, fat, and protein suitable for the developmental age of the infant as well as enzymes and coenzymatic factors, vitamins, hormones, and immunological factors (Caba-Flores et al., 2022, p. 2). Added to this are stem cells, leucocytes, polyunsaturated fatty acids, cytokines (inflammatory and anti-inflammatory), and microbiota (bacteria, fungi, and viruses) that colonise the infant gut to support appropriate development of the immune system. Around 200 different oligosaccharides further promote immunity and 'feed' the microbiome. Finally, human milk contains microRNAs "that are absorbed by the intestinal epithelial cells and are involved in immunomodulatory and epigenetic regulation" (Caba-Flores et al., 2022, p. 2). The outcome of this complexity is ideal nutrition both for a particular baby and for the beneficial bacteria and other microbiota residing in their gut, with long-term impacts on health and immunity (Consales et al., 2022). As discussed in Chapter 2, frequent and extended breastfeeding promotes health, while artificial substitutes carry numerous risks for mothers and babies. For example, a recent nationally representative US sample found a 21% higher risk of postnatal death among infants who were not breastfed, with a 31% increase in risk for Black infants (Meek et al., 2022).

Responsive Infant Toileting

An additional element of the human EDN in my conceptualisation is infant toileting – the practice of holding a newborn or young infant over a suitable container/area to allow them to eliminate without soiling themselves. As I have noted in a previous publication, "[t]oilet training is a Western cultural institution so deeply taken-for-granted few parents can conceive of an alternative" although offering toileting opportunities from birth or a few months old remains standard practice in parts of China, India, and Africa, and toileting independence may be achieved substantially earlier in these settings (Pugmire, 2014, p. 54). While around half of 3-year-olds belonging to rural Chinese families have attained nocturnal bladder control (Liu et al., 2000), longitudinal data suggests only 7.5% of New Zealand children meet this milestone by 3 years of age (D. M. Fergusson et al., 1986). This pattern continues over time

and has been replicated in other Western/non-Western country pairings (Pugmire, 2014). Comparison between Vietnamese children (who begin toilet training early) with Swedish children (who follow the Western pattern of late toilet training) found the majority (89%) of the Vietnamese children were using the potty daily at 6 months, and fully toilet trained by 24 months (98%); while only 5% of the Swedish children had begun using a potty by 24 months, and only 55% had achieved bladder control independent of an adult by age 3 (Duong et al., 2013). Delays in initiating and completing toileting training have been increasing in Western countries over the last few decades (Blum et al., 2004; Choby & George, 2008; Kaerts et al., 2012). This pattern may be related to increased use of single-use plastic nappies (Berk & Friman, 1990), and changing ideas about what is normal and possible (Pugmire, 2014).

There is no evidence that waiting to begin toilet training is beneficial. On the contrary, "the limited empirical research available on toilet training supports the idea that skills associated with toileting are present and able to be developed much earlier than is considered usual in Western countries" (Pugmire, 2014, p. 57). Photographs and descriptions of infant toileting among the Digo of East Africa in the late 1970s support claims these infants accomplish reasonable night and day dryness within the first 6 months post birth (deVries & deVries, 1977). The concept of maturational "readiness" which continues to dominate the paediatric and psychological toilet training literature today has little basis in evidence, and begets confusion about behavioural indicators and appropriate ages to begin (Kaerts et al., 2012). Contrary to assumptions that toileting requires a degree of physiological maturity universal across cultures (deVries & deVries, 1977), sphincter control appears experience-dependent (Pugmire, 2014). Toilet training is itself associated with physiological changes such as increased bladder capacity, improved coordination between the bladder and the sphincter, and complete emptying of the bladder (Duong et al., 2013). Vietnamese children achieve bladder control and coordination earlier than Swedish children, with significantly higher frequency of complete emptying from 9 months onwards, and consistently complete emptying from 18 months onwards (Duong et al., 2013). Further, both electroencephalography (Sillén & Hjälmås, 2004) and parent reports (Pugmire, 2014) suggest that young infants exhibit signs of arousal and possibly genital-directed gaze prior to eliminating. The body awareness of elimination needs may be present from birth or soon after.

While it is not explicit in the EDN literature, I argue that the practice of responding to infant vocalisations and body language in order to meet toileting needs was likely adaptive during our history as a species because it kept babies comfortable and happy and improved hygiene. Like other responsive caregiving, the baby-led practice of offering toileting opportunities 'on demand' (whenever a baby wants) may be associated with reduced crying. During our evolutionary history both the cleanliness and quiet of this approach could conceivably have protected infants and caregivers from predation, and been facilitated by our status as 'carrying' mammals who kept babies close. The improved hygiene associated with a lack of soiling in locations where resources and medicines are limited to natural sources may have reduced illness and infection to improve survival. Within mainstream Western culture continuous use of nappies is the norm, and these may be changed only 6 times a day (Kimberly-Clark, 2014), despite suggestions infants may eliminate up to 24 times per day (Sillén & Hjälmås, 2004). This modern Western disconnect may result in babies spending many hours wet or dirty. Even when nappies are changed promptly they pose a risk to hygiene.

Nappy changes at day care facilities are associated with outbreaks of infectious disease such as diarrhoea and hepatitis A (Simon & Thompson, 2006, cited in Choby & George, 2008).

Positive Care and Absence of Negative Care

Discussion of caregiving in Chapter 3 has already covered the nurturing, child-centred, responsive care experienced by hunter-gatherer children across continents. This pattern of childcare is considered to form an essential part of the evolved developmental niche. Positive care refers to times an infant is handled gently, played with, talked and listened to, held or carried, and responded to promptly, as well as the degree to which they have constant access to a well-known caregiver they love. Negative care describes the frequency with which pēpi are left to cry (rather than picked up when they cry), yelled at, or hit/thrown/shaken.

Alloparenting and Social Support

Social support of the mother-infant dyad, including shared care by adults and older children in the community facilitates stability and consistency in delivering this sensitive responsive care. As noted in previous chapters, alloparenting supports rather than replaces maternal care, which remains critical to infant outcomes.

Conclusion

Early experiences affect the development of our brain, immune system, and how we respond to the stress that we encounter throughout our lives. For better or worse they impact our neurological structure, neural networks, our relationships, and our risk of psychological and physical ill-health. Optimising outcomes for tamariki requires preventative support to set families up for success. The first goal of the *Parenting From the Start* antenatal workshop was to prevent or minimise harm by making caregivers aware of the potential damage associated with adverse childhood experiences. The second goal was to promote wellbeing. Elements of the evolved developmental niche such as natural birth, close physical proximity, co-sleeping, breastfeeding, and positive care benefit the developing child. I propose infant toileting as an additional element of the human EDN which was likely adaptive during our history as a species. Research on these elements provided a foundation for the *Parenting From the Start* workshops discussed in Chapter 6.

CHAPTER SIX

Outlining a Preventative Intervention: The Parenting From the Start Antenatal Workshop

Whaowhia te kete mātauranga
Fill the basket of knowledge

This final chapter of Part 1 describes the antenatal workshop I developed. *Parenting From the Start* is a preventative intervention designed to introduce expectant parents and their support people to the elements of the evolved developmental niche (Narvaez, Fuentes, et al., 2014; Narvaez, Gleason, et al., 2013; Narvaez, Wang, et al., 2013) as areas in which they could support their child's early experiences. The purpose of the workshop was to disseminate the latest multi-disciplinary understandings of early development as psychoeducation, improve access to infant baby carriers (slings) as culturally-appropriate caregiving tools, and thus improve outcomes. The workshop was intended to facilitate maternal sensitivity and the development of secure attachment relationships by providing caregivers with information on how such relationships develop and why they are important for future functioning. This information was placed in evolutionary, biological, psychological, and socio-historical contexts, with an emphasis on cross-cultural evidence and the theme of sensitive responsive care. Contextualising parenting knowledge was considered essential as a way of acknowledging that parenting is both universal and bound up with structural factors and socio-cultural ideas. The approach taken avoided giving specific advice about parenting – aiming instead to increase the capacity for informed choice. This chapter provides a narrative overview of the *Parenting From the Start* antenatal workshop with example activites to give a sense of participants' experiences. The description is necessarily incomplete given the 7-8 hour length of each workshop, but all elements have been summarised alongside examples of activities and slides from the fully-scripted Keynote presentation produced for the study. The full documents are not included in the thesis due to their length, but allow a high degree of replicability if the intervention should prove useful.

Intervention and Control Group Workshops

Two versions of the *Parenting From the Start* workshop were developed for the study: One for intervention-group parents (the antenatal workshop) and the other for control group parents (the preschool workshop).[64] The two versions of the workshop fulfilled slightly

[64] Control group participants attended the preschool workshop at the end of the study, in a 'waiting list control' design. In the meantime they had access to standard care, including free antenatal visits with a community or lead maternity care midwife and/or the hospital team throughout pregnancy, scans and specialist referrals as appropriate, and fully-funded pregnancy and parenting classes with a qualified childbirth educator (usually 6x weekly classes, each lasting two hours). In international terms this would be considered a 'treatment as usual' group rather than an absence of care.

different purposes as children in the control group were several years old by the time their whānau and support people attended and thus at a different developmental stage to the newborns expected by participants randomly assigned to the antenatal intervention. Approximately half of the topics remained the same in both workshops and the underlying values were the same. Both workshops were designed to be evidence-based, respectful, and culturally-appropriate for Aotearoa New Zealand, summarising multi-disciplinary findings relating to the impact of caregiving on child development. Only the *Parenting From the Start* antenatal workshop was evaluated longitudinally during the study, although written feedback was collected from attendees of both versions. The preschool workshop is described further in Appendix Q, but is not discussed further here.

All workshops were developed and presented by the lead researcher (LM): a registered clinical psychologist of Pākehā descent who speaks conversational Māori. At the time of the study I was a hapū (pregnant) mother of three. Te Reo Māori (Māori language) and whakataukī (proverbs) appeared throughout both versions of the workshop as deliberate mechanisms of de-colonisation. Explicit valuing of Te Ao Māori (the Māori world) and Mātauranga Māori (Māori knowledge) during the workshops recognised tangata whenua as the first people of this land, and *Te Tiriti o Waitangi* as the founding document of Aotearoa NZ. Acknowledging the harm caused by colonisation (poverty, land and language loss, dislocation from ancestral practices and supports) was an essential element of the workshops. Traditional Māori parenting, as articulated by the historians and Māori scholars cited in Chapter 2, was used as an exemplar of the sensitive responsive shared caregiving human infants have evolved to expect, with historical photographs to illustrate Māori babywearing (pīkau) in particular.

The culturally-appropriate nature of the workshops was extended by the use of the hui format (Pitama et al., 2017), beginning with a bilingual mihi (greeting) and pepeha ('placing' the presenter in terms of cultural heritage as tangata tiriti) and a short, non-religious karakia (blessing). All workshops were fully catered with a vegetarian lunch and buffet of snacks, with each meal break preceded by a karakia kai.[65] The gatherings included time set aside for whakawhanaungatanga (relationship building), including warm-up activities to help participants learn one another's names and begin to develop rapport, directed and informal kōrerorero (discussion), and the chance to debrief at the conclusion of the day before closing with a final karakia. These details were finalised after consultation with supervisors (particularly NT-M) and mentors with Māori and Pacifika cultural expertise. Participants' qualitative feedback on the antenatal workshop can be found in Appendix R.

The Antenatal Workshop

Intervention group participants attended a *Parenting From the Start* workshop during pregnancy, and were encouraged to bring their partners, family members, and other support people. The workshop was free of cost and offered in a single day (up to 8 hours total,

[65] All karakia were non-religious in the sense they did not mention a Christian God – to maximise the acceptability to a diverse multi-cultural audience. Reference to Ngā Atua Māori was made in the karakia kai. These atua are variously understood as "ancestors with continuing influence", gods or demons, and/or "a way of rationalising and perceiving the world" (Moorfield, 2011, p. 13).

including lunch and tea breaks) or split over two sessions as negotiated with participants and host organisations. Babies and small children were welcomed, and toys were provided for them. Parents were encouraged to bring support people and to move in and out of the room as they needed, to facilitate caregiving. Workshops number 2, 3, 6, and 7 took place in a single day, whereas 1, 4 and 5 were spaced over two sessions. Workshop 8 was offered digitally to the one participant who was unable to complete Part 2 of the workshop in person. Most people attended Part 1 followed by Part 2, but a few participants opted to complete the workshop in reverse order, attending half each of two different workshops.

The workshop focused on the basic needs of infants (stable, loving, responsive care by sensitive, reflective caregivers) – synthesizing research to make it accessible without offering guidance about how or whether any particular information should be taken up. The non-judgemental, participatory format provided caregivers with ideas about how they could be responsive, explained why this is important in terms of child outcomes, and acknowledged common difficulties, to get them thinking about how best to meet their baby's needs within the constraints of modern life. A number of videos, discussions, and hands-on activities complemented the *Keynote* presentation format, which included 189 colour slides with embedded images and audio-visual content. Regular breaks (every hour) prevented long periods of sitting still, which can be particularly uncomfortable during pregnancy.

Following discussion of close proximity as a cross-cultural norm, and scientific research on the positive impact of holding and carrying babies (see Chapter 2), intervention participants were gifted a soft stretchy wrap (sling) and shown how to use it safely. The slings were 100% cotton *Moby Wraps* offered in a range of colours. *Moby Wraps* were selected because they are widely available, NZ-designed, relatively cheap, biodegradable, fit adults of all shapes and sizes, and are suitable for infants up to 16.5kgs. Most children weigh less than this at age 2 years, meaning the slings could be used for the 12-20 months covered by the study. *Moby Wraps* retailed for NZ$75.90 each at the time of the study. All *Moby wraps* used in the project were provided by New Zealand distributor *Scarecrow Farm* at the wholesale price of $40 each (Scarecrow Farm, 2017). Figure 4 shows the T.I.C.K.S. rules for safe babywearing which were shared with participants as part of this session (UK Sling Consortium, 2015).

Figure 4.

Parenting From the Start Slide 080 Demonstrating Safe Babywearing



The parenting topics covered in the workshop included early brain development, attachment, trauma and other adverse experiences (e.g., maltreatment, poverty, discrimination), options during pregnancy, birth, and infant feeding, skin-to-skin time following vaginal or surgical birth, infant sleep and toileting options, alloparenting (shared care by multiple adults), and the long-term consequences of early care. These topics are summarized in Table 9, and the remainder of the chapter highlights certain examples to provide a sense of what the workshop was like. Content related to the evolved developmental niche (EDN) was supported by scientific, historical, cross-cultural, and Indigenous scholarship as discussed in previous chapters. Relevant literature reviews are included in the present chapter where pertinent information has not previously been discussed.

Table 9.

Topics Covered in the Parenting From the Start Antenatal Workshop

EDN Element	Topics	Key themes from the research literature
Background information: Bio-psycho-social determinants and correlates of health	Gene x environment interactions/epigenetics Early brain development Consequences of parenting	'Nature' and 'nurture' produce outcomes in combination – both are important Adverse childhood experiences are correlated with poorer physical and psychological health Abuse and neglect damage the brain and immune system Sensitive responsive care grows healthy brains
Background information: Ancestral parenting	Evolutionary history of mammals and *Homo sapiens* (humans) Hunter-gatherer parenting Historical and social factors Traditional Māori parenting	Humans are social mammals, and that lineage is 'written into' our bodies and brains Hunter-gatherer societies were the norm for 95% of our pre-history as *Homo sapiens,* and differ from modern societies in multiple ways Elements of the evolved developmental niche (EDN) included high social support, natural birth, extended breastfeeding, close physical proximity, infant toileting, safe co-sleeping, alloparenting, & multi-age play Traditional Māori parenting closely matched the EDN. Colonisation impacted parenting
Sensitive, responsive care	Parenting the brain: the importance of sensitive, responsive caregiving	Babies have evolved to expect constant physical proximity and attuned gentle care by a stable group of alloparents Sensitive responsiveness contributes to secure attachment relationships, which in turn are associated with psychological wellbeing
Social support	Consequences of presence or absence of social support	High social support during pregnancy and birth may improve outcomes for mother and baby and was the evolutionary norm
Natural birth	Options for labour & birth	Unmedicated vaginal birth 'primes' mother and baby for breastfeeding and bonding
Close physical proximity	Skin-to-skin after vaginal and surgical birth Effect of separation on baby Baby-wearing and Kangaroo Mother Care Baby-wearing safety and comfort	Newborns benefit from skin-to-skin time with their parents, especially if they are born pre-term Separation dysregulates babies Infant carrying is associated with significantly less crying and higher rates of secure attachment Kangaroo Mother Care (full-time) keeps infant vital signs stable – especially for pre-term babies
Positive touch	Gentle handling	Rough handling and abuse can cause infant brain damage

		Cuddles, closeness, and positive touch enhance infant development
Breastfeeding	Options for infant feeding	Breastfeeding improves health outcomes for mother and baby. Formula use increases health risks
		Breastfeeding is challenging in modern society but is possible for most women. Requires support
		Feeding 'at the breast' is possible for almost all babies. Lactation aids are available
		Donor milk may pose fewer health risks than formula if supplementation is necessary
Toileting	Options for dealing with infant elimination	Babies who are 'toileted' from birth or soon after may toilet independently sooner than those left in nappies
	The practice of infant toileting	Prompt responsiveness to toileting cues may reduce/prevent 'colic', nappy rash, and other discomfort and distress
Sleeping	Options for infant sleep	Co-sleeping is the biological norm
		Risks of bed-sharing include adults under the influence of drugs or alcohol, babies exposed to tobacco smoke, falls, and anything interfering with a child's airway/breathing (e.g., suffocation by pillows/toys/blankets, soft bedding, crevices)
		Room-sharing protects against SUDI and supports breastfeeding. Babies are safer if put down on their back. The NZ Ministry of Health recommends room-sharing but not bed-sharing
Alloparenting	Alloparenting	Alloparenting (shared care by multiple adults and older children) is the norm for our species
		Caregivers were stable members of the family/ community, not strangers
Play	Multi-age play and interaction	One-on-one 'serve & return' interactions are essential for healthy brain development
		Every interaction with baby is an opportunity for positive touch and emotional connection

Parenting From the Start Part 1

After karakia, introductions, whakawhanaungatanga (relationship-building exercises), and initial questionnaires, the antenatal workshop began with participants choosing a life-sized baby doll to care for during Part 1. These dolls were altered versions of a commercial product which comes in several skin tones – weighted by filling with wheat to approximate a newborn at birth. The dolls feel very 'real', and participants were asked to treat them as live pēpi (infants) for the first half of the workshop by holding them continuously, supporting their head, and alternating their own position as a caregiver might. Figure 5 shows the workshop

pēpi, who served several purposes. Most importantly, they were intended to give the workshop topics substance through embodiment – offering a realistic sense of what it is like to negotiate everyday tasks such as having morning tea while caring for a newborn. By the time participants were gifted their Moby Wraps at the end of the morning they could feel the difference these tools make to tired arms and backs. Secondly, the pēpi allowed participants to practice skills such as putting on a Moby Wrap, or holding a baby in the supported squat which is common for infant toileting. Thirdly, the instruction to keep moving as if holding a pēpi who objects to being put down both normalised the adaptive infant behaviour of wanting to be held, and gave participants explicit permission to stand up, change seats, rock, dance, or whatever they preferred during the multiple hours of the workshop. Like the regular breaks, this helped keep everyone 'fresh'.

Figure 5.

Some of the Pēpi (Baby) Dolls Used in the Parenting From the Start Antenatal Workshops



The academic content of the workshop began with a presentation about why parenting matters. This section explained epigenetics (gene x environment interactions) and the impact of early experiences. Adverse childhood experiences and their correlates were discussed, both in terms of long-term consequences and risk factors for adversity (modifiable and non-

modifiable). Workshop attendees then observed a presentation about early brain development, and findings suggesting that children who are abused and neglected end up with abnormalities in their brain, their stress response system, and their immune system (Danese & McEwen, 2012). Short videos produced by *Harvard University Center on the Developing Child* were interspersed with Keynote slides discussing the development of complex functional networks of brain cells based on experience, leading to emotion regulation and resilience when care is nurturing. Table 10 provides live web links to these resources. The (declining) plasticity of brain development was stressed, so that attendees would be cognizant of their power to influence their baby's brain architecture during the early years. I explained that *Parenting From the Start* was developed to provide support before birth and set parents up for success to support optimal outcomes for tamariki and an "easier road" for parents. This section finished with a slide on "crying as communication", which promoted the idea babies come with "built-in" instructions: that is, infant behaviour and vocalisations provide vital information about what a particular child needs moment-by-moment. Crying was discussed as an evolutionary mechanism which signals something is wrong, and motivates us to solve the problem. I emphasised that it is not stress itself, but *uncomforted* stress that can become toxic in repeated large doses. Babies are too small to deal with big emotions alone, and our presence is protective in situations they find aversive. This reinforced messages from the Harvard videos, and gently challenged the commonly-held Western belief that comforting crying is 'bad parenting' which may 'spoil' children.

Table 10.

Harvard University Videos Shown in Part 1 of the Parenting From the Start Antenatal Workshop

	Name of video (duration)	URL link
1	*Experiences Build Brain Architecture* (2 minutes)	https://developingchild.harvard.edu/science/key-concepts/brain-architecture/
2	*Serve & Return Interaction Shapes Brain Circuitry* (2 minutes)	https://developingchild.harvard.edu/resources/serve-return-interaction-shapes-brain-circuitry/
3	*Toxic Stress Derails Healthy Development* (2 minutes)	https://developingchild.harvard.edu/resources/toxic-stress-derails-healthy-development/

Having covered the impact of parenting on early brain development, we moved to discussing the quality of the relationships that develop between pēpi and their caregivers. Attachment theory was introduced, with information about the precursors of the three organised attachment patterns (secure, insecure-resistant, and insecure-avoidant) as well as disorganized attachment. Further slides summarised the poorer long-term outcomes associated with attachment insecurity. Poverty was acknowledged as an overarching factor that interferes with the development of secure attachment. The workshop mentioned the possibility of change via therapy and/or later positive relationships, to prevent adult attachment status being seen as immovable, but the focus was on the power of caregivers to influence infant attachment from the outset.

Next we moved to considering what babies need, as: "the better parents are at knowing what their baby needs and meeting those needs, the more likely their babies will become securely

attached" (Parenting From the Start, 2018, slide 40). Participants were encouraged to reflect on our lengthy evolutionary origins as mammals (190 million years) and hunter-gatherers (200-300,000 years) and how parenting has changed over the 10-15,000 years since humans began to develop permanent settlements, agriculture, and diversify into modern cultural groups. The theory of the evolved developmental niche (EDN) was outlined, with its emphasis on natural birth, close physical proximity to caregivers around the clock, co-sleeping, extended breastfeeding, frequent positive touch and the absence of negative touch, infant toileting, high social support, alloparenting, and multi-age interaction/play. An example of hunter-gatherer caregiving (from Morelli et al., 2014) was followed by overviews of modern EDN research (Narvaez, Gleason, et al., 2013; Narvaez, Wang, et al., 2013).

I explained that most elements of the evolved developmental niche were alive and well in traditional Māori parenting prior to the arrival of Europeans. Women maintained the generational links by birthing and breastfeeding (de Joux, 2015), which exemplified mana wahine[66] (Tupara, 2013b), and were highly valued within traditional Māori worldviews. Pēpi were kept close day and night and carried by both men and women ('pīkau' or 'waha'). Violence towards children was not acceptable to Māori, and early European observers commented particularly on the lack of physical punishment, and the inclusion of children in multi-age activities (Jenkins et al., 2011). Alloparenting was introduced as a taonga (treasure) Māori have maintained into the present, which was likely common to all our ancestors (Hrdy, 2009). Part 1 of the workshop finished with segments on the value of social support, and how close proximity and babywearing (use of a baby sling or carrier) contribute to early relationships. The overriding theme of the first half was that child-centred sensitive responsive care promotes long-term wellbeing, and the final activity involved small-group discussion about what babies need, and the options we caregivers have for meeting those needs. Thus, Part 1 showed how small, simple actions - such as holding our babies – can bring us closer to the kind of parenting human infants have evolved to expect, and can have profound effects on how our tamariki develop. Babies don't need fancy equipment or specially-trained experts - they just need us.

Parenting From the Start Part 2

The second half of the antenatal workshop followed a baby's journey through pregnancy, labour and birth, and early life: discussing the choices parents and caregivers get to make at each stage. Emphasis was placed on how earlier decisions affect later outcomes and options. An evolutionary bio-psycho-social framework based on research evidence was maintained throughout. For example, the segment on hapūtanga (pregnancy) focused on historical, cross-cultural, and scientific information about care during pregnancy. I summarise this here.

In the world's oldest societies, women maintained "moderate but regular physical activity... throughout pregnancy, especially in the later part" (J. Goldsmith, 1984, p. 207). They did not overwork, but there was no inactivity either. Women in hunter-gatherer and tribal societies walked everywhere, tended their gardens, collected and prepared foods, and swam in the

[66] Mana (noun) refers to "prestige, authority, control, power, influence, status, spiritual power, charisma", while wāhine (noun) refers to women (Moorfield, 2011, online entries).

oceans and rivers. Participants were invited to discuss how the move to urban living and sedentary occupations has changed our lifestyles, and what is likely to happen if we "spend our pregnancies sitting in chairs and lying on the couch?" (Slide 96). Decreased activity and bed rest during pregnancy are not supported by evidence. A 2017 review was quoted, noting inactivity increases the risk of deconditioning, venous thromboembolism, and bone demineralization, and "there is no intervention that we as providers can recommend to pregnant women as impressive in its significant impact on so many maternal and perinatal outcomes" as maintaining regular exercise (Berghella & Saccone, 2017, p. 335). In non-pregnant adults, exercise improves cardiorespiratory fitness, enhances psychological well-being, and results in greater longevity. Participants were informed that evidence from more than 50 randomised controlled trials suggests almost all pregnant women would benefit from exercising regularly throughout pregnancy. Aerobic exercise during pregnancy is associated with lower incidences of gestational diabetes mellitus (GDM), less gestational hypertension (GHTN) and related disorders, fewer preterm births and caesarean sections, and higher likelihood of vaginal birth (Berghella & Saccone, 2017). Incorporating gentle to moderate exercise into daily life was introduced as one of the most important things Western women can do to improve their birth outcomes.

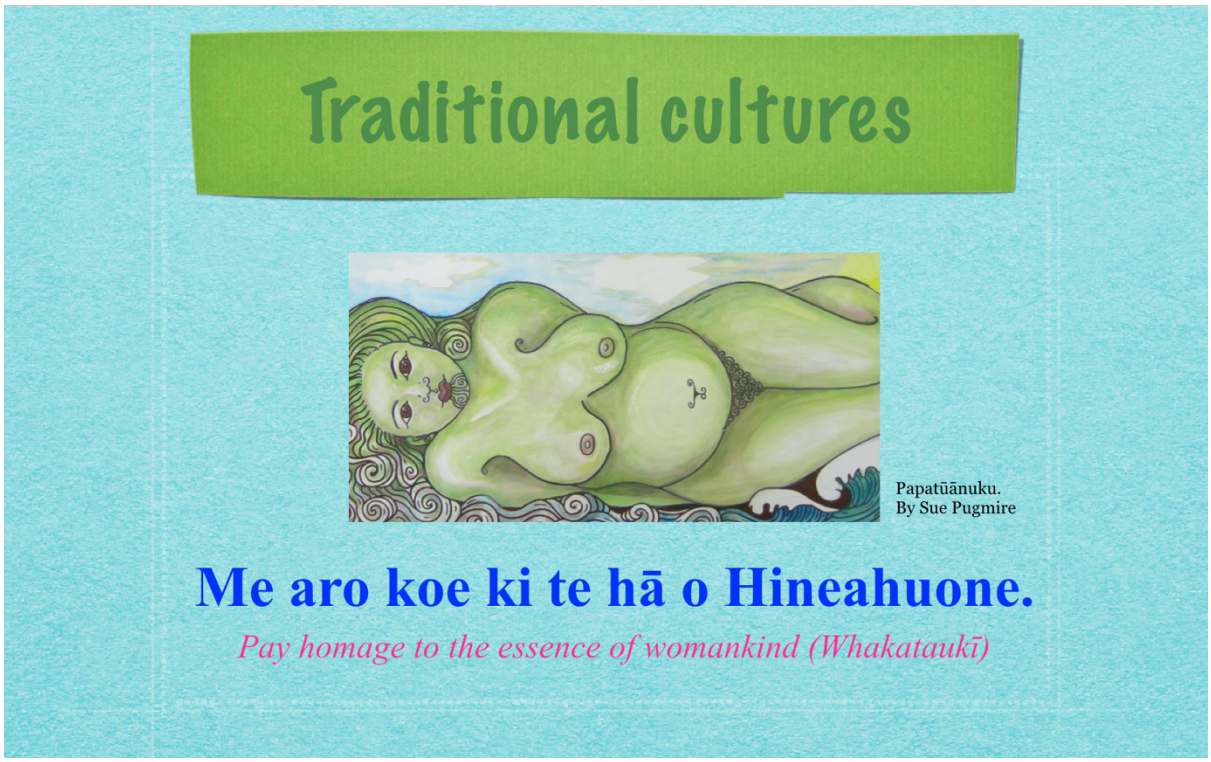
With this fitness as a backdrop, almost all traditional cultures encouraged women to keep moving (or even working) during the first part of labour. Research in modern populations suggests that active birth may shorten labour and reduce pain (Desseauve et al., 2017; Mtatina et al., 2022; W. R. Trevathan, 2012). The workshop section on whānautanga (birth) therefore mentioned active birth practices (Figure 6), and other traditional tools to facilitate labour, such as massage, lubrication of the perineum, and use of water. Waterbirth was not a universal ancestral practice, but it promotes physiologically-normal childbirth (vaginal and drug-free) of the kind considered important within the evolved developmental niche.[67] The

[67] Choosing to labour or birth in a modern birthing pool provides a physical space less likely to be disturbed by health professionals and other birth attendants. There is an implicit expectation that consent should be sought before touching somebody who is immersed in water. These functions of privacy and protection of female autonomy may be similar to other cultural rituals which surround birth cross-culturally (J. Goldsmith, 1984; Tikao, 2013). Choosing a water birth also provides some assurance unnecessary medical interventions will not be offered, as most are inconsistent with being in a birthing pool. Experimental research suggests use of water is an effective and low-risk option for labour and birth. An initial Cochrane Review of 12 randomised controlled trials involving 3,243 women found immersion in water during the first stage of labour reduces the duration of the first stage as well as reducing use of epidural and spinal pain relief (478/1254 versus 529/1245; risk ratio (RR) 0.90; 95% confidence interval (CI) 0.82 to 0.99, six trials), while birthing in water or using water during the second stage of labour is associated with significantly higher maternal satisfaction with the birth experience (RR 0.24; 95% CI 0.07 to 0.80). Immersion in water reduced the average labour by 32 minutes with no evidence of adverse effects (mean difference = -32.4 minutes; 95% CI -58.7 to -6.13; Cluett & Burns, 2009). More recent reviews and meta-analyses have examined maternal and infant outcomes of immersion hydrotherapy prior to birth and waterbirth (Burns et al., 2022; Edwards et al., 2023), as well as qualitative experiences of labour (Clews et al., 2020). Some reviews focus on specific groups such as those birthing in hospital (Vanderlaan et al., 2018), and the second Cochrane Review examines RCTs exclusively (Cluett et al., 2018). Immersion in water during labour has consistently demonstrated benefits for healthy birthing women. The largest review includes 36 studies (N = 157,546 participants) across a range of birth settings: obstetric units (31 studies, n = 70,393), midwife-led settings (4 studies, n = 61,385) and mixed setting (1 study, OU and homebirth, n=25,768). In this review, immersion in water during labour significantly reduced pharmacological pain relief (epidural k=7, n=10,993; OR 0.17 95% CI 0.05 to 0.56; injected opioids k=8, n=27,391; OR 0.22 95% CI 0.13 to 0.38), as well as maternal pain (k=8, n=1,200; OR 0.24 95% CI 0.12 to 0.51) and postpartum haemorrhage (k=15, n=63,891; OR 0.69 95% CI 0.51 to 0.95). Increased maternal satisfaction was statistically significant (k=6, n=4,144; OR 1.95 95%

whānautanga section of the workshop also included discussion of a short birth video showing a quiet home waterbirth, data about the beneficial presence of lay companions during labour, and mention of the importance of good nutrition. The intention of this, like all sections, was to empower whānau by highlighting their multiple choices and the associated outcomes.

Figure 6.

Parenting From the Start Antenatal Workshop Slides 110 and 115



CI 1.28 to 2.96), as were the odds of an intact perineum (k=17, n=59,070; OR 1.48; 95% CI 1.21 to 1.79) with water immersion[67] (Burns et al., 2022). Research on waterbirth supports it as a safe option for healthy pregnancies, although there are ongoing methodological limitations such as small sample sizes in many studies (Taylor et al., 2016). Birthing in water increased the risk of cord avulsion ('cord snapping'; OR 1.94 95% CI 1.30 to 2.88: an absolute difference of 4.3 per 1000 vs 1.3 per 1000) compared to land birth in one review (Burns et al., 2022), reduced risk of shoulder dystocia and postpartum hemorrhage in another review (Cristina et al., 2022), and showed no differences in most neonatal outcomes (Burns et al., 2022; Cluett et al., 2018). A review and meta-analysis of waterbirth involving 6 trials (706 birthing people ≥ 37 weeks' gestation) found that augmentation of labour (41.7 vs. 84.7%, $p < 0.0001$) and anesthesia (10.5 vs. 72.4%, $p < 0.0001$) were significantly less common among those birthing in water, with no differences in estimated blood loss, postpartum haemorrhage, perineal tears, episiotomy, mode of delivery of perinatal outcomes compared with land birth. Labours were shorter with water birth ($p = 0.04$; Length of first stage $p < 0.00001$, third stage $p = 0.02$), maternal satisfaction was higher ($p = 0.01$), and pain scores lower ($p = 0.003$) (Edwards et al., 2023). A review and meta-analysis of infant outcomes (29 studies) found no significant differences in neonatal mortality, admission to neonatal or special care units, Apgar scores, umbilical cord gases, or rates of infection between water and land births (Taylor et al., 2016).



Note. Image of woman dancing by Ria Pugmire, used with permission.

Stress was another factor covered in this part of the workshop, as it is a key prenatal variable impacting maternal and infant health and wellbeing. Endogenous chemicals and processes associated with both everyday stressors, and catastrophic events, are correlated with negative infant outcomes when mothers are exposed during pregnancy. Meta-analysis of 42 studies (N = 65,814,076 women) by Caparros-Gonzalez and colleagues (2021) found that infants whose mothers reported high levels of prenatal stress had increased risk of psychiatric (odds ratio of 1.28, p <.02) and medical (OR = 1.24, p <.01) disorders. Significant overall effect sizes were found for autism spectrum disorder (OR=1.45, p <.01), obesity, and infant colic (OR=1.20, p <.02). Other large meta-analyses suggest maternal prenatal stress (MPS) is significantly associated with reduced infant birth weight and gestational age (based on 88 prospective studies, N = 5,889,930, d =−.12; Bussières et al., 2015) and increased risk of congenital heart disease among infants (ORs = 1.86 or 2.11 depending on the measure of stress used; Gu & Guan, 2021). Meta-analysis of 55 longitudinal studies also suggests a small but statistically significant relationship (r = .16) between mothers' prenatal distress and children's externalizing behaviour years later (Tung et al., 2023). Proposed mechanisms for these effects are epigenetic, including changes to the functioning of the HPA axis impacting intrauterine and foetal cortisol levels, regulatory functions such as sleep and intestinal activity, immune system functioning, and the sympatho-adrenomedullary system which regulates response to acute stress and return to homeostasis (Bussières et al., 2015), although genetic factors cannot be ruled out.

Stress after birth also appears detrimental, with meta-analyses finding that lower socioeconomic status, family income, or maternal education, poorer maternal mental health (specifically internalizing symptoms), and higher parenting stress are all associated with lowered sensitivity measured by the *Maternal Behaviour Q-Sort* (Booth et al., 2018). In this

case it appears to be the mother who is directly affected, with babies subsequently impacted by the quality of caregiving available. Another meta-analysis of 133 mostly cross-sectional studies found that the significant links between parenting stress and child behaviour problems remained stable up to age 18 years (Barroso et al., 2018). Parenting stress was more strongly related to externalizing (n = 30,695, weighted effect size r = 0.57, d = 1.39) than internalizing (n = 17,727, weighted ES r = 0.37, d = 0.79) problems among children, and was highest where children had autism or developmental delay. The relationship may be bidirectional, with parental stress and child behaviour affecting one another over time as well as being impacted by other variables such as poverty (Barroso et al., 2018).

In light of these findings, practical suggestions for self-care common in hunter-gatherer contexts were mentioned: rest and relaxation, massage, and emotional support. I focus here on massage as an example of the information provided to participants. As noted in Chapter 2, massage during pregnancy and labour is a tradition within Te Ao Māori (Tikao, 2013) as in many of the world's oldest societies (J. Goldsmith, 1984). Scientific research suggests it is associated with many benefits: decreasing depression and anxiety, leg and back pain, prenatal complications, rates of premature delivery and improving birth outcomes (Field, 2010; Field et al., 1997, 2004, 2005, 2009, 2010; Field, Grizzle, et al., 1996). Expectant mothers receiving 20 minutes of massage a week had 75% fewer pre-term babies and 80% fewer low-birthweight babies (Field et al., 2009). Massage during labour (15 minutes per hour) was associated with 3-hour-shorter labours on average, less medication use during labour, and lower cortisol levels in mothers and babies (Field, 2010). Figure 7 shows one of the workshop slides from this section

Figure 7.

Slide 116 from the Parenting From the Start Antenatal Workshop



Inclusion of concepts from traditional Māori and cross-cultural parenting consistent with our human evolved developmental niche was part of the drive to make *Parenting From the Start* culturally-appropriate for Aotearoa. In the same vein, participants were prompted to consider whether they wanted to birth the placenta (whenua) naturally in their own time, or to be given medication and have their third stage of labour 'actively managed' by health professionals. We discussed how the iho (umbilical cord) can be clamped immediately, or delayed so the newborn receives all of their cord blood. In traditional societies women often stood up or moved around soon after birth, which may have helped them birth the whenua (placenta) easily (J. Goldsmith, 1984). Leaving the umbilical cord intact until it has stopped pulsating helps ensure babies get plenty of oxygen while their lungs are starting to function. Left alone, the umbilical cord will continue to pump blood to the just-born baby for some minutes, increasing infant blood volume by up to 30 percent (Wiberg et al., 2008). This reduces the need for blood transfusions, and may increase iron stores during the first 4-6 months of life.

Hereafter participants got into small groups to brainstorm people they would and would not want to be present at their birth. Gaskin (2008) suggests that the people who are present can change your experience of labour - even make it slower or more painful - so it is worth thinking seriously about who you will invite, and why, and what kind of preparation they might need in order to be a help rather than a hindrance. The context in which births took place amongst hunter-gatherer and traditional farming societies was "conducive to the relaxation of the mother" (Goldsmith, 1984, p. 207). Birth was understood as a normal and natural part of life, so occurred in a familiar place and started in its own time. Women were supported by well-known others, and they were active participants in the process. Workshop participants were asked what they thought might happen "if modern women adopted these same contextual factors when giving birth?" (Figure 8).

This section ended with a slide showing birth outcomes from 'The Farm', an American intentional community with an onsite midwifery centre based on women-centred views valuing natural birth (Gaskin, 2008). Outcome data on the 2,028 women seen by Farm midwives between 1970 and 2000[68] suggest that modern women who take control of their birth experience and have access to good food and exercise, positive role models, and excellent care throughout pregnancy and birth need very little in the way of intervention. Of these women, 95% had successful homebirths, only 1.4% had caesarean sections, 5.4% of births were induced, 0.5% required forceps to deliver the baby, and neonatal mortality was 0.59% (this includes 0.2% lethal abnormalities and 0.2% postnatal deaths).[69] The 15 sets of twins were all born vaginally, and there were zero maternal deaths (Gaskin, 2008), In addition, 99% of these women breastfed, and only 1% reported postpartum depression. By way of comparison, NZ homebirths made up only 5% of total births in 2012, when the perinatal death

[68] This outcome data includes every woman seen during this period, even if they planned to birth in hospital, had risk factors, or were transferred during labour.

[69] Of the 4 postnatal deaths at The Farm, one was a crib death, 2 were due to probable infections, and 1 premature baby died from hyaline membrane disease after a hospital delivery in 1972. Of the 4 infant deaths occurring during labour, 2 were due to placental abruptions, and 2 were due to prolapsed cords (one involving a mother whose legs were paralyzed from polio, whose cord prolapsed at the first sign of labour) (Gaskin, 2008).

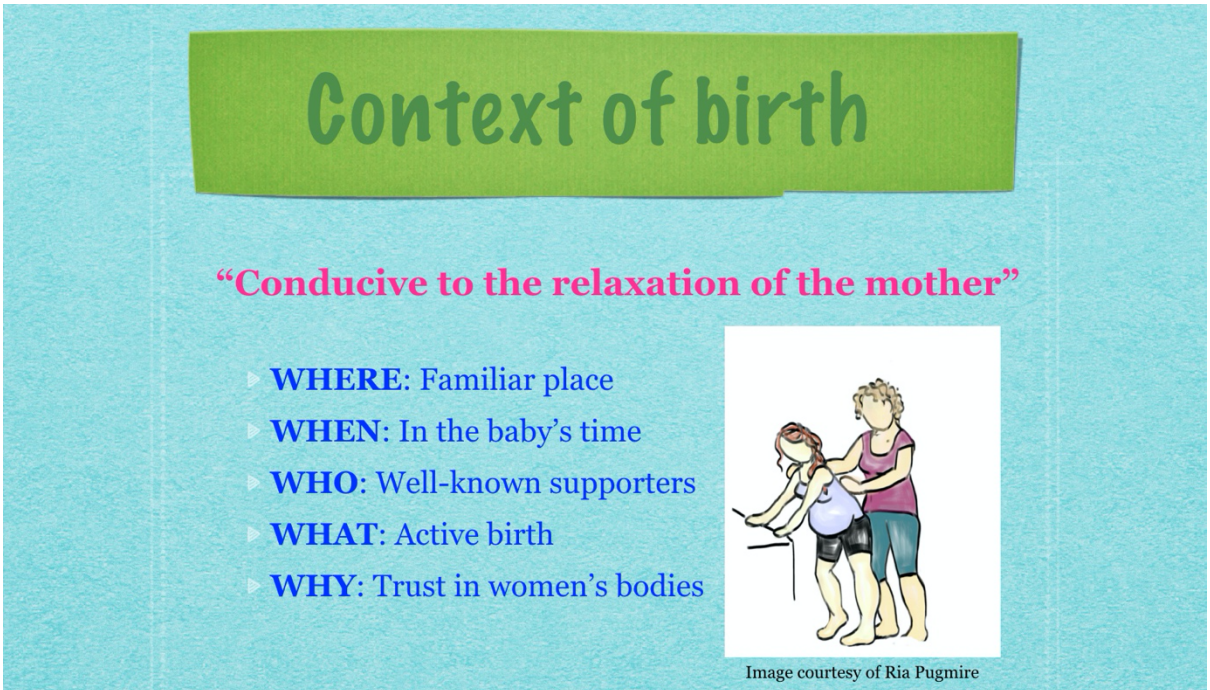
rate was 0.97% (total) births[70] (Manatū Hauora Ministry of Health, 2015). At Palmerston North Hospital the same year, 22.7% of labours were induced and 30% of women experienced caesarean surgery (18% 'emergency' and 12% elective). Rates of antenatal and postpartum depression in NZ are approximately 8.5% during the third trimester of pregnancy and 5% nine months after birth (Underwood et al., 2017).

Figure 8.

Slides 118 and 119 from the Parenting From the Start Antenatal Workshop



[70] The perinatal death rate of 0.97% (total) births is inflated because it doesn't distinguish between terminations after 20 weeks and babies who died for other reasons before or after birth (up to 28 days old). However, it's the closest statistic I could find (Manatū Hauora Ministry of Health, 2015). If we use the neonatal statistic (0.31%) then we are excluding stillbirths, which unfairly disadvantages *The Farm* data.



The evolutionary value of 'natural' vaginal birth, close physical proximity, co-sleeping, and breastfeeding were highlighted, and infant toileting was explained, consistent with the reviews in the previous chapters. In all these areas, the intention was to consider the match with and/or deviations from the evolved developmental niche and associated impacts on child development. A point of difference of *Parenting From the Start* was the explicit acknowledgement that women have evolved to birth babies safely. In ancestral environments, mothers who died in childbirth left behind babies who were much less likely to survive (Hrdy, 2009). Giving birth safely thus provided a huge adaptive advantage, meaning women were probably naturally selected to be good at it, despite the challenges of our large-brained infants. Even in medieval England (450 to 1500 AD), where poor nutrition, poverty, over-crowding, and little knowledge of hygiene were the norm, only 2.5% of women (1 in 40) are estimated to have died in childbirth (Leyser, 1999) – countering the common assumption that birth was dangerous for the majority. Among hunter-gatherers, death in childbirth is often described as a leading cause of mortality among adult women, but the absolute numbers still affect a minority. Hewlett (1991) reports that 9 of 102 deaths recorded among Aka women 18-45 years were related to childbirth complications,[71] and that Aka men in their early 20s were four times more likely to die than women[72] (Hewlett, 1991). Evidence from the best available sample of non-industrial populations (N = 3,327) suggests seventy percent of

[71] This means 8.8% of deaths were related to childbirth, not 8.8% of the adult female population died in childbirth. The actual mortality rate for this age group is not reported by Hewlett (1991), but the best evidence available suggests that 57% of hunter-gatherer children survive to age 15 years, and of those, most people (64%) reach age 45. Women aged 45 years have a further life expectancy of another two decades (an additional 20.7 years), although the exact numbers vary across groups (Gurven & Kaplan, 2007).

[72] The causes of death for young Aka men are often risky activities such as climbing a large tree to get honey or hunting an elephant. Violent deaths, which disproportionately affect men, are much lower for Aka than for many non-industrial cultures (Hewlett, 1991).

deaths are due to illness (respiratory 20%+, gastrointestinal 5-18%), violence and accidents account for another 20 percent of deaths (variable across populations), and degenerative diseases account for only 9 percent of deaths (Gurven & Kaplan, 2007). Childbirth is not mentioned among the listed causes. Data for Aka (N = 669) show 92.2% died from illnesses, 2.5% from degenerative diseases, and 5.4% from all violence and accidents (Hewlett, van de Koppel, & van de Koppel, 1986; cited in Gurven & Kaplan, 2007). Many modern causes of death were rare or absent in modern hunter-gatherer populations and prehistoric foraging populations, which involved greater physical activity and more diverse food sources (Gurven & Kaplan, 2007; Larsen, 1995).

Two card-based activities from Part 2 of the workshop illustrate the depth of information participants were able to engage with during this brief intervention. Between them, the *Timeline* and *Birth Outcomes* exercises allowed participants to reflect on the history and present state of birth and infant care in Pākehā and Māori cultures.

Timeline Activity

The timeline activity was completed at the start of Part 2, and highlighted changes in birth and feeding practices since the first Māori and Pākehā arrived in Aotearoa from around A.D. 250-1150 and 1769-1800 respectively. As noted in Chapter 2, the provision of culturally-sensitive pregnancy services for Māori requires an awareness of our colonial history and present, while knowledge of traditional birthing practices may empower those who have suffered historical trauma (Tikao, 2020). A set of 98 single-sided laminated cards displaying key statistics and events were distributed to participants, who worked together to lay them out in chronological order and comment on anything they found interesting. Of these cards, 7 related to general social or medical history,[73] 72 related to birthing practices, and the remaining 19 to infant feeding. Most related to the period after Te Tiriti o Waitangi was signed in 1840. The timeline thus created was used as the basis for initial discussion about the impact of colonisation on Māori and variability in attitudes and actions over time. For example Figure 9 shows slides which briefly outline first contact between the Indigenous and colonising cultures in Aotearoa. From a starting point of around 125,000 to 175,000 individuals, the Māori population reached its lowest point in 1896, with only 42,113 survivors of wars, germs, and racist policies, although there was a steady rise from this point onwards (Belich, 1996).

[73] Medical care in colonial Australasia did not empower women. A surgeon visiting NZ in the late 19th century reported that 32% of all surgeries performed in Adelaide between 1885 and 1895 were ovariotomies. Ovariotomy (the removal of the ovary, i.e., female castration) was seen as a 'cure' for most female problems: "troublesomeness, eating like a ploughman, masturbation, attempted suicide, erotic tendencies, persecution, mania, simple 'cussedness'" and painful menstruation (Donley, 1998, p. 55).

Figure 9.

Slides 003 and 004 from the Parenting From the Start Antenatal Workshop





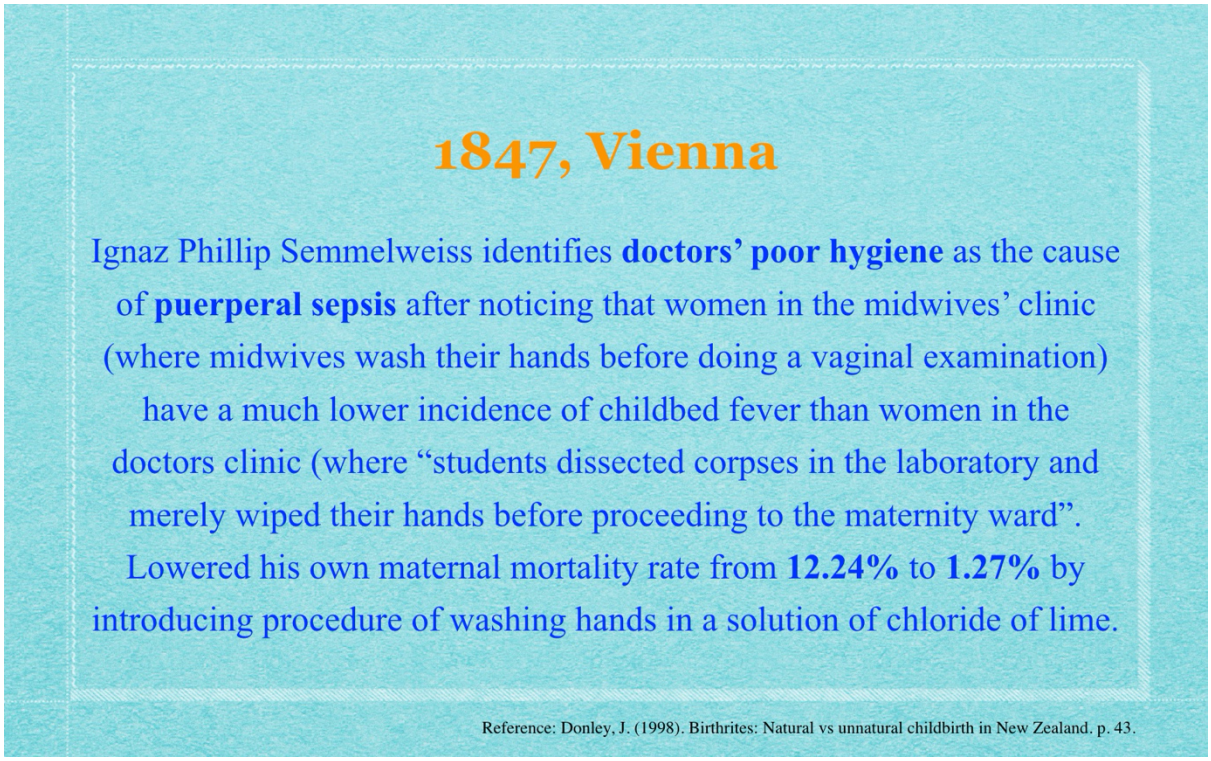
Maternity and Social Change in Aotearoa

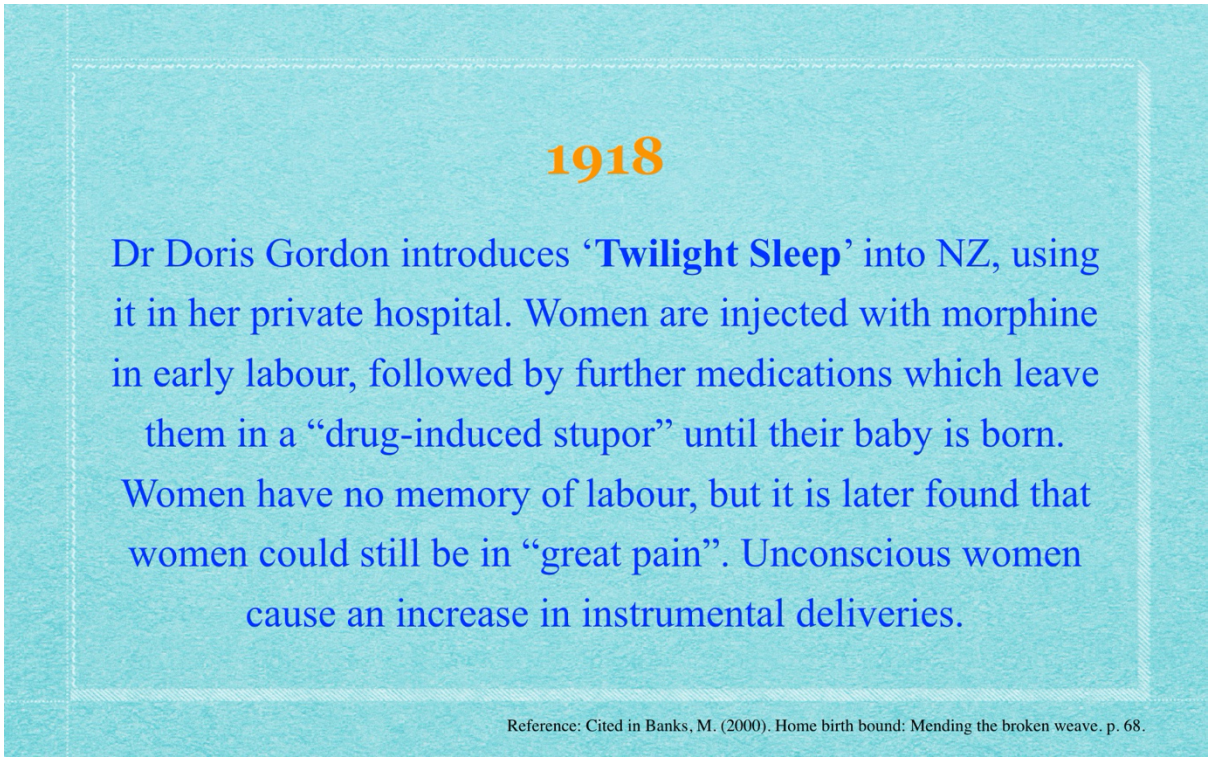
As well as providing general historical context about colonisation, the *Timeline Activity* provided participants with background knowledge about the change from the tohunga and lay midwives who attended Indigenous and settler women (Donley, 1998) to the current maternity system operating in Aotearoa. In 1880 all women in New Zealand gave birth at home, as they had since and prior to first contact (Banks, 2000). The number of New Zealand women dying in childbirth was 3.9 per 1000 live births (0.39%) at this time, although the maternal mortality rate for Māori was twice the non-Māori rate. In 1882 the first Pākehā woman birthed in hospital in New Zealand, and by 1885 the maternal mortality rate had risen to 0.73%. By 1920 a third of babies (35%) were delivered in hospital, and one year later New Zealand's maternal death rate was the second-highest in a USA list of nations. An official enquiry highlighted the principal cause of death as puerperal sepsis (childbed fever) (Banks, 2000). Ignaz Phillip Semmelweiss' text on the causes and prevention of puerperal sepsis was published in 1861, 14 years after he identified the problem (see Figure 10), but many medical practitioners refused to believe they could be "carriers of infection" (Banks, 2000, p. 66). The *Midwives Registration Act* of 1904 resulted from accusations that midwives were "dirty" and "dangerous", although evidence for this was lacking. Failure to wash hands and change clothes between patients combined with invasive practices such as vaginal examinations and surgical procedures meant it was doctors who were responsible for the majority of maternal deaths (Banks, 2000). In 1921 the NZ Minister of Health advised women to avoid both anaesthetics and doctor attendance during labour if they wanted to avoid puerperal sepsis (Banks, 2000; Donley, 1998).

By 1926 more than half of New Zealand births (58%) took place in hospital, and doctors were commonly involved regardless of the location. The institutionalisation of birth and introduction of labour medications such as 'Twilight sleep' led to a steep rise in instrumental deliveries. Department of Health statistics from the same year show that forceps deliveries occurred in only 3.8% of the midwife-led St Helens hospitals, but were used in up to 56.8% of births at some private hospitals run by doctors, with an average outside St Helens of 15.28% (Banks, 2000). Dr Doris Gordon's private hospital was threatened with closure due to overuse of forceps, and in 1927 Gordon founded the NZ Obstetrical Society to promote doctors interests, ensuring they had "freedom to give what pain relief they saw fit" and to prevent the Health Department developing a State Maternity Service staffed only by midwives (Donley, 1998, p. 42). While hospital midwives led by the NZ Health Department adopted strict measures to prevent the spread of infection in 1925, it was not until the 1930s that doctors and the Obstetrical Society accepted that puerperal sepsis was an acquired infection (rather than something that had been lying dormant within the women themselves) and general hygiene measures in hospitals were improved. The specific types of bacteria that cause puerperal sepsis were identified in 1935 (Banks, 2000). While unanimity regarding hygiene has grown, political tensions between those advocating for natural versus medicalised childbirth continue to the present.

Figure 10.

Slides 008 and 022 from the Parenting From the Start Antenatal Workshop





Despite the growing power of medical professionals at the expense of midwives, the NZ Health Department continued to promote childbirth as a normal physiological process (Donley, 1998) and in 1937 still acknowledged traditional Māori birthing practices (such as

birthing in raupo whare – houses made of bull-rushes near fresh running water) as healthy options (Banks, 2000). By 1938 hospital birth was the norm for Pākehā women. But while 87% of New Zealand women overall went to hospital, most Māori women (83%) still birthed at home. The Māori population in 1940 had rebounded to 86,000, but social change accompanying colonisation meant 36% of Māori now lived in houses that were deemed unsuitable for human habitation, 45% had unsafe water supplies, and 20% lived below the poverty line. The increased use of hospital by Pākehā and decreased standard of living for Māori coincided with the infant mortality rate peaking at 15% (153.26 deaths per 1000 live births; Donley, 1998). Despite an absence of evidence that hospital birth improved outcomes, and Department of Health support for homebirth as an acceptable option,[74] Plunket advice from the 1940s claimed hospital birth was "generally safer for mother and baby", influencing generations of women (Banks, 2000, p. 73). Rapid increases in the use of public hospitals were also related to the government-subsidised 'maternity benefit' introduced in 1939, which provided free hospital care (Banks, 2000). By 1947 around half of Māori women gave birth in hospital, and the proportion was around 90% by 1959 (Tupara, 2013b). The 1951 *Social Security Amendment Act* guaranteed payment for anaesthetists, ensuring availability of pain-relieving drugs for all women birthing in hospital (Banks, 2000) and further cementing the role of doctors in birthing. Perceived deficiencies resulting from medicalised birth were highlighted by the formation of the consumer-led *Natural Childbirth Group* the same year, to promote home birth and natural birth in maternity homes, advocate for fathers to be present during birth, and fight for babies to remain with their mothers.[75] By 1967 the vast majority (95%) of Māori were birthing in hospital, without improvements in outcomes. Maternal mortality was three times that of non-Māori women, and infant mortality was 4 times the rate for non-Māori babies (Banks, 2000; Tupara, 2013b).

Historian James Belich notes that the medical profession were extremely successful at taking control of the birth process and health care in Aotearoa. "Helped by the state, doctors asserted their dominance and improved their status and incomes from the 1890s", assisted by tightening gatekeeping and registration and "increasingly powerful professional organisation" (Belich, 2001, p. 161). Competing medical groups were offered the choices of "subordination or marginalisation. Nurses and chemists accepted the former; homeopaths the latter; midwives a bit of both" (Belich, 2001, p. 161). Belich concludes that "The extent to which medical systems are socially constructed can be exaggerated, but an exhaustive recent study does seem to show that doctoral dominance was due at least as much to superior politics as to superior medicine" (Belich, 2001). From the mid 1970s, however, international and local 'natural' and 'active' birth movements called for women and families to reclaim birth and control over their bodies and choices. There was a 'flax roots' demand for more midwifery autonomy and an assertion of women's rights to birth at home and/or without 'professional' intervention (Simmonds, 2014). The *Nurses Amendment Act* in 1990 meant that midwives could again practice autonomously throughout pregnancy, labour, and the early postpartum period and attend births, including home births, as independent practitioners. By

[74] A free 1947 publication available to NZ birthing women devoted 9 of the 31 pages to home birth preparations.
[75] The *Natural Childbirth Group* developed a year later into the *Natural Childbirth Association*, but the name was changed in 1952 to *Parents Centre* in response to "scornful and intimidating" reactions from doctors and nurses. Within 5 years the Wellington branch has dropped its aim of supporting home birth as being "likely to provide a focus for yet further medical hostility" (Dobbie, M., 1990 The trouble with women: The story of Parents Centre New Zealand, pp. 18-21, cited in Banks, 2000, p. 126).

2008 midwives were the Lead Maternity Carers (LMCs) for about 80% of New Zealand pregnancies (Kutinova, 2008). Nevertheless, in 2012, only 5 percent of women in the Manawatū gave birth at home, in line with national averages (Midcentral District Health Board & Whanganui District Health Board, 2015).

The Rise of Medicalised Birth

In light of this history, the transition to hospital birth appears ideological rather than scientific, with the first Cochrane Review on planned place of birth noting the change "was not supported by good evidence" (Olsen & Jewell, 2009, p. 2). What followed was a steady rise in medical interventions such as artificially inducing labour rather than waiting for it to begin in its own time – taking birth further from the human evolved developmental niche. The official rate of induction in the U.S. in 2005 was 22.3% - more than double the 1990 rate of 9.5% (Buckley, 2009). In England (2005 to 2006) and Canada (2001 to 2002), induction rates were around 20 percent. Australasian research suggests that rates of induction have been increasing for decades. A study of all births from 32 to 42 weeks gestation in New South Wales between 1998 and 2007 (N = 739,904 deliveries) found the proportion of labours induced increased from 25.3 to 29.1% over that decade alone, with increasing use of oxytocin alone (47.2 to 50.9%) and in combination with prostaglandin (18.9 to 24.4%) as the mechanism for the induction, and decreasing use of prostaglandin alone from 33.5 to 23.8% (Mealing et al., 2009). Induction of labour may increase the risk of caesarean in nulliparous women. Twenty five to thirty percent of first-time mothers whose labour is induced artificially can be expected to end up with a caesarean section (Robson et al., 2013). In the United States the caesarean rate quadrupled from 5.5% of all births in 1970 to 25% in 1987 (Flamm, 1990), with a further increase of 9.5% between 1990 and 2018 in Northern America (Betrán et al., 2021). This pattern has been repeated worldwide, with an average increase of 19% from 1990 to 2018 (Betrán et al., 2021). Analysis of the most recent data (2010-2018) from 154 countries found caesarean rates have risen in all areas, but most steeply in the mid-range 'less developed' countries (22.9%) and most slowly in 'least developed' countries. Average caesarean section (CS) rates in the most recent period (2010-2018) ranged from 5% in sub-Saharan Africa (an increase of only 3.6% since 1990) to 42.8% in Latin America and the Caribbean (Betrán et al., 2021). The authors note that in some areas surgical births have increased by more than 40 (China, Dominican Republic, Romania, Mauritius, Georgia and Paraguay) or 50 (Turkey, Andorra and Egypt) percentage points over this period. New Zealand statistics for inductions and surgical births (Table 11) illustrate the dramatic changes in birth practices since 1990.

Table 11.

Inductions and Surgical Births in Aotearoa New Zealand (1990 to 2015)

Intervention	1990	1995	2000	2005	2010	2015
Inductions (%)	6	18.6		21.6[76]		24[77]
Caesarean sections (%)	12[78]	15.8	20.8	22.8	23.6	25.5

Note: Data sourced from Banks (2000) and Ministry of Health reports (Betrán et al., 2021)

Caesarean section (CS) is a "life-saving" procedure where a baby cannot be born safely or remain in the womb, but it brings with it immediate and long-term risks (Betrán, Ye, et al., 2016, p. 2), including hemorrhage, sepsis, pulmonary embolism, and death (W. R. Trevathan, 2012). CS is a major operation that involves "cutting through all layers of the abdominal wall and entering the body cavity that contains vital internal organs such as the stomach and intestines" (Flamm, 1990, p. 7). Gaskin notes that women who chose 'elective' caesareans in the recent past were nearly three times as likely to die as women who choose a vaginal birth, despite there being no medical reason for the surgery (Gaskin, 2008). With repeat caesareans, a woman still increased her risk of dying threefold, and had approximately 5 to 10 times the chance of complications such as infection, hemorrhage, hysterectomy, ectopic pregnancies, injuries (to the bladder, intestines, or urethra), infertility, and dangerous placental complications. The more caesareans a woman had, the more these risks increased (Flamm, 1990; Gaskin, 2008). Caesarean section also increased the risk of harm to the baby; accidental laceration (nearly a 2% chance, increasing to 6% of breech presentations), respiratory distress (a major cause of neonatal mortality), and prematurity, because even repeat ultrasound scans cannot guarantee the baby is really mature enough to be born (Gaskin, 2008). The body of research comparing safety of repeat caesareans and VBACs (vaginal births after caesarean) suggests that a VBAC is by far the safer choice and that around 78% will result in successful vaginal births (Flamm, 1990). In practice, many women will end up with multiple caesarean sections. For example, 2011 data from the National Maternity Hospital in Dublin, Ireland, show 61% of women (571 out of 936) with a previous caesarean who had a single infant at or after 37 weeks gestation experienced another caesarean in their subsequent pregnancy. While these risks have been minimised in high-income countries to the point that caesareans are considered as safe as vaginal deliveries in terms of short-term harms, even elective caesareans retain higher risk in low- and middle-income settings (Keag et al., 2018). In countries such as Aotearoa where some groups, such as Māori, experience lower socioeconomic status and worse health outcomes, this raises questions regarding the most appropriate population for comparison when it comes to the safety of surgical birth.

At a population level, caesarean sections are most protective when they are neither underused nor overused (Betrán et al., 2021). Thus, "many countries face a double burden related to CS (i.e., unmet need of CS coupled with CS provided unsafely) while others, mostly due to inequity in health, face a triple burden (i.e., the double burden that affects a fraction of the population is aggravated by overuse of CS in another fraction of the population)", with

[76] 2003 statistic from Banks (2000).
[77] 2013 statistic from Banks (2000).
[78] 1989 statistic from Banks (2000).

the latter wasting financial and human resources (Betrán et al., 2021, p. 2). In 1985 an expert group convened by the World Health Organization (WHO) synthesised available evidence on international perinatal mortality rates and appropriate technologies for birth and concluded "there is no justification for any region to have a caesarean section rate higher than 10–15%" (p. 158) and "The induction of labour should be reserved for specific medical indications. No region should have rates of induced labour higher than 10 per cent" (B. Moore, 1985, p. 159). In 2014 a subsequent WHO meeting confirmed this position based on a systematic review and ecological analysis, again noting that "at a population level, CS rates higher than 10% were not associated with reductions in maternal and newborn mortality rates" (Betrán, Torloni, et al., 2016, p. 667). In 2007 the caesarean rate in Australia was 30.9% (Shorten, 2010). In 2014 the Manawatū region of Aotearoa had almost identical rates (Midcentral District Health Board & Whanganui District Health Board, 2015). Thus, while caesarean sections may be difficult to access in low-resource settings, high-resource settings such as New Zealand are associated with unnecessary caesarean deliveries to the detriment of some mothers and babies (T. Zhang et al., 2019).

Concerns about the overuse of caesarean sections are based not only on low perinatal mortality in populations with low caesarean rates (B. Moore, 1985) but also on increased risks of negative long-term outcomes among children delivered surgically. A systematic review of RCTs (k = 1) and large (>1,000 participants) prospective cohort studies with at least one-year follow up in high-income countries (k = 79) involving 29,928,274 participants found that compared with vaginal delivery, caesarean delivery was associated with benefits and risks. Significantly decreased risks of urinary incontinence (OR 0.56) and pelvic organ prolapse (OR 0.29) in the mother after a caesarean section were balanced against significantly increased risks of miscarriage (OR 1.17) and stillbirths (OR 1.27) as well as placenta previa (OR 1.74), placenta accreta (OR 2.95), and placental abruption (OR 1.38) in subsequent pregnancies. Children delivered by caesarean had significantly increased risk of asthma up to the age of 12 years, and obesity up to the age of 5 years (Keag et al., 2018). A more recent systematic review and meta-analysis of 61 studies (67 independent samples) covering 20,607,935 births found that children born by caesarean section had significantly increased risk of autism spectrum disorders (OR, 1.33; I2 = 69.5%) and attention-deficit/hyperactivity disorder (OR, 1.17; I2 = 79.2%) compared with children born vaginally (T. Zhang et al., 2019). Possible biological mechanisms proposed to explain these different outcomes include altered development of the immune system due to colonisation of the microbiome with different bacteria, altered stress response, and epigenetic changes related to DNA methylation. This second comprehensive review across 19 countries found comparable risks of neurodevelopmental disorders whether caesareans were classified as emergency or elective, suggesting that underlying medical issues were not responsible for the correlations[79] (T. Zhang et al., 2019).

[79] The small numbers of studies on some neurodevelopmental outcomes is a current limiting factor in this area. While correlations between caesarean delivery and later depression and psychotic disorders were nonsignificant, relationships with intellectual disabilities, Obsessive Compulsive Disorder (OCD), and tic disorders all became statistically significant with the removal of a single outlier study from the meta-analysis, suggesting that further research may link a greater variety of neurodevelopmental disorders to surgical birth. In contrast, assisted vaginal delivery (e.g., using forceps) increased the risk of tic disorders, but no other categories of neurodevelopmental disorders (T. Zhang et al., 2019).

The increased and increasing rates of labour 'augmentation', instrumental (e.g., forceps), and surgical birth have been explained in terms of a 'cascade of intervention' which is likely to occur in institutional settings (Buckley, 2009). For instance, an Australian retrospective cohort study (N = 7,459) excluding mothers with previous surgical deliveries and private health insurance and adjusting for 11 potential confounders found that the risk of caesarean section was doubled when women 38 years and over had their labours induced, whether they were expecting a first or subsequent baby. Without induction, the risk of caesarean section, and likelihood of unassisted vaginal birth were similar to women under 38 years, while instrumental deliveries were significantly less likely among older than younger birthing women whose labours were not induced[80] (Dunn et al., 2017). Examples of this cascade of intervention relating to the use of epidurals (Buckley, 2009), routine vaginal examinations, and surgical birth were provided in the workshop alongside physiological descriptions of the hormones relevant to birth and breastfeeding. Detailed information relating to biological and social factors influencing birth was intended to provide sufficient knowledge to facilitate informed choices by the expectant parents attending the workshop. In order for these choices to be meaningful it was important to supplement this information with descriptions of current maternity services and outcomes research, and this was the focus of the next workshop activity.

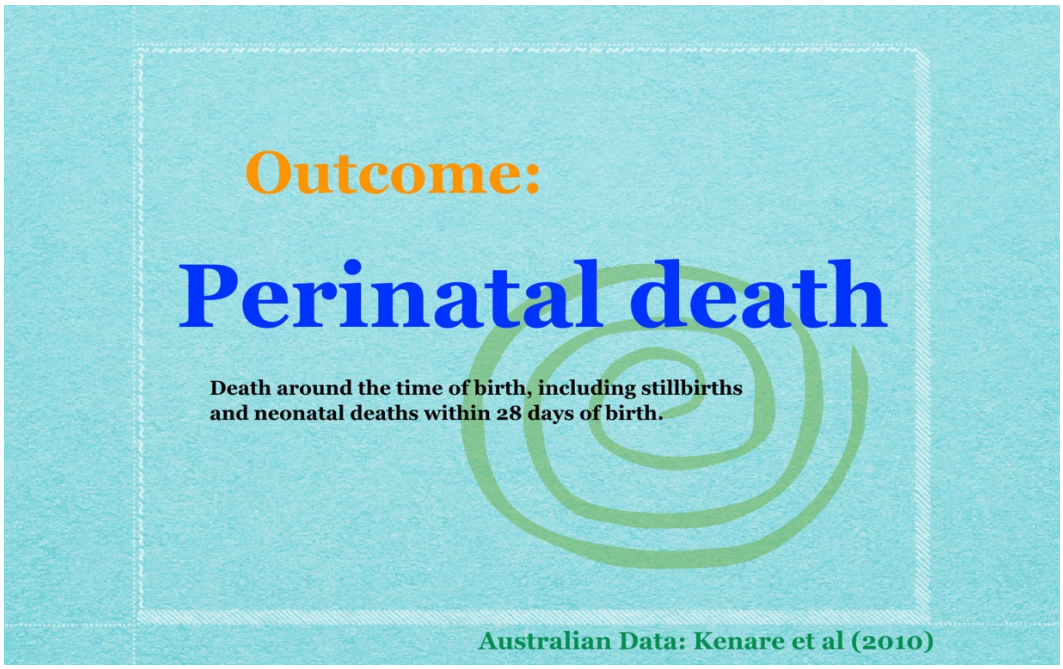
Birth Outcomes Activity

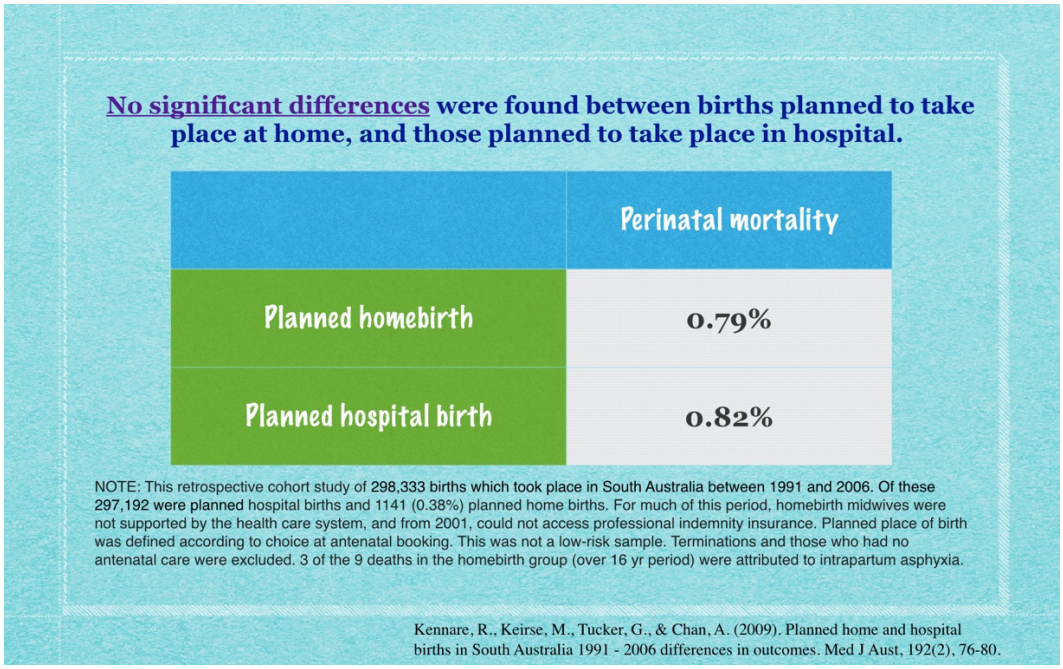
A key choice made during pregnancy, because it influences so many other factors, is where to give birth. In modern Aotearoa families can plan to birth in hospital, at a birth centre, or at home. Permission from a health professional is not required for any of these options, and all are fully-funded (free to consumers), unless a private obstetrician is engaged. The *Birth Outcomes* activity summarised data from largest and most methodologically robust studies comparing births planned to take place in hospital with those planned to take place at home or in a birth centre, so that participants could reflect on their options in light of the best scientific information available. Figure 11 provides examples of cards (front and back) from the *Birth Outcomes* exercise. As a set, the 83 *Birth Outcome* cards summarised findings relating to perinatal mortality and morbidity as well as positive outcomes. These included rates of vaginal birth, instrumental deliveries (forceps, suction), caesarean sections, exclusive breastfeeding and use of infant formula, Low Apgar scores, perineal damage and episiotomies, use of medication (including 'augmentation' of labour), transfer to neonatal units or higher level of care, and postpartum hemorrhage/maternal blood loss. The purpose was to allow workshop participants to compare research findings across studies for the outcomes they were most interested in. Each card showed a particular outcome on the front, with study details on the reverse side. My aim was to make research evidence as accessible as possible, catering for those wanting the main points only as well as for attendees desiring a deeper understanding of the sample size and other study features.

[80] Repeating the multivariate logistic regression analysis with the cut-off for 'advanced maternal age' (AMA) lowered to 35 or increased to 40 years obtained the same result, with the likelihood of surgical birth following induction two to three times greater among older birthing women (Dunn et al., 2017).

Figure 11.

Card 001 (Front and Back) from the Parenting From the Start Birth Outcomes Activity





Home Versus Hospital

Midwives, doctors, and consumers vary in the extent to which they believe birth is a 'natural' and 'normal' biological process versus a 'dangerous' medical event (Gaskin, 2008). These differing constructions have profound effects on birthing practices (who does what, and when, and why). Hospital births tend to be characterised by some level of active management, in which labour may be induced, 'augmented' or 'assisted' if it does not conform to arbitrary norms (such as an average of 1cm dilation per hour), and in which

monitoring is routine (Kitzinger, 1991). Women who choose to birth in their own environment are less subject to institutional pressures, routines, or staff enforcing these norms (Buckley, 2009; Gaskin, 2008). They have increased control over how they birth (where, in what positions, whether to use a birth pool) and who is present. It is hardly surprising that women birthing at home therefore express more satisfaction with their births and have lower rates of medical intervention – most of which are available only in hospital (Kitzinger, 1991). Non-institutional birth is much closer to the ancestral birth environment, and may side-step iatrogenic complications.[81] An early meta-analysis found that women who planned to birth in hospital (rather than at home) were significantly more likely to have inductions, augmented labour, episiotomy, operative vaginal birth, severe lacerations, and caesarean section (Olsen, 1997). Babies born in hospital were significantly more likely to have low Apgar scores, respiratory problems and birth trauma than those born at home (Olsen & Jewell, 2009). Planning to birth in hospital appeared to increase rates of intervention "without any benefit for low-risk women"[82] (Olsen & Jewell, 2009, p. 2). At the time of this first Cochrane Review there had been only one randomised controlled trial of place of birth, but methodologically sound observational studies found no statistical difference in mortality between planned home and hospital births, and suggested that "both home and hospital births are sufficiently safe for safety no longer to be of overriding importance" as outcome criteria (Olsen & Jewell, 2009, p. 2 & 5). The most recent Cochrane Review echoed this conclusion, finding equivalent safety for planned home and hospital birth, but "less intervention and fewer complications" among women who planned home births (Olsen & Clausen, 2013, p. 1). Subsequent research has supported these claims, and the *Birth Outcomes* activity considered them study-by-study, separating out the multiple kinds of birth outcomes associated with planned place of birth.

Type of Birth

At the most basic level, planned place of birth is associated with type of birth. A large retrospective cohort study (N = 298,333 births during 1991-2006) in South Australia found women planning a home birth were significantly less likely to have a caesarean section (CS = 9.2%) than women planning a hospital birth (CS = 27.1%), as well as significantly less likely to have an instrumental delivery (forceps, vacuum, or both; 4.4% vs 12.8%) (Kennare et al., 2010). This was not a low-risk sample. The *Birthplace* prospective cohort study of low-risk women with singleton, term pregnancies in England 2008-2010 (N = 64,538) similarly found

[81] Obstetric intervention is also one of the risk factors for birth trauma, or posttraumatic stress disorder (PTSD) secondary to childbirth, with prevalence estimates of 1.5-5.6% (Beck, 2006). When self-descriptions rather than formal diagnoses are used, percentages of women describing their births as traumatic ranges from 34% to 55% (Soet, Brack, & Dilorio, 2003; Ryding, Wijma, & Wijma, 1998, cited in Beck, 2006). Birthing women have used words such as "horrific", "degrading", and "barbaric" to describe their experience of health care providers (Elmir, Schmied, Wilkes, & Jackson, 2010, cited in Kendall-Tackett, 2014, pp. 104–105). These kinds of psychological consequences are not considered in studies on birth outcomes, but the long-term effects can include subsequent avoidance of sexual activity and fear of childbirth (Fones, 1996; Goldbeck-Wood, 1996, cited in Beck, 2006), attachment difficulties, and related parenting problems (Bailham & Joseph, 2003; Beck, 2004a, 2004b, cited in Beck, 2006). Traumatic birth experiences may also affect subsequent fertility. For instance, Swedish women with negative rather than positive experiences of their first birth have fewer subsequent children and longer interbirth intervals (Gottvall & Waldenstrom, 2002, cited in Beck, 2006, p. 381).

[82] For high-risk women one hopes that the prompt availability of medical facilities and personnel would compensate for these iatrogenic (doctor-caused) risks.

that caesarean sections were significantly more likely in planned hospital births (11.1%) than in three non-obstetric settings (home, freestanding midwifery unit, and 'alongside' midwifery unit), with normal vaginal birth showing the reverse results (Birthplace in England Collaborative Group, 2011). The *Outcomes Activity* card relating to this data is shown in Figure 12. Rates of normal birth[83] were 87.9% at home (2.8% of total births), 83.3% in freestanding midwifery units, and 76% in alongside midwifery units, but significantly lower (57.6%) when the planned place of birth was a hospital obstetric unit, even though participants who had planned caesareans or caesareans before the onset of labour were excluded from the analysis. Natural delivery of the placenta was also much less likely in planned hospital births (6.1%) than in planned homebirths (31.3%) and births planned to occur in freestanding (22.1%) or alongside (14.1%) midwifery units. The findings of significantly fewer instrumental deliveries and caesareans for planned home births than planned hospital births have been replicated in Canada (Hutton et al., 2009, 2016; Janssen et al., 2009) and Aotearoa New Zealand (Davis et al., 2011), so this pattern of results seems to hold across developed counties. New Zealand birth types by planned place of birth are shown in Table 12.

Table 12.

Birth Type (%) by Planned Place of Birth in Aotearoa New Zealand (2006 to 2007 data)

Planned place of birth	Vaginal birth	Emergency CS	Vacuum extraction	Forceps
Home	95.4	2.6%	1.1%	0.9%
Primary unit	94.7	3.2%	1.18%	0.9%
Secondary unit	84.5	8.5%	4.8%	2.2%
Tertiary hospital	72.7	14.9%	7.4%	4.9%

Note: This retrospective observational data comes from 61,072 low-risk singleton pregnancies (babies head down and 37+ weeks) that took place 2006-2010 (inclusive) and were available in the *New Zealand College of Midwives Clinical Outcomes Research Database* (COMCORD). The dataset grew steadily from 30% of all pregnant women in 2006 to 47% in 2010. Planned caesareans were excluded from all groups but babies with lethal congenital abnormalities and babies who died prior to labour are included (Davis et al., 2011).

Maternal Outcomes

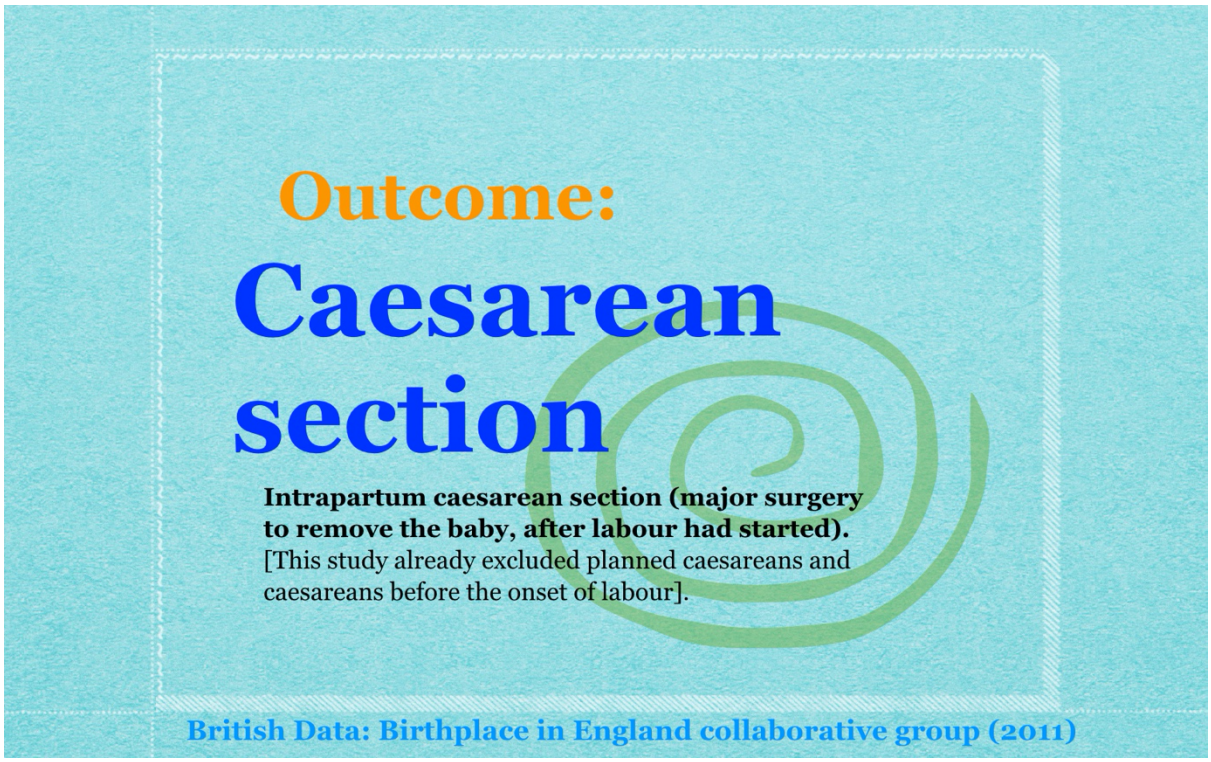
Examination of other maternal outcomes also supports primary birthing as the safer option for low-risk pregnancies. While the Australian study found no significant differences in rates of postpartum haemorrhage between planned homebirths (4.4%) and planned hospital births (5.5%), only a small proportion of these births fell into the homebirth category (0.38% of the total) because homebirth midwives were not supported by the public healthcare system and could not access professional indemnity insurance during much of the study period (Kennare et al., 2010). Canadian research has found a significantly lower risk of serious maternal bleeding (blood loss >1000mLs) in planned homebirths (0.8%) than planned hospital births (1.2%), with blood transfusions required twice as often (1.2%) in planned hospital births

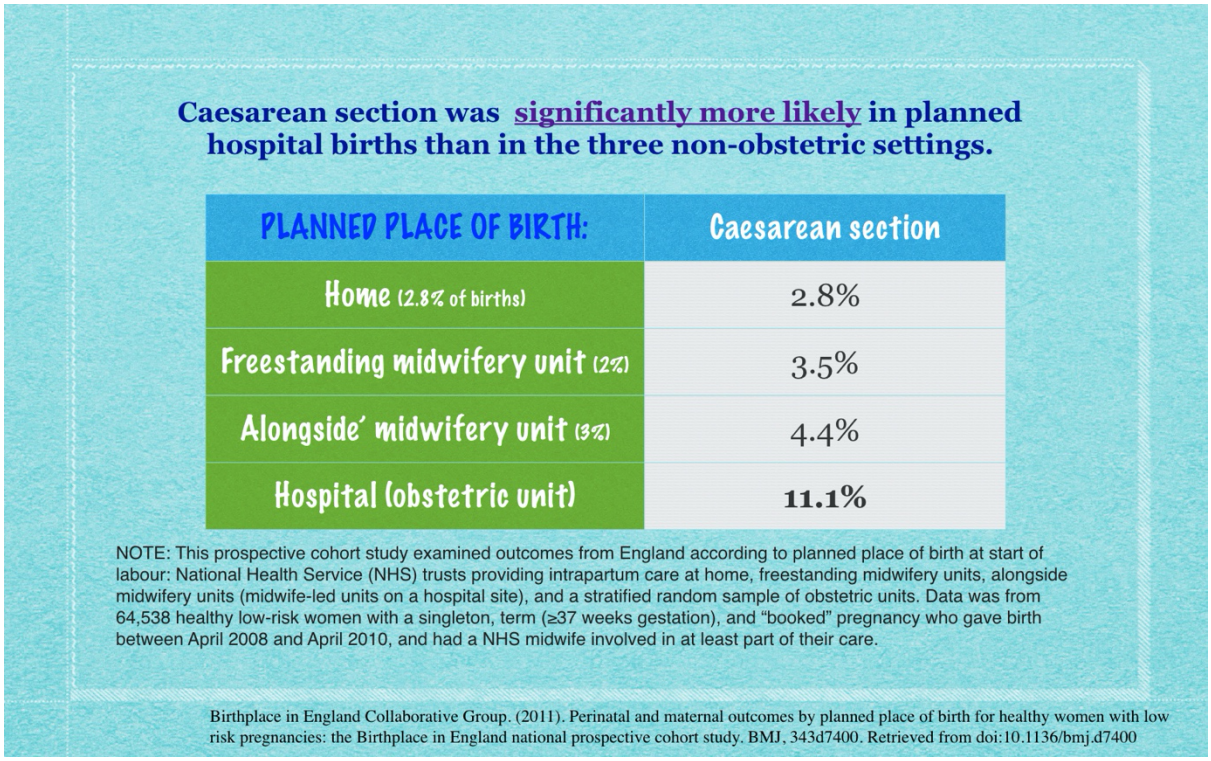
[83] Normal birth was operationally defined as vaginal birth without induction of labour, epidural or spinal analgesia, general anaesthesia, forceps or ventouse delivery, caesarean section, or episiotomy (Birthplace in England Collaborative Group, 2011).

compared with home and midwifery units (Hutton et al., 2009). This finding has been replicated (Janssen et al., 2009), with more recent research suggesting the increased risk of postpartum hemorrhage in planned hospital births may be statistically significant in multiparous but not nulliparous women (Hutton et al., 2016). Maternal mortality is so rare it fails to occur in most samples of low-risk women (e.g. Janssen et al., 2009), and millions of women would be needed for a study of sufficient power to detect differences due to place of birth (Olsen & Clausen, 2013). Less serious maternal outcomes correlated with planned place of birth include perineal trauma resulting from birth and episiotomy. These are discussed next.

Figure 12.

Card 010 (Front and Back) from the Parenting From the Start Birth Outcomes Activity





Perineal tears occur naturally as part of the birth process. Episiotomy refers to cutting of the vaginal opening or perineum by a health professional, with the intention of easing delivery. The two kinds of perineal trauma should be considered together in order to capture all damage to the vagina and perineum. Despite early assumptions that episiotomy would improve outcomes, routine episiotomy has been shown to significantly increase the risk of severe perineal trauma (by 30%), as well as pain with sexual intercourse, with no advantages for mothers[84] (Hartmann et al., 2005). More recent recommendations for selective episiotomy are similarly at odds with the evidence base. Meta-analysis of the two existing prospective randomised controlled trials comparing selective episiotomy with the avoidance of episiotomy (k = 2, N = 574) shows no significant differences in severe perineal trauma, any perineal trauma (first- to fourth- degree perineal tears), instrumental delivery, duration of the second stage of labour, perineal pain, or postpartum hemorrhage (G. M. V. Pereira et al., 2020), providing no rationale for the still widespread use of the surgery (21.4% in the selective episiotomy group, vs 1.7% in the 'no episiotomy' group).

Studies in multiple countries have consistently found the risk of episiotomy is significantly higher in planned hospital births than planned home births. The differences are large and clinically meaningful. In the Australian sample episiotomy was more than five times more common in planned hospital births (21.7%) than planned homebirths (3.6%), a significant difference (Kennare et al., 2010). Similarly, British research found episiotomy was significantly more likely when the planned place of birth was a hospital obstetric unit (19.3%) than home (5.4%), with midwifery units again falling in between (freestanding midwifery unit = 8.6%; alongside midwifery unit = 13.1%) (Birthplace in England Collaborative Group, 2011).

[84] This systematic review is based on 26 randomised controlled trials with thousands of participants, although the total number is not provided in the article (Hartmann et al., 2005).

Canadian studies found the relative risk of episiotomy during planned homebirth was only 0.73 of the risk of episiotomy during planned hospital birth in the years 2003-2006 (Hutton et al., 2009), and dropped to 0.68 of the risk of hospital birth in the period 2006-2009 (Hutton et al., 2016). In New Zealand the chance of an episiotomy after a low-risk pregnancy is about half as likely in planned home births compared with births planned for primary hospital settings, controlling for maternal age, parity, ethnicity, and smoking status (RR = 0.57 for homebirths), which again is both statistically significant and clinically meaningful (Davis et al., 2011). This reduction in episiotomy does not occur at the expense of perineal trauma, which is also significantly less likely for home births. Serious perineal trauma, defined as a third or fourth degree perineal tear (involving the anal sphincter), is significantly less likely in planned homebirths (1.3%) than planned hospital births (2.3%) regardless of parity (Hutton et al., 2016). Combining these categories, Hutton et al (2009) found that perineal damage (episiotomy or any second- to fourth- degree perineal, labial, or vaginal tear) was significantly less likely in planned homebirths (38.7%) than planned hospital births (44.5%), with a relative risk of 0.87 (Hutton et al., 2009), which is consistent with data from a low-risk New Zealand sample which found significantly fewer reports of perineal trauma for planned homebirths compared with births planned in primary units (RR = 0.74) (Davis et al., 2011).

Birth Interventions

Perhaps related to the lower risks of surgical and instrumental births, hemorrhage, and perineal trauma, planned homebirths are associated with reductions in the induction and 'augmentation' of labour as well as use of pharmacological pain relief. These medical interventions carry side-effects. Artificial rupture of membranes (ARM) is a medical procedure in which the amniotic sac is punctured with the intention of bringing on or speeding up labour. Low-risk New Zealand births planned in primary birthing units carry significantly lower risk of the waters being broken artificially than those planned to take place in hospital, with the relative risk of ARM adjusted for maternal age, parity, ethnicity, and smoking status being 1.49 in secondary hospitals and 1.51 in tertiary hospitals (Davis et al., 2011). The risk of ARM in planned homebirths is about 30% lower again, with a relative risk of 0.63 compared with births planned in primary birthing units (Davis et al., 2011). In Britain, the probability labour will be 'augmented' using synthetic oxytocin (syntocinon) is significantly increased for planned hospital births (23.5%) compared with non-obstetric settings, with more than four times the risk of planned homebirths (5.4%) (Birthplace in England Collaborative Group, 2011). In Canada ARM is the primary method of augmentation, but synthetic oxytocin is sometimes used, with augmentation of one kind or another used in 23.7% of homebirths, 39.9% of hospital births attended by a midwife, and 50.4% of hospital births attended by a doctor (Janssen et al., 2009). In another study, augmentation was significantly less likely in planned homebirths (27.7%) than planned hospital births (36.3%) attended by midwives (Hutton et al., 2009). A sample consisting of a later cohort in Canada found augmentation was significantly less likely in planned home births for both nulliparous and multiparous participants, with an overall relative risk of 0.79 compared with planned hospital births (Hutton et al., 2016). In New Zealand the likelihood of augmentation among low-risk women planning a hospital birth is almost double the risk for births planned in primary units, while planned homebirths have a significantly lower risk of augmentation compared with births planned in primary units (RR = 0.63) (Davis et al., 2011).

Pharmacological Pain Relief

Use of medications for pain relief is also increased for institutional birth across developed countries. For example, the use of drugs injected into the spine (epidural or spinal anaesthesia) is significantly more likely in births planned to take place in English obstetric units (30.7%) rather than midwifery-run units (10.6-15.3%) or at home (8.3%) (Birthplace in England Collaborative Group, 2011). Although much rarer, the use of general anaesthetic in this sample was also significantly more likely in obstetric settings (1.5%) than for planned home births (0.5%). In Canada pharmacological pain relief is significantly less likely in planned home births regardless of parity, with an overall relative risk of 0.39 compared with planned hospital births attended by midwives (Hutton et al., 2016). Among nulliparous participants, pain-relieving drugs were used in 34.5% of planned homebirths and 59.9% of planned hospital births. For multiparous women the rates of pharmacological pain relief were only 6.4% in planned homebirths and 32.3% of planned hospital births (Hutton et al., 2016). Specific drugs included nitrous oxide (4% of planned homebirths, 17% of planned hospital births), narcotic analgesia (2%; 6%), epidural (11%; 23%), spinal (2%; 4%), pudendal (.1%; .3%), and general anesthesia (.3%; .5%).[85] While a minority (16.2%) of planned homebirths involve pharmacological pain-relief, the rate for planned hospital births (42%) is much higher despite both groups being attended by midwives (Hutton et al., 2016), and this pattern was present in earlier data also (Hutton et al., 2009). Use of pain relief during labour is similar in New Zealand, with significantly increased use in planned hospital births. Adjusted for maternal age, parity, ethnicity, and smoking status, the relative risk of pharmacological pain management compared with primary birthing units is 1.49 for births planned for secondary hospitals and 1.64 for births planned for tertiary hospitals (Davis et al., 2011). Planned homebirths have significantly lower risk again (RR = 0.14 compared with primary units).

Infant Outcomes

Infant outcomes may be of particular interest to parents. By far the largest study on place of birth to date gathered retrospective data from all 529,688 low-risk women in the Netherlands who gave birth between 2000 and 2006 (inclusive), and were in midwifery care at the onset of labour (de Jonge et al., 2009). 60.7% of these women planned homebirths, 30.8% planned hospital births, & 8.5% were unknown/undecided. The large sample size gave sufficient power to examine rare outcomes. No significant differences were found between the relative risk of perinatal death[86] for planned homebirths and planned hospital births. Rates of transfer to the neonatal unit were also similar (de Jonge et al., 2009). This was replicated in South Australian research (N = 298,333), with no statistically significant differences between the perinatal mortality[87] of 0.79% for planned homebirths and 0.82% for planned hospital births despite

[85] The lower number in each pair applies to the planned homebirth group, some of whom will have transferred to hospital to receive these interventions (Hutton et al., 2016).

[86] Perinatal death rates include intrapartum death and neonatal death of the baby up to 7 days after birth. Deaths before the onset of labour and congenital abnormalities were excluded from the study (de Jonge et al., 2009).

[87] In this study perinatal death included stillbirths and neonatal deaths within 28 days of birth (Kennare et al., 2010).

the inclusion of higher risk pregnancies[88] (Kennare et al., 2010). The smaller prospective *Birthplace in England* study (N = 64,538) used a composite measure to examine adverse neonatal outcomes. These were rare in all settings, and most do not result in infant death.[89] There were no significant differences by place of birth for multiparous women, for whom the overall risk of a perinatal problem ranged from 0.23% for planned home births to 0.33% for planned hospital births. For nulliparous women a small but significant difference was detected between the risk of perinatal problems for planned home births (0.93%) and births planned for other locations (midwifery units 0.45-0.47%; hospital 0.53%) (Birthplace in England Collaborative Group, 2011). A small Canadian study (N = 2,889) reported significantly lower perinatal death rate for planned homebirths attended by midwives (0.35%) than for planned hospital births (0.57% when attended by midwives; 0.64% when attended by doctors) (Janssen et al., 2009), but two larger Canadian studies have reported no significant differences in infant mortality based on planned place of birth. The second Canadian study (N = 13,384) used matched groups of low-risk pregnancies and found identical perinatal death rates of 0.1% in the home and hospital groups and a small but significant difference in neonatal morbidity favouring homebirth (2.3%) over hospital birth (2.8%) (Hutton et al., 2009). The more recent Canadian study (N = 22,986) found no significant differences despite using a composite measure of perinatal death or morbidity[90] and analysing nulliparous and multiparous women separately as in the *Birthplace in England* research. Adverse neonatal outcomes were found in 0.39% of births[91] with no differences related to planned location, although newborns in the planned homebirth group were significantly less likely to require resuscitation at birth or oxygen therapy beyond 24 hours,[92] and experienced significantly fewer birth injuries[93] (Hutton et al., 2016). Retrospective NZ data from 2006 to 2010 (inclusive; N = 61,072 low-risk singleton term pregnancies) also found no significant

[88] Within the category of perinatal death, planned home births were associated with higher rates of intrapartum death (1.8 per 1000 births vs 0.8 per 1000 planned hospital births), and deaths attributed to intrapartum asphyxia (2.6 per 1000 births vs 0.3 per 1000 planned hospital births). The authors suggest these results may reflect the lack of formal support (supervision and back-up) for independent homebirth midwives, who were not integrated into the South Australian health care system during the 1991-2006 period of this study (Kennare et al., 2010).

[89] Adverse neonatal outcomes in this study included stillbirth after start of care in labour or early neonatal death (13%), neonatal encephalopathy (disturbed neurological function involving problems with breathing, and seizures; 46%), meconium aspiration syndrome (30%), brachial plexus injury (8%), fractured humerus, or fractured clavicle (4%) (Birthplace in England Collaborative Group, 2011).

[90] Perinatal death or morbidity was defined as stillbirth (any death after the onset of labour), neonatal death before 28 days, or serious morbidity (Apgar score less than 4 at 5 mins, or resuscitation with positive pressure ventilation and cardiac compressions) (Hutton et al., 2016).

[91] The study excluded preterm (< 37 wk gestation) and breech deliveries, people with more than one previous caesarean delivery, multiple pregnancy or medical induction (with oxytocin or prostaglandin), but not postterm pregnancies. The home birth group included all records indicating "home," "undecided" or "other" as the intended place of birth at the onset of labour (Hutton et al., 2016).

[92] The relative risk of resuscitation among homeborn infants was 0.23 compared with hospital births attended by a midwife, and 0.56 compared with hospital births attended by a doctor, while the relative risk of oxygen therapy was 0.37 compared with hospital births attended by a midwife, and 0.38 compared with hospital births attended by a doctor despite the hospital births being matched as equally low-risk in this sample and all births being attended by midwives (Hutton et al., 2016).

[93] Birth injuries included subdural or cerebral hemorrhage; fracture of clavicle, long bones, or skull; facial nerve injury; Erb palsy; or unspecified birth trauma. The relative risk of birth injury was 0.26 in the homebirth group compared with planned hospital birth attended by a midwife, and 0.33 of the risk of planned hospital birth attended by a doctor (Janssen et al., 2009).

differences between perinatal death rates for planned homebirths (0.20% infant mortality), and births planned for primary units (0.19%), secondary-level hospitals (0.30%) and tertiary hospitals (0.30%) (Dixon et al., 2014). Births planned for primary settings (home or a birthing unit) were significantly less likely to result in low Apgar scores (Apgar <7 = 1.5% home, 1.7% primary unit) than births planned for secondary (2.3%) or tertiary (2.8%) hospitals (Dixon et al., 2014). Transfers to the neonatal unit were also significantly less likely for births planned in primary settings (1.8% home, 2.2% primary unit, 3.1% secondary hospital, 3.8% tertiary hospital). Thus, the literature suggests that while the risk of infant death is equivalent across settings for women with low-risk pregnancies, with some evidence this may also apply to high-risk pregnancies, babies are more likely to be born healthy when a home- or midwifery centre birth is planned.

Infant Feeding

Infant feeding was the final outcome considered in the *Birth Outcomes* activity. Although fewer studies have tracked feeding outcomes according to planned place of birth, Canadian data shows partial or exclusive use of artificial breastmilk substitutes are significantly less likely for planned homebirths (8.1% at 1 week, 9.3% at 6 weeks) than planned hospital births (15.2% at 1wk, 18.8% at 6wks) (Hutton et al., 2009). For both nulliparous and multiparous participants, rates of exclusive breastfeeding were significantly higher after planned homebirths (90% overall 3 days post birth, 87.8% at 10 days) than planned hospital births attended by midwives (82.9% at 3 days, 78.9% at 10 days) (Hutton et al., 2016).

In summary, the common belief that birthing in hospital is 'safer' for all women is not evidence-based, and the modern practice of birthing in institutions under medical supervision is associated with higher levels of intervention such as induction and augmentation of labour, pharmacological pain relief, instrumental and surgical births. Statistical information relating to the real risks and benefits associated with planned place of birth were presented to workshop participants through the *Birth Outcomes* cards, which allowed expectant parents to consider the scientific literature on each topic at a glance and delve deeper if they wished.

Workshop Conclusion: Early Care

The *Parenting From the Start* antenatal workshop ended with topics relating to early care within the evolved developmental niche: touch, feeding, toileting, sleep, play and interaction, and physical proximity. The section on infant feeding is provided to illustrate my approach, as it seemed the most controversial of these topics. A final video shared with participants described ways to support initiation of breastfeeding in the hours after birth, including a newborn baby's ability to 'crawl' to the breast and latch on by themselves when left skin-to-skin with their mother and undisturbed. This is part of the *Global Health Media Project* series available online. The link is provided in Table 13.

Table 13.

Videos Shown in Part 2 of the Parenting From the Start Antenatal Workshop

	Name of video (duration)	URL link
1	*Niwha Birth Video* (6 minutes)	No longer available on YouTube
2	*Early Initiation of Breastfeeding for Health Workers* (11 minutes)	https://globalhealthmedia.org/videos/early-initiation-of-breastfeeding/

Infant feeding information provided in the workshop included multiple options in terms of what is fed (human breastmilk, donor milk, infant formula) and the method of delivery (direct breastfeeding, bottle, cup, teaspoon, lactation aid; see Figure 13). Breastfeeding was presented as the biological norm for humans, and the risks of artificial supplementation were outlined (Figure 14). Previous authors have pointed out the inappropriateness of talking (only) about 'benefits of breastfeeding' among mammalian species – it is deviation from breastfeeding that requires discussion (Z. Sulaiman et al., 2012). Caregiver perceptions may be affected by this difference in the style of presentation, with more positive responses to breastfeeding when the evidence is framed in terms of risks of not breastfeeding (Stuebe, 2009). The workshop also included opportunities for discussion about the ways in which breastfeeding can be sabotaged, for instance by colonialism (Glover & Cunningham, 2011; Simmonds, 2014), inaccurate or inconsistent advice from health professionals, and hospital routines that are "detrimental to breastfeeding" (Dennis, 2002, p. 12).

To maximise participant engagement and empowerment, information about the risks and benefits of various caregiving practices were presented as options rather than guidance. Provision of evolutionary, scientific, and Indigenous knowledge allowed expectant parents to consider detailed information in context. While the evidence does converge in support of some parenting strategies, such as providing human breastmilk and avoiding artificial substitutes, this was not considered a reason for advocating one over the other. My assumption was that the research information speaks for itself. Parents open to evidence-based approaches would not need guidance to breastfeed if the risks and benefits had been explained, while those resistant to breastfeeding might become disengaged in the face of such advice and would be more likely to benefit from knowing about alternatives such as 'feeding at the breast' and lactation aids which capture some of the benefits.

Figure 13.

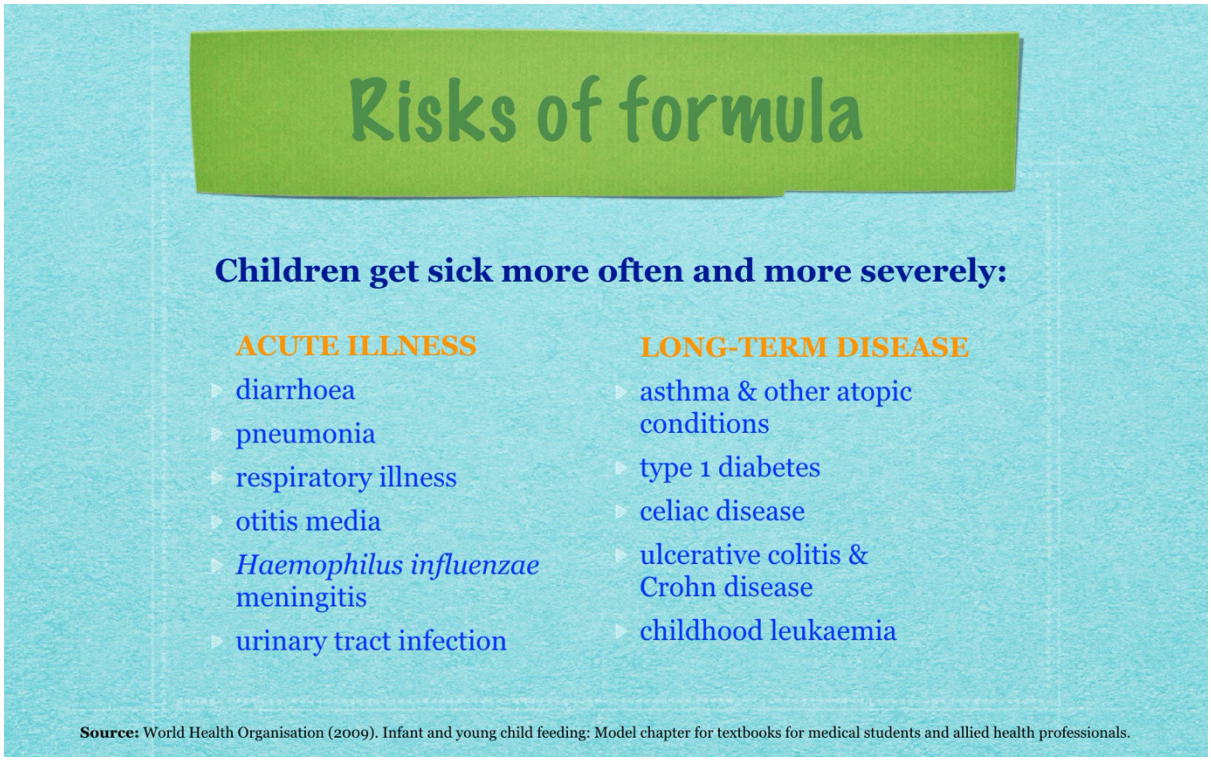
Slide 149 from the Parenting From the Start Antenatal Workshop

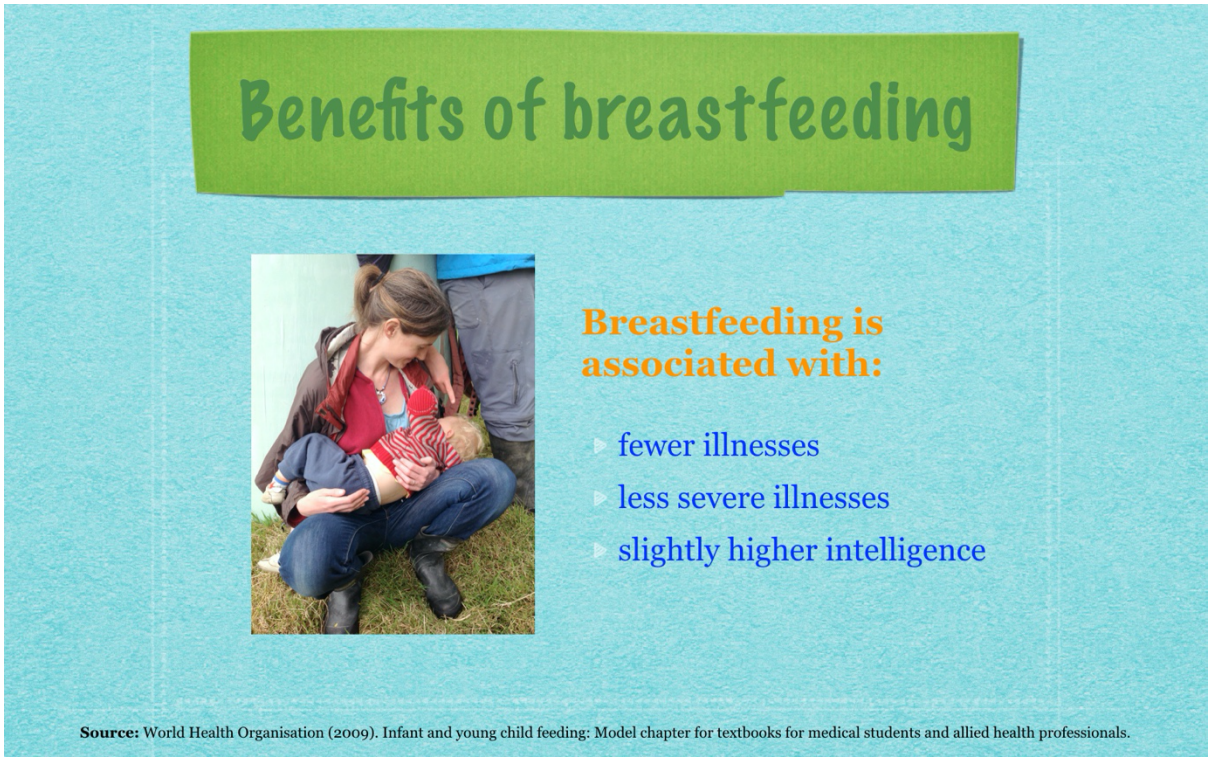


The strongest predictor of breastfeeding initiation and duration is prenatal intention to breastfeed (Donath & Amir, 2003), and fathers are critical to this decision making, so prenatal intentions were a focus of *Parenting From the Start*. A recent meta-analysis found that higher levels of maternal education, keeping mothers and babies together ('rooming in' and/or skin-to-skin immediately after birth), not smoking, more breastfeeding education, and vaginal (rather than surgical) birth are also associated with higher levels of breastfeeding initiation and longer breastfeeding duration in Western countries (Cohen et al., 2018). Relevant societal factors such as the marketing of artificial breastmilk substitutes and timing of mothers' return to paid work were acknowledged in workshops but were not targeted directly by the intervention.

Figure 14.

Slides 154 and 155 from the Parenting From the Start Antenatal Workshop





In conclusion, the *Parenting From the Start* workshop presented parents with evidence-based information relating to pregnancy, labour and birth, early care, and parenting during the first year. Relating these topics to early brain development and attachment, placing them in cross-

cultural and evolutionary contexts, and providing a gifted sling were other aspects of the intervention intended to improve child development and outcomes via sensitive responsive care and secure attachments. A novel feature of the intervention was that I hoped to achieve these results indirectly, by promoting the informed choice of caregivers rather than by promoting specific actions. The remainder of the thesis outlines the randomised controlled trial I conducted to evaluate the intervention and assess the success of this approach.

CHAPTER SEVEN

Evaluating a Preventative Parenting Intervention

I orea te tuatara ka puta ki waho
A problem is solved by continuing to find solutions

Part 1 of the thesis described the development of the *Parenting From the Start* antenatal workshop. This chapter introduces Part 2 of the thesis – the evaluation of my intervention. I begin by articulating a rationale for using an experimental and longitudinal methodology to evaluate the *Parenting From the Start* workshop. This was not the only possible path to follow given the diverse multi-disciplinary literature on which this project rests. Next I outline information included in the pre-registration of the trial, including the research objectives, hypotheses, and primary and secondary outcomes. Finally, the research team who assisted with the project are described briefly along with their relevant experience and roles. Details of the method, including deviations from the pre-registered protocol, are in Chapter 8.

Methodology

The *Parenting From the Start* antenatal workshop was evaluated using an experimental design with a few additional qualitative elements. The control possible in a randomised trial means that even as a one-off intervention this study could shed light on the capacity for change offered by the brief, preventative intervention. The longitudinal study design incorporated a number of features which combined to contextualise the findings and consider competing explanations of the results. Firstly, mothers were followed from pregnancy until their babies were over a year old. This allowed for two follow-up assessments post birth. Secondly, the use of a wait-list 'standard care' control group and random assignment enabled direct comparisons between mothers who did and did not experience the intervention. Thirdly, investigating parenting intentions immediately before and after the workshop provides some clues about 'what changed?' for mothers in the intervention group as a result of taking part. Fourthly, workshop feedback collected at the end of each half of the workshop provides insight into how the workshop was received by participants. Finally, a team of research assistants blind to study condition reduced the possibility of bias in key follow-up assessments and moved the study beyond dependence on self-report measures.

The study is somewhat unusual in the decision not to focus on 'vulnerable' groups – that is, people with more challenging parenting circumstances such as living on an inadequate income. Meeting diagnostic criteria for a psychological disorder, facing addiction issues, parenting at a young age, and identifying as Māori or Pasifika are often assumed to be risk factors increasing vulnerability and need. The challenges associated with these circumstances and the structural racism and discrimination faced by Māori and Pasifika peoples are real, and should absolutely garner additional support and redress. In particular, overseas research suggests rates of secure attachment are halved when families face financial hardship (e.g.

Anisfeld et al., 1990). However even in so-called 'middle class' samples only around two thirds of children end up with secure attachment relationships. This leaves a lot of room for improvement regardless of socio-economic status. Although 'targeting' vulnerable groups is often assumed to better utilise limited resources, it is my observation that parents do not always appreciate being profiled based on their age, mental health status, or family income, let alone their ethnicity in order to qualify for support. Nobody likes to feel they are expected to fail their children, and within psychology it is well-known that such expectations may contribute to stigma and discrimination as well as self-fulfilling prophesies. Further, I suggest that targeting may reduce two effects which could otherwise increase the reach of parenting interventions: informal exposure and power spread. When a wide range of people take part in a parenting intervention the ideas have the potential to be shared through a larger number of informal social networks. If repeated exposures to an idea increase the chances of adopting it (Hassan & Barber, 2021), then increasing this spread of ideas through informal social networks can be recruited as a beneficial side-effect of a direct intervention. In a society where some groups such as Pākehā and those with high socioeconomic status hold more influence than others, these groups have a greater capacity to disseminate ideas. While this project makes an effort to increase social justice by acknowledging and naming colonialism and racism and explicitly valuing Mātauranga Māori, it also seemed sensible to acknowledge the potential for change in the currently-dominant group and consider how this might maximise impact and minimise the chance of perpetuating deficit models of vulnerability. For these reasons I preferred to make *Parenting From the Start* available to anyone who wished to take part. Some constraints did prove necessary for practical reasons (e.g., only birthing people could participate, as I wished to gather data on pregnancy and labour), but I did not rate potential participants in terms of 'risk'.

Pre-Registration

The trial protocol was registered with the *Australia New Zealand Clinical Trials Register* (ANZCTR) on 28 February 2017, prior to recruitment commencing (ACTRN12617000321347). The universal trial number is U111111840331. Trial information can be found at: http://www.ANZCTR.org.au/ACTRN12617000321347.aspx. Some details of the intervention content and rationale were not made publicly accessible on the website during the study due to concerns they could impact the parenting choices of control group participants. This content was recorded in the 'private notes' field of the ANZCTR record.

Research Aims and Hypotheses

This research aimed to increase knowledge of how to support new parents (mātua) by:

- Designing a preventative intervention based on the evolved developmental niche (EDN),
- Evaluating the impacts of the antenatal parenting workshop and gifted sling on attachment and health outcomes for mothers and their infants.

- Collecting data on current local parenting practices and their interrelationships.

Three key hypotheses were tested, all of which were pre-registered with ANZCTR. Firstly, I expected the *Parenting From the Start* parenting intervention (workshop plus sling) to alter antenatal **parenting intentions**, as seen by statistically significant changes from a pre- to post-test questionnaire asking about expectant mothers' plans with regards to birth, infant feeding, infant sleep, infant toileting, close proximity, alloparenting (shared care by multiple adults) and responsive care. I expected workshop participants to describe more EDN-consistent intentions *after* the workshop than *before*. More specifically, I hypothesised that experimental participants would be more likely to endorse items relating to natural birth, exclusive/extended breastfeeding, infant toileting, co-sleeping, babywearing, alloparenting & responsive care.

Secondly, I expected the antenatal parenting intervention to alter **actual parenting strategies** across the infant's first year. Specifically, I hypothesised that evolved parenting practices such as natural birth, co-sleeping, exclusive/extended breastfeeding, infant toileting, babywearing, and alloparenting would be increased among new parents who received the intervention relative to the control group.

Thirdly, I expected the antenatal parenting intervention to improve **maternal sensitive responsiveness, infant attachment, and health outcomes**. Most importantly, I predicted that infants in the intervention group would be significantly more likely to be classified as 'securely' attached by blind observers at one year of age. I also expected that mothers in the intervention group would be rated more sensitive and responsive to their infants by a 'blind' observer. Based on prior research, I expected the relationship between study condition and attachment to be mediated or moderated by parental sensitivity and responsiveness. In addition, I hypothesised that mothers who received the antenatal parenting intervention would report higher rates of vaginal birth, fewer birth interventions, fewer admissions to the neonatal unit (NNU), less 'colic' and postnatal depression, and greater exclusivity and duration of breastfeeding.

For brevity, these hypotheses summarise categories of outcome variables. Specific variables falling within these categories were grouped according to their importance as either primary or secondary outcome measures. These are outlined next.

Primary and Secondary Outcome Measures

Primary outcomes refer to the main measures of effectiveness (or lack of effectiveness) of the intervention. Secondary outcomes are variables of lesser interest, or experiences at time points of lesser interest, that are nevertheless relevant to the study. Tables 14 and 15 show all variables which were preregistered as primary and secondary outcome measures respectively, along with the instruments to be used for the assessment, original time points, and planned analyses, as these details were included in the pre-registration of the study.

Table 14.

Primary Outcome Measures

Outcome	Timing	Analysis
1) **Maternal sensitivity and responsiveness** (score or classifications from 3 measures, all involving expert ratings based on a 60-minute home observation). Two established observational measures were planned: the *Maternal Behavior Q-Sort (MBQS-mini)* and *Ainsworth Sensitivity Scales*, plus another observational/ interview measure purpose-designed for this study: *Observational Measure of Sensitivity and Responsiveness (OMOSAR)*. All measures were originally intended be completed by the lead researcher, a registered clinical psychologist	At home visit 4-6 months post birth	Significance testing (e.g., t-tests) to compare intervention and control groups on each measure Predictive validity of these measures (separately and together) was assessed by entering the scores into a linear regression equation, with the SSP as the outcome measure
2) **% of infants securely attached** to their mother on the *Strange Situation Procedure (SSP).* The SSP is scored by a research assistant who is 'blind' to group allocation	At lab assessment 12 to 15 months post birth	Significance testing (e.g., t-tests) to compare intervention and control groups

Note. All details in this table including operational definitions, timing, and planned analyses were pre-registered, along with the expectation that the timing of the lab assessment would be adjusted for infants born prematurely. The online pre-registration form allowed a maximum of three primary outcome measures.

Table 15.

Secondary Outcome Measures

Outcome	Timing	Analysis
1) **Parenting intentions** as measured by maternal responses to likert scales on purpose-designed questionnaire: *Parenting Intentions Questionnaire (PIQ)*	Administered twice as a pre-test and post-test immediately before and after workshop (same day)	Changes in descriptive statistics (e.g., means and standard deviations) on each question/section from pre- to post-test. Significance testing where possible
2) **Workshop feedback** as measured by maternal responses to likert scales on purpose-designed *Workshop Feedback Form*. The feedback form also invited qualitative responses (comments, feedback)	Immediately after the workshop (same day)	% of workshop participants who endorsed particular responses
3) **% of infants admitted to the newborn intensive care unit** as measured by maternal report on purpose-designed questionnaire: *Parenting Strategies Questionnaire (PSQ)*	4-6 months post birth	Significance testing (e.g., t-test) to compare intervention and control groups

4) **% of mothers reporting particular birth interventions** (e.g., medication, forceps, caesarean sections) as measured by maternal report on purpose-designed questionnaire: *Parenting Strategies Questionnaire (PSQ)*	4-6 months post birth	Significance testing (e.g., t-test) to compare intervention and control groups
5) **% of infants who were partially/fully/exclusively breastfed** at various ages according to mother's report on purpose-designed questionnaires: *Parenting Strategies Questionnaire (PSQ) and Evolved Developmental Niche Scale (EDN Scale)*	At home visit 4-6 months post birth (PSQ), and during lab assessment 12-15 months post birth (EDN Scale)	Significance testing (e.g., t-test) to compare intervention and control groups
6) **% of mothers with scores over 13 on the *Edinburgh Postnatal Depression Scale (EPDS).*** Mean depression score on EPDS. This screening test was OPTIONAL, so not be completed by all participants	At home visit 4-6 months post birth	Significance testing (e.g., t-test) to compare intervention and control groups
7) **% of mothers employing particular parenting strategies** as measured by maternal responses to purpose-designed questionnaire: *Parenting Strategies Questionnaire (PSQ)*, which included 60 multi-choice and likert-type items	At home visit 4-6 months post birth	Descriptive statistics (e.g., % endorsing particular responses, &/or means and standard deviations) for intervention group compared to control group. Significance testing where possible
8) **Mean scores on the purpose-designed *Evolved Developmental Niche Scale*** *(EDN Scale)*, measuring ancestral parenting practices	At lab assessment 12-15 months post birth	Descriptive statistics for intervention group compared to control group. Significance testing where possible

Note. All details in this table including operational definitions, timing, and planned analyses were pre-registered, along with the expectation that the timing of the lab assessment would be adjusted for infants born prematurely. The online pre-registration form allowed a maximum of 40 secondary outcome measures.

The Research Team

Designing and running a randomised controlled trial is not a small undertaking and it was not possible to complete this project alone. Experimental designs require separation between those running an intervention (who know which group participants have been randomised to), and those conducting follow-up assessments (who must be blind to study condition). Using the *Strange Situation Procedure* as an outcome measure increased the required roles further. While the Host and Coder roles can be combined where necessary, the Stranger must be a person the baby being assessed has never seen before. Thus a minimum of two trained confederates are essential to running each procedure, and three is preferable. Twelve research assistants (RAs) were recruited to assume key roles running and interpreting the primary outcome measures. The majority of the research assistants involved were volunteers

with a passion for supporting families. All understood the importance of a compartmentalized approach to research where those involved in the intervention are not involved in follow-up assessments. All RAs signed confidentiality forms, examples of which can be found in Appendix N, so that expectations around maintaining participant privacy were explicit.

Two RAs require special mention because of the dual relationships involved. My husband Daniel Morrimire (DM, 'Morri') travelled with me to Minnesota and completed the attachment training alongside me. He then devoted many months to running and scoring attachment assessments for the study. Morri's academic background in zoology and early childhood education contributed to his interest in babies as the most fascinating of all animals. By prior agreement we did not discuss specific dyads or details of their attachment classifications during the study. My sister Ria Pugmire (RP), also a PhD student in (health) psychology at the time, agreed to complete the home visits for the study after my planned home visitor pulled out at the last minute. Ria was paid for her time and travel expenses from my scholarship funds (indirectly), in order to ensure the maternal sensitivity measures were completed by somebody with appropriate experience, blind to group allocation, and not involved in other aspects of the study. Deep trusting relationships with Morri and Ria coupled with our shared academic backgrounds in science and psychology facilitated a high-functioning collaboration involving excellent communication and clear boundaries.

Morri led a team of twelve research assistants to set-up, run, and score each *Strange Situation Procedure* – working mostly on Friday mornings when the *Massey Psychology Clinic* was quieter and the rooms we needed were free. Morri took on the Host role for 20 of the 42 assessments (47.62%) as a third RA was not available on those days. The other RAs in the SSP team all presented as women, and took turns playing the Stranger once they had completed training and felt comfortable they knew what was required. Nobody on the SSP team had access to data about the study condition families belonged to or other results from the study. When an additional RA was available to take on the Host role, Morri could focus exclusively on setting up the rooms and video equipment, starting and stopping recordings, ensuring the observation room camera captured the best view of each mother-baby dyad and that the scripts and protocol were followed. If procedures did not go to plan, as when a baby refused to let their mother leave the room or insisted on a breastfeed during an episode, Morri's extensive training with the Minnesota attachment lab allowed him to make 'on the spot' decisions about how to proceed, and to record these deviations from protocol on the fidelity checklist. These were handed to me at the end of each day of testing along with the completed *Final Questionnaires* and *ACE Scales*.

The following chapter describes the randomised controlled trial to evaluate *Parenting From the Start*, both as it was initially planned and as it was conducted. Reasons for deviations from pre-registration are outlined in the relevant sections.

CHAPTER EIGHT

Method

Tē tōia, tē haumatia

Nothing can be achieved without a plan, workforce and way of doing things

This chapter outlines the randomised controlled trial used to evaluate the *Parenting From the* Start workshop. The study took place in the Manawatū/Horowhenua rohe (regions) of Aotearoa New Zealand, from March 2017 to February 2018. The geographical regions includes the city of Palmerston North and surrounding towns and rural areas falling under the MidCentral District Health Board, which served a population of just under 179,000 at the time of the study (Te Pai Hauora o Ruahine o Tararua/Midcentral District Health Board, 2019). Around two thousand babies are born in the MidCentral region each year,[94] and the largest ethnic group are Pākehā/New Zealand Europeans (Te Pai Hauora o Ruahine o Tararua/MidCentral District Health Board, 2020). Twenty percent of the population identify as Māori, 3% Pasifika, 8% Asian, and 69% Other (Te Pai Hauora o Ruahine o Tararua/Midcentral District Health Board, 2019).

Ethics

Ethical approval for the research was obtained through the full-review pathway from the *Southern Health and Disability Ethics Committee* (HDEC; ethics reference 16/STH/186) on 2nd December 2016, and included pre-registration as a requirement. Potential participants who met eligibility criteria were given more detailed information about the study by the lead researcher (LM) and signed a *Consent Form* if they wished to take part. Participants signed a second *Consent Form* at the home visit 11-24 months after the birth of their child, as the ethics committee informed us New Zealand law does not permit consent on behalf of an unborn child, meaning the initial consent was insufficient on its own.

Design

An experimental design with two parallel arms was used to evaluate the brief preventative parenting intervention and collect local data on current caregiving strategies and outcomes. Potential participants were randomly assigned to either an intervention or a waiting list control group during pregnancy and accepted if they met eligibility criteria and signed a *Consent Form*. Each family was followed until their baby was 11-24 months old with two

[94] There were 2,060 babies born across MidCentral DHB birthing facilities in 2020: 1,654 at Palmerston North Hospital, 282 at Te Papaioea Birthing Centre (which opened in November 2017 and came under MDHB control in April 2020), 38 women gave birth at Dannevirke Community Hospital, and 86 within Te Whare Kōhungahunga. This total excludes the 71 home births recorded by the DHB (Te Pai Hauora o Ruahine o Tararua/MidCentral District Health Board, 2020).

points of contact post birth: a home visit and a clinic assessment. The pre-registration protocol indicated the home visit would occur 4 to 6 months post birth, and the clinic assessment 12 to 15 months post birth, but the assessment windows were changed post-registration for scheduling and methodological reasons. Home visits were delayed until 6 to 12 months post birth, with this change occurring after recruitment had begun but prior to any visits occurring, based on advice from our maternal sensitivity trainers at the University of Guelph that one of the maternal sensitivity measures (the MBQS) is generally more useful towards the end of the first year when children are mobile and better able to communicate their preferences (H. Bailey, personal communication, 17 February 2018). In the event, home visits were completed when babies were between 11 and 24.5 months old (M = 13.5). The timing of final clinic assessments was expanded to include the range 11 to 20 months post birth due to difficulty scheduling assessments in an age group where short illnesses are common and many parents are juggling paid work with caregiving commitments. The key outcome measure at this time point (the SSP) remains meaningful within this wider period. Several babies in the study fell outside the wider age range however, and while their data was usually included, their age is noted in relevant sections of this thesis. Records indicate that final assessments actually took place between 11.5 and 22.5 months post birth (M = 15.45). Figure 15 provides a flow diagram of showing phases of progress through the study.

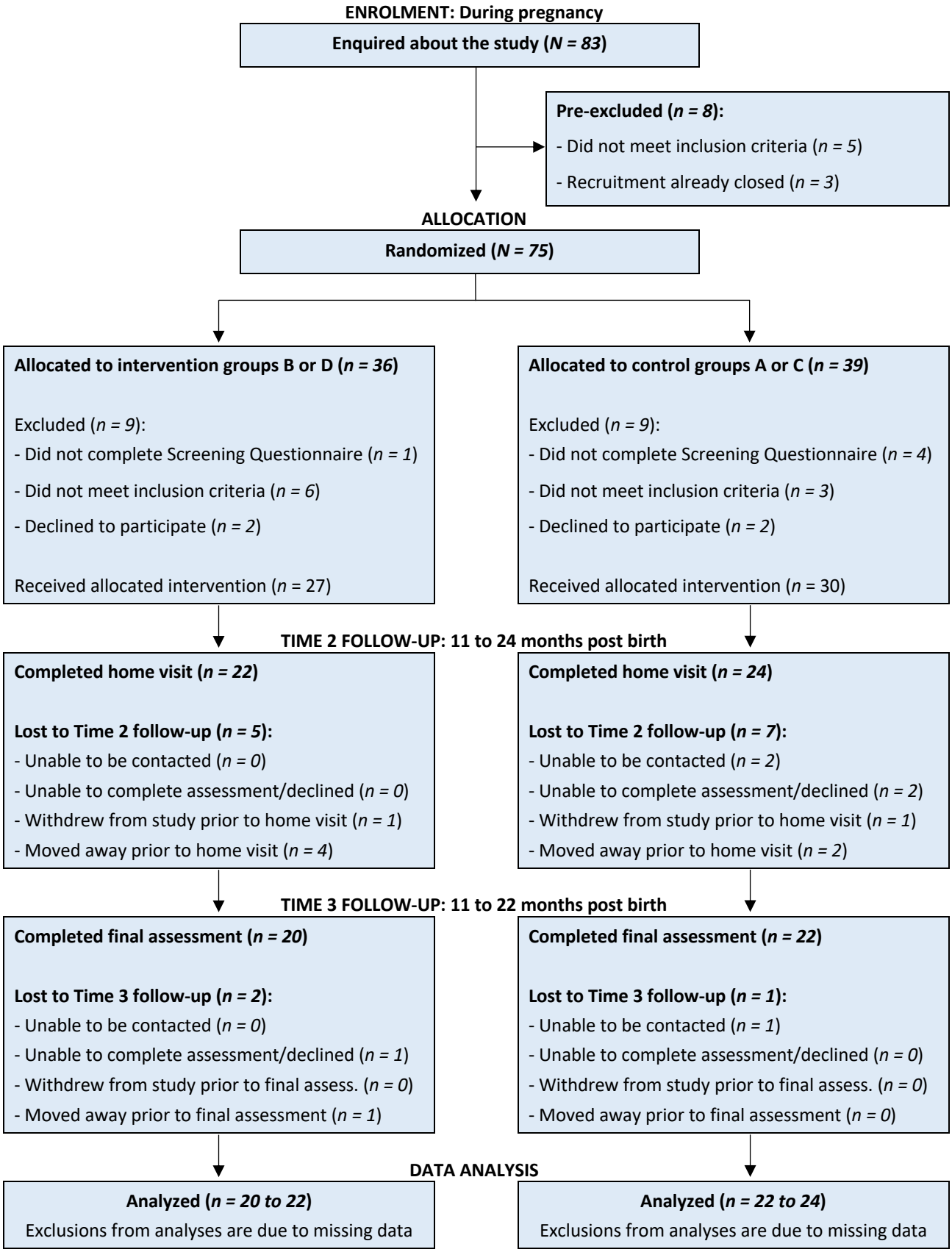
Initially, only first-time mothers were recruited, and randomly assigned either to group A (wait-list control) or group B (intervention) at the point they received an information pack about the study. Feedback from the pilot workshop suggested the intervention might also be useful to experienced parents, so ethical approval was obtained to add two additional study groups (*16/STH/186/AMO1, Southern HDEC*, 2017, 15th August). Recruitment of experienced mothers (people expecting a second or subsequent baby) thus began several months later – almost halfway through the recruitment period. Experienced mothers were randomly assigned to the newly created Groups C (wait-list control) or D (intervention) based on a separate randomisation.

There were four versions of the *Information Sheet*, which were given out in (pre-arranged) random order: Two for the intervention groups (B & D) and two for the control groups (A & C). Randomisation was accomplished using the online *Research Randomizer* calculator (Urbaniak & Plous, 2007). Lists of random numbers were generated for first-time mothers and experienced mothers separately, with even numbers indicating assignment to an intervention group (Group B or D) and odd numbers indicating assignment to a control group (Group A or C). A research assistant with no other role in group assignment (DM) completed the randomisation and prepared all resources in sealed, numbered, opaque envelopes. There was no way of knowing in advance who each envelope would be given to.[95] Separate randomisations for first-time mothers and those expecting a subsequent baby (i.e., stratification) ensured nearly equal numbers from each category ended up in the intervention

[95] One participant (ID51) was assigned to the wrong group, presumably due to an error in preparing the *Information Packs*. They should have been invited to join intervention group (B) but were assigned to the waiting list control group (A) instead. The error was not discovered until after the study was concluded and group allocations were checked for the final report, but as it happened this person moved away prior to the follow-up assessments so is not included in any outcome analyses.

Figure 15.

Flow Diagram of the Randomized Trial Showing the Two Parallel Conditions



Note. First-time mothers were assigned to groups A or B, and mothers expecting a subsequent baby were assigned to groups C or D. Time 2 and 3 follow-ups were intended to occur 6-12mths and 11-20mths post birth.

and control conditions. Randomisation was set to generate fixed blocks of ten[96] so that groups would remain relatively equal in size even with small numbers of participants.[97]

Randomising potential participants to groups at the outset facilitated allocation concealment and allowed the provision of slightly different information to each group – detailing the process they would personally undertake if they chose to take part. One member of the research team (DM) prepared the randomization, and another (LM) implemented it by handing out *Information Packs*, meaning nobody knew in advance who would end up in each group. One downside of this concealment/blinding design was that sample size could not sensibly be calculated based on 'intention to treat' as recommended by the CONSORT guidelines (CONSORT Statement; Schulz et al., 2010) because all participants were randomized prior to consenting to participate. Another downside is that decisions about whether to take part could have been based on which condition people were assigned to (a kind of post randomisation exclusion directed by potential participants). This could conceivably result in bias (D. Fergusson, 2002; Rehman et al., 2020). Ethical approval was obtained for this design on the basis that providing full information about the *Parenting From the Start* antenatal workshop intervention to the control group (who would not experience this element during pregnancy) could lead participants to consider parenting strategies they would not otherwise come across – acting as an unintended and unwanted intervention which diminished their value as controls. That is, the chosen methodology served to mask, or partially blind, participants with respect to the details of the study not directly relevant to them. Control group participants knew of the existence of the other conditions, but not the timing or specific content of the *Parenting From the Start* antenatal workshop.[98]

Participants

Inclusion criteria included being pregnant at the time of enrolment, expecting a normal pregnancy with a single baby, living in the Manawatū, Whānganui, or Horowhenua regions of

[96] Exactly 5 people out of every 10 were assigned to the intervention group, and the other 5 to the control group.
[97] Recruitment did not stop on a multiple of 10, so the groups are not perfectly equal in size.
[98] The *Information Sheet and Consent Form* for Groups A and C (wait-list control participants) described the preschool workshop in general terms only, as seen in this excerpt:

> *"The workshop summarises evidence-based information about early brain development, and is designed to get participants thinking about their parenting and the long-term outcomes they want for their child/tamaiti. The workshop provides an introduction to the science of parenting: what we know about the outcomes of particular parenting practices, and why parenting matters.*
>
> *The workshop does not advocate a single 'right' way to care for children – one size does not fit all when it comes to parenting, and studies showing group differences cannot tell us what is best for particular individuals. The workshop will include a consideration of pros and cons and why parents might consider various options. Knowing about the research can help us think about how best to meet our tamariki/children's needs within the constraints of modern life.*
>
> *Our goal is for you to be empowered to make informed decisions about what is best for your own whānau"* (pp. 2-3).

Aotearoa New Zealand at least part time (this was defined as within 60-minutes-drive of Palmerston North), being able to speak, read, and write well in English, and being willing to remain involved in the study for 1-2 years and participate in both follow-up assessments. People with serious or chronic health conditions were allowed to enter the study on a case-by-case basis if the research team judged the particular health condition would not seriously interfere with their ability to benefit from the parenting intervention being trialled. Potential participants were excluded if they reported serious mental or physical health issues or addictions that were likely to limit their ability to make use of the information and resources presented in the workshop, insufficient time to attend a *Parenting From the Start* workshop while pregnant, or a close personal relationship with the lead researcher/workshop presenter (LM) which could interfere with effective randomization. The PhD supervision team included a registered midwife/certified lactation consultant (CB), a senior psychologist/Māori researcher (NT-M) and two senior clinical psychologists (SH and KR) during design and recruitment. Decisions regarding inclusion/exclusion were by consensus of LM and SH, based on screening questionnaire information and advice from CB pertaining to health conditions.

Procedure

Recruitment Process

The study was advertised by posters displayed around the Manawatū and Horowhenua regions in spaces expectant parents might frequent such as medical centres, Māori health organisations, universities and wānanga (Māori tertiary institutions), midwifery offices, and swimming pools, as well as online via social media (Facebook). Potential participants volunteered (i.e., were self-selected). Recruitment ran from 3rd March 2017 to 3rd February 2018. Local organisations offering care during pregnancy were invited to share information about the study, and several completed *Locality Assessments* to allow them to hand out and collect back *Screening Questionnaires* on behalf of the research team. Appendix B includes the *Locality Assessment* checklist.

Screening Process

Potential participants completed a short *Screening Questionnaire* to ensure they met inclusion criteria and were enrolled by the lead researcher (LM) once eligibility had been determined. The *Screening Questionnaire* was given either prior to, or along with, the rest of the *Information Pack.*[99] A sample *Information Pack* is provided in Appendix A.

Of the 83 people who enquired about the study, 8 were pre-excluded. Two of these people were unable to attend a workshop during pregnancy and therefore could not have complied

[99] Giving out the *Information Pack* alongside the *Screening Questionnaire* constituted an unintentional change to the study protocol which occurred for practical reasons in a minority of cases when potential participants displayed a strong interest in taking part but were nearing the end of their pregnancies or otherwise eager to read through the *Information Sheet* without delay and asked to take all forms away with them to complete. This had the potential to impact randomization if potential participants failed to enter the study, as the *Information Pack* was the mechanism for random assignment to groups.

with their actual or potential random allocation to the intervention group. This includes people who made contact within a few days of their due date or whose babies were born before they had attended a workshop. One additional person was not pregnant at the time of enquiry, and another was a second-time mother who enquired during the first month of recruitment when the study was only open to people expecting a first baby. One person was pre-excluded due to a close personal friendship with the workshop presenter. Three potential participants were pre-excluded because they made contact with the research team after recruitment had closed. People who were pre-excluded were not randomised because their ineligibility was obvious.

The remaining 75 individuals were randomly allocated to a group, but not everybody who was randomised was eligible or willing to take part. Type of exclusion by study condition can be read from Figure 15. The most common reason for exclusion was inability to attend a workshop during pregnancy. Eight potential intervention group participants fell into this category. Five people were excluded because they did not complete a *Screening Questionnaire* (four from the control group), and four more declined the invitation to take part (i.e., did not complete a *Consent Form*; two from each condition). One person was excluded due to a health condition that was judged likely to affect their pregnancy, birth, and/or parenting choices, and four were invited to participate despite reporting a serious physical or mental health condition. Thus, the final sample consisted of 57 expectant mothers. All participants self-identified as women, although gender was not presented as binary and this was not an inclusion criteria. Because all participants gave 'female' as their gender, the terms 'mothers' and 'women' are used interchangeably with 'study participants' throughout this thesis. 48 out of 54 first-time mothers and 20 of 25 experienced mothers who made initial enquiries were eligible to participate. Sample sizes reported here are based on the 57 participants (expectant mothers) who entered the study and received their allocated intervention.

Sample Size, Power, and Funding

Initial power calculations were necessarily tentative, as many of the relevant effect sizes could not be accurately estimated in advance. Primary outcome measures were considered as the basis for a range of possible effect sizes in a priori calculations to determine an appropriate sample size. As discussed in Chapter 4, meta-analyses suggests that short-term, behaviourally-focused interventions have moderately increased maternal sensitivity in previous studies, with combined effect sizes of d = .48[100] (van IJzendoorn et al., 1995) or d = .47 (Bakermans-Kranenburg et al., 2003). Assuming two groups, Independent Samples t-tests with a two-sided criterion for detection, an alpha of 0.05, and power of 0.80, the minimum sample size needed for an experiment sensitive enough to consistently detect an effect size of d = 0.47 would be 73 mother-baby dyads per group (The jamovi project, 2021).

[100] Cohen's *d* and Pearson's *r* are the most common measures of effect size. Cohen's *d* indicates the size of the difference between two groups while Pearson's *r* is a correlation coefficient measuring the strength of the relationship between two variables.

The effect size of existing attachment interventions is more variable, and few can be considered similar to the current intervention. A meta-analysis of 23 randomised controlled intervention trials assessing improvements in infant attachment obtained a group effect size of $d = 0.20$ ($p < .05$), but further analysis showed that only interventions focused exclusively on improving maternal sensitivity significantly affected infant attachment security, with the greater effect size of $d = 0.39$ ($p < .01$, k = 10, n = 463; Bakermans-Kranenburg et al., 2003). Using Egeland et al.'s (2000) classification of intervention methods, the attachment section of my *Parenting From the Start* workshop fits most closely into the category of "programs that seek to enhance parental sensitivity at the behavioral level" rather than those focused on the mental representations or wellbeing of parents, or provision of home visits (cited in Bakermans-Kranenburg et al., 2003, p. 196). But *Parenting From the Start* is aimed much earlier than most intervention research (during pregnancy), based on the evolved developmental niche rather than traditional attachment theory alone, combines parenting knowledge with gifted tools (a soft baby carrier), and is not targeted exclusively at clinical or 'vulnerable' groups. In terms of similarities, *Parenting From the Start* does aim to increase maternal sensitivity and does use attachment as an outcome measure, but pin-pointing a possible effect size based only on these characteristics was difficult. Of the five antenatal interventions identified by Bakermans-Kranenburg and colleagues (2003), only one focused exclusively on increasing sensitive maternal behaviour (Leitch, 1999, $d = 0.82$), and only two included attachment as an outcome measure ($d = 0.00$ in Barnard et al, 1988; $d = 0.96$ in Jacobson & Frye, 1991), with wide variation in effect sizes (0.00 to 0.96). It is unclear to what extent this existing research might be applicable. More similar prior research utilising a gifted sling intervention to increase maternal sensitivity and rates of attachment (Anisfeld et al., 1990) obtained statistically and clinically significant results with a total sample size of 49 mother-baby dyads. The review gives effect sizes of $d = 0.53$ for sensitivity, and d = 0.62 for attachment in this study (Bakermans-Kranenburg et al., 2003). Assuming Independent Samples t-tests with a two-sided criterion for detection, an alpha of 0.05, and power of 0.80, the minimum sample size needed for an experiment sensitive enough to consistently detect an effect size of $d = 0.62$ would be 42 mother-baby dyads per group (The jamovi project, 2021).

Table 16 illustrates the sensitivity of a designs with a total of 146 mother-baby dyads to true effects of increasing sizes; that is, how likely we are to conclude that the true effect size (delta) $\delta > 0$ when the effect size is large enough to care about.

Table 16.

Power by Effect Size Assuming a Sample Size of N = 146 Mother-Baby Dyads

True effect size	Power to detect	Description
$0 < \delta \leq 0.327$	≤50%	Likely miss
$0.327 < \delta \leq 0.467$	50% – 80%	Good chance of missing
$0.467 < \delta \leq 0.601$	80% – 95%	Probably detect
$\delta \geq 0.601$	≥95%	Almost surely detect

Note. Jamovi model assuming two-sided alpha = .05 with power = .80 to detect effect size $d = .47$

Given the range of possible effect sizes which might be relevant, and my financial constraints as a PhD candidate, I aimed for a large enough sample size to detect changes in infant attachment and maternal sensitivity as a result of the intervention, with some possibility of identifying smaller effects.

Financial support for the project came from a variety of scholarships, grants, and personal contributions totalling $133,709. Details are summarised in Appendix C. Funding was sufficient to gift up to 200 sets of parenting resources (100 per study condition), but this ambitious sample size was not achieved as I lost a pregnancy the week recruitment began and was unable to proactively promote the study for some weeks. Recruitment ended after 11 months due to time constraints[101] with an initial sample size of 57 expectant mothers total (40 first-time mothers and 17 experienced mothers). Of these, 46 mothers completed one or more follow-up measures alongside their babies – a retention rate of 80.7%. The majority (N = 42, 74% of the original sample) completed both follow-up assessments. While retention is satisfactory for a longitudinal study lasting well over a year,[102] the initial sample size was disappointing. All unused funds were returned and funders had no input into the project.

Power analysis on completion of data analysis evaluated the sensitivity of the design for detecting a specified effect size using Independent Samples t-tests given the final sample size. Condition sample sizes of 20 and 22 for intervention and control groups respectively allow detection of effect sizes of $\delta \geq 0.47$ with a probability of at least 0.318, assuming a two-sided criterion for detection and a maximum Type I error rate of $\alpha = 0.05$ (The jamovi project, 2021). Detection of effect sizes of $\delta \geq 0.62$ had a probability of at least 0.499, assuming a two-sided criterion for detection and a maximum Type I error rate of $\alpha = 0.05$ (The jamovi project, 2021). Table 17 shows that the power to detect effect sizes of 0.620 to 0.887 is only 50% to 80%, so moderate effects will not always have been detected within my sample, and effect sizes smaller than this are likely to have be missed (The jamovi project, 2021).

Table 17.

Power by Effect Size Given the Final Sample Size (N = 42)

True effect size	Power to detect	Description
$0 < \delta \leq 0.620$	≤50%	Likely miss
$0.620 < \delta \leq 0.887$	50% – 80%	Good chance of missing
$0.887 < \delta \leq 1.142$	80% – 95%	Probably detect
$\delta \geq 1.142$	≥95%	Almost surely detect

Note. Jamovi model assuming two-sided alpha = .05 with power = .80 to detect effect size of delta = .62

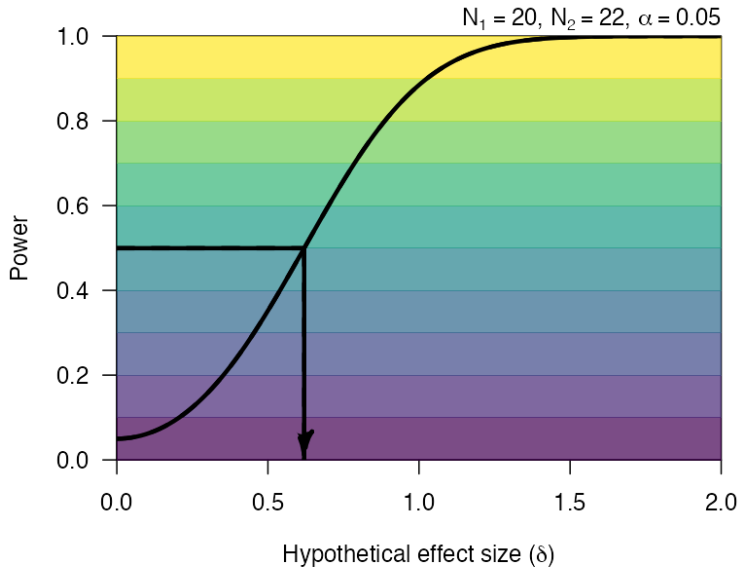
[101] In addition to university constraints on the length of doctoral studies, I gave birth myself on 26/2/2018, with subsequent parental leave precluding further workshops.

[102] Depending on the stage of pregnancy at which participants entered the study they were involved for the remaining time until their baby was due plus over a year post birth (sometimes 20+ months).

The power curve in Figure 16 shows how the sensitivity of the test and design is larger for larger effect sizes. The sample size achieved at the final follow-up assessment (N = 42) did not have the power to reliably detect true effects smaller than Cohen's *d* = 0.887. Thus, although all variables specified in the pre-registered hypotheses were examined, only large effect sizes are likely to have been detected in this initial evaluation of the intervention.

Figure 16.

Power Curve Showing How the Sensitivity of the Final Research Design (N = 42) is Larger for Larger Effect Sizes



Expert Hui and Pilot Workshop

As part of the bicultural partnership approach used in the project, an early version of the *Parenting From the Start* workshop was presented to 17 health professionals and language/cultural experts on 10th November 2016. Written feedback from this range of psychologists, nurses, childbirth educators, social workers, midwives, lactation consultants, parenting educators, Te Reo Māori experts, and other stakeholders informed the subsequent development of the intervention. Individual consultations with experts, mentors, and my cultural supervisor were also undertaken as required.

In addition, potential participants who were excluded from the study early in the recruitment period (e.g., because they were not pregnant at the time of enquiry or not expecting a first baby) were invited to attend a pilot workshop alongside graduate students and professionals volunteering as research assistants (total N = 14). The purpose of the pilot workshop was to provide anonymous written feedback to improve implementation of the intervention and study procedures in the subsequent study. No analysis based on attendees of the expert hui or pilot workshop is included in this thesis, but their advice and wisdom guided the project.

Data Collection

Data collection occurred in three phases, outlined in Figure 17. The first set of information was collected during pregnancy (Time 1) for intervention group participants only. The intervention (described in Chapter 6) combined an 8-hour antenatal workshop with a gifted *Moby Wrap* sling. Intervention group participants completed the *Parenting Intentions Questionnaire* (PIQ) immediately before and after the intervention to track any changes resulting from the workshop. A *Workshop Feedback Form* for each half of the workshop enabled participants to comment on the quality of the intervention, and this feedback informed minor changes in subsequent workshops. The two halves of the workshop were designated Part 1 and Part 2. Participants assigned to the wait list control group did not complete any measures at this time point to avoid new parenting information acting as an unintended intervention.

All participants (both intervention and control) were followed up when their babies were 11-24 months old (Time 2). Each family was visited in their home for 90 to 120 minutes at a time convenient to them. Visit length was increased from the planned 60-90 minutes duration I pre-registered based on feedback from the home visitor that the interview and associated tasks could not be completed within 60 minutes and the visit usually took two hours. An introductory email to mothers explained that the purpose of the visit was to see how they and their babies were doing, and to complete additional measures. Participants were observed with their baby: playing with and without toys, during feeding (where possible), and during a divided attention task requiring mothers to balance childcare with completing the *Parenting Strategies Questionnaire* (PSQ) with paper and pen. The semi-structured interview included questions about the family's parenting approach to date. The procedure for the home visit was based on descriptions by Pederson et al (2014) and Bailey and colleagues (2017, p. 437). Babies were free to play and wander in between the brief assessments of dyadic play – creating a busy naturalistic environment in which mothers had to deal with the conflicting demands of monitoring, entertaining, feeding, and comforting their toddler alongside completing questionnaires and answering the home visitor's questions. This procedure is thought to reduce observer effects, and meta-analyses suggest it has resulted in robust assessments of maternal sensitivity (Atkinson et al., 2005). The home visitor took notes, but no video recording was used. All measures were broad and contextual based on meta-analyses suggesting this approach produces larger effect sizes than simple behaviour counts (De Wolff & van IJzendoorn, 1997; H. H. Goldsmith & Alansky, 1987). All home visits were completed by the same research assistant (RP). Debriefs with the lead researcher (LM) were carried out in person or by phone after each visit, and before scores were finalised, to assist the research assistant in reflecting more fully on their impression of each mother-baby pair.[103] Measures were scored based on the full 90 to 120 minutes home observation, with the exception of one assessment which was conducted via Zoom video call because the family had moved away.

[103] This procedure was recommended by our trainers at the University of Guelph. I acknowledge the potential for unintentional bias given the lead researcher had knowledge of study group membership, but LM did not tell mention which group participants belonged to.

Mothers were offered the chance to complete the *Edinburgh Postnatal Depression Scale (EPDS)* screening test for postnatal depression during the home visit. This was optional, and participants scoring over the cut-off of 10 were referred to local services and/or provided with information about where they could seek support. After each home visit the research assistant completed three measures of parenting sensitivity and responsiveness. With the exception of high scores on the postnatal depression measure, participants were not routinely advised of the outcome of these assessments.

Figure 17.

Diagram of Study Methodology Showing Assessment Measures Over the Three Time-Points.

RECRUITMENT

Study advertised online and throughout the Manawatū/Horowhenua, with assistance from partner organisations. Potential participants complete *Screening Questionnaire* & receive an *Information Pack*

↓

ENROLMENT IN RANDOMLY ALLOCATED GROUPS

Intervention Groups: B & D (n = 27)	**Control Groups: A & C** (n = 30)

↓

TIME 1: During Pregnancy

PRE-TEST

Parenting Intentions Questionnaire (PIQ) including *Parenting Beliefs Scale* (PBS)	(not applicable)

INTERVENTION

Antenatal parenting workshop & gifted sling	(wait-list control)

POST-TEST

PIQ, PBS and *Workshop Feedback Form*	(not applicable)

↓

TIME 2: First follow-up (home visits 11-24mths post birth)

Parenting Strategies Questionnaire (PSQ) including *Parenting Beliefs Scale* (PBS), & parts of the *Evolved Developmental Niche* (EDN) *Scale*	*PSQ*
Postnatal Depression Questionnaire (EPDS)	*PBS*
Ainsworth Sensitivity Scales (ASS)	*EPDS*
Maternal Behavior Q-Sort (Mini-MBQS)	*ASS*
Observational Sensitivity Measure (OMOSAR)	*Mini-MBQS*
	OMOSAR

TIME 3: Final follow-up (clinic assessments 11-22mths post birth)

Strange Situation Procedure (SSP)	*SSP*
Evolved Developmental Niche (EDN) *scale*	*EDN scale*
Adverse Childhood Events (ACE) *scale*	*ACE scale*
-	**Preschool workshop & gifted parenting book**

TIME 4: Feedback

Letter to participants and partner organisations	Letter to participants and partner organisations

When babies reached a year old (Time 2), mothers were invited to a final assessment at the University Psychology Clinic. Participants were met by a research assistant unaware of their group allocation (i.e., whether they were in an intervention or control group). This 'host' guided each parent-child dyad through the *Ainsworth Strange Situation Procedure* (SSP), with the assistance of at least one other trained research assistant. Twelve volunteers – mostly psychology students or professionals in associated fields (e.g., parenting educators and breastfeeding support workers) took turns assisting the research assistant (DM) who ran and scored all procedures. All research assistants were blind to participants' study condition (intervention vs control group), and completed at least 1 hour of training in advance to ensure they understood their roles adequately[104] as well as signing confidentiality forms. A full script for the SSP was provided and used for each attachment assessment. The lead researcher emailed participants in advance to describe the final assessment and explain it would be run by trained research assistants to reduce bias, noting it would be helpful if they could avoid mentioning which of the study groups there were in. A sample letter is shown in Appendix D.

Before leaving the Psychology Clinic, all participants were asked to complete two questionnaires. The first asked about the baby's first year and covered all elements of the evolved developmental niche (the *Final Questionnaire*, which included the *EDN Scale* - a new measure developed for this study). The second questionnaire, the *ACE Scale* retrospectively assessed the number of adverse childhood experiences (ACEs) mothers were themselves exposed to before the age of 18 years. This one-page questionnaire is designed for routine use in medical practices[105] and can be viewed in Appendix P. All participants were given the opportunity to ask questions and thanked for their involvement.

Some months after the final assessment was complete, control group participants were contacted by the researcher and invited to attend a preschool version of the *Parenting From the Start* workshop focusing on evidence about what young children need to thrive. All participants (intervention and control) were also eligible for a free one-on-one consultation with a registered clinical psychologist (the lead researcher) to discuss any aspects of parenting that concerned or interested them, including their baby's attachment assessment.[106]

At the conclusion of the study, all participants were sent a letter/email thanking them for their participation and summarising the main findings in clear, jargon-free language. A summary of findings was also sent to funders and partner organisations such as the *Te Hāhi Tūhauwiri NZ Society of Friends (Quakers)*, *Barnardos*, *Te Aroha Noa Community Services*, and *Community Birth Services*. Staff of partner organisations were offered the chance to attend a

[104] Training was one-on-one or in small groups and included general information about attachment and the purpose of each part of the *Strange Situation Procedure* as well as videos &/or role plays to increase familiarity with the Host and Stranger roles.

[105] The ACE scale is usually followed by a brief explanation about how ACEs are associated with poor health in adulthood. The information that adverse childhood experiences such as abuse and neglect are linked to poorer health outcomes (both physical and psychological), and sensitive responsive parenting is linked to positive outcomes was detailed in the Preschool version of the *Parenting From the Start* workshop that control group participants were invited to attend at the conclusion of the study.

[106] Few participants have made use of this opportunity to date, despite several written reminders, but this may have been impacted by the Covid-19 pandemic, which began as data collection ended and continued to impact gatherings several years later.

workshop as part of their professional development, and several dedicated training sessions were offered on attachment as a koha/thank you for their assistance with recruitment.

Measures

The experimental methodology chosen for this trial allowed *Parenting From the Start* to be evaluated using a variety of established and purpose-designed measures assessing parenting strategies and health outcomes. Pre- and post-tests within the intervention group made it possible to track changes in parenting intentions which occurred as a result of the parenting workshop, and workshop feedback was collected to guide development of the intervention. The primary outcomes identified in the pre-registration were (1) maternal sensitivity & responsiveness, & (2) security of the attachment relationships between each child and their mother. These were considered key indicators of the effectiveness of the intervention. Secondary outcomes included (1) workshop feedback, (2) changes in parenting intentions, (3) parenting strategies used during the first year, and health outcomes such as (4) birth outcomes and interventions, (5) admissions to the neonatal unit (NNU), (6) breastfeeding outcomes, and (7) postnatal depression.

No standardised questionnaire exists which covers all or even most of the elements of the human evolved developmental niche. It was therefore necessary to create items about parenting intentions and strategies to capture a range of ancestral parenting practices as they might appear in modern Aotearoa New Zealand. I developed questionnaire items relating to a hypothetical prototype of hunter-gatherer caregiving based on similarities which exist across foraging cultures around the world, with consideration for how such parenting might appear in the context of a modern developed agricultural society such as Aotearoa New Zealand. As noted in Part 1 of the thesis, anthropological research characterises hunter-gatherer caregiving as warm, nurturing, and responsive, with 'natural' (physiologically normal, non-institutional) birth, extended breastfeeding, and infant needs met promptly and consistently by a variety of alloparents in addition to the biological parents (Hewlett & Lamb, 2009). My goal was therefore to cover key elements of the evolved developmental niche (EDN) including physiologically-normal birth, extended breastfeeding, high levels of social support, alloparenting, close physical proximity, and sensitive responsive care (Narvaez, Gleason, et al., 2013; Narvaez, Wang, et al., 2013; Narvaez & Witherington, 2018) as well as related variables such as postnatal depression and the key outcome measures of maternal sensitivity and patterns of infant attachment.

Three self-report questionnaires were constructed to cover the three time periods. The *Parenting Intentions Questionnaire* (PIQ) provided pre- and post-test measures completed by expectant mothers immediately before and after the *Parenting From the Start* workshop during pregnancy (Time 1). The *Parenting Strategies Questionnaire* (PSQ) was completed at the home visit (Time 2), and a subset of items from this measure constitute the *Brief EDN Scale*. The *Final Questionnaire* (Appendix I) was completed at the final assessment (Time 3). A subset of items from this last time point constitute the *Evolved Developmental Niche* (EDN) *Scale*.

Subsequent sections outline all measures (both new and established), presented in the order participants completed them except where it makes sense to discuss Time 2 and Time 3 results in tandem.

Time 1 Measures (During Pregnancy)

Intervention group participants completed the *Parenting Intentions Questionnaire* (PIQ) immediately before and after the *Parenting From the Start* antenatal workshop, and separate *Workshop Feedback Forms* at the conclusion of Parts 1 and 2 (the two halves of the workshop). Time was set aside to ensure the forms were filled out on site in all but rare instances.

Workshop Feedback. Workshop feedback was a secondary outcome measure assessed via maternal responses to likert scales on the purpose-designed *Workshop Feedback Form*. Study participants, partners, support people (including whānau), and community members/health professionals completed feedback forms for Parts 1 and 2 of the workshop separately, to better assess perceptions of the first and second halves. Responses were anonymous and almost always completed the same day, at the end of the relevant section. Questions on the *Feedback Forms* asked about the *overall quality of the workshop* (1=very bad, 2=bad, 3=okay, 4=good, 5=excellent). Half marks were permitted. Similar 5-point likert scales assessed the extent to which participants felt the workshop had *increased their ability to make informed choices* about parenting, *increased their parenting knowledge*, and *increased their parenting confidence,* rated the degree to which they considered each half of the workshop *culturally appropriate for Aotearoa New Zealand*, and whether the information was *presented in a non-judgemental way*. Possible scores for these questions included: 1=strongly disagree, 2= disagree, 3= not sure, 4=agree, 5=strongly agree. Half marks were permitted. Participants used the same scale to rate the degree to which they were *glad they attended* and whether they thought the workshops *should be offered to other parents.* Open-ended questions invited additional qualitative responses about the aspects of the workshop participants *liked most, liked least,* and *found most useful/interesting* as well as asking them to *describe the workshop to other parents*. The purpose of this qualitative data was to guide future workshops by enabling attendees to clarify or expand on their answers and/or express additional ideas and concerns. An example *Feedback Form* is shown in Appendix E.

Parenting Intentions. Parenting intentions were secondary outcomes measured by maternal responses to likert scales on the *Parenting Intentions Questionnaire* (PIQ), which was purpose-designed to quantify caregiving plans and beliefs prior to childbirth. Items were chosen to cover multiple domains of the evolved developmental niche. The full *Parenting Intentions Questionnaire* (PIQ) can be found in Appendix F. Parenting intentions assessed at Time 1 are summarised in Table 18, including the item/s or scale/s used, with additional details in Appendix G.

Table 18.

Parenting Intentions Assessed During Pregnancy (Time 1)

Parenting intention	Item or scale	Measurement
Birth intentions	*Planned place of birth*	Ordinal scale where 1=home, 2=birth centre, 3=hospital
	Planned type of delivery	Ordinal scale where 1=vaginal, 2=instrumental, and 3=surgical
	Planned use of medications	5-point likert scale anchored with descriptors: (1) definitely not, (2) probably not, (3) maybe, (4) probably, (5) definitely
Feeding intentions	*Intention to breastfeed*	5-point likert scale anchored with descriptors: (1) definitely not, (2) probably not, (3) maybe, (4) probably, (5) definitely
	Intention to feed formula	5-point likert scale anchored with descriptors: (1) definitely not, (2) probably not, (3) maybe, (4) probably, (5) definitely
	Age baby will start breast milk	Age 0 to 12mths rounded to nearest half month, with a score of 13 indicating plans to avoid formula
	Age baby will start formula	Age 0 to 12mths rounded to nearest half month, with a score of 13 indicating plans to avoid formula
	Intended duration of breastfeeding	Age 0 to 12mths rounded to nearest half month, with a score of 13 indicating plans to avoid formula
	Intended duration of exclusive breastfeeding/ human milk	Age 0 to 12mths rounded to nearest half month, with a score of 13 indicating plans to avoid formula
	Overall intention to practice infant toileting	Ordinal scale where 0=No, not at all, 1=Don't know, 2=Yes part time, and 3=Yes full time
	Planned frequency of day-time infant toileting	5-point likert scale anchored by descriptors: (0) never, (1) occasionally, (2) sometimes, (3) often, to (4) always
	Planned frequency of night-time infant toileting	5-point likert scale anchored by descriptors: (0) never, (1) occasionally, (2) sometimes, (3) often, (4) always
Intentions regarding close proximity	*Co-sleeping (intention to room-share at night)*	5-point likert scale anchored by descriptors: (0) never, (1) occasionally, (2) sometimes, (3) often, (4) always
	Co-sleeping (intention to bed-share at night)	5-point likert scale anchored by descriptors: (0) never, (1) occasionally, (2) sometimes, (3) often, (4) always
	Planned separations during daytime sleeps	5-point likert scale anchored by descriptors: (0) never, (1) occasionally, (2) sometimes, (3) often, (4) always
	Planned separations during nighttime sleeps	5-point likert scale anchored by descriptors: (0) never, (1) occasionally, (2) sometimes, (3) often, (4) always
Intentions regarding alloparenting (shared care)	*Number of main caregivers during first six months*	Continuous scale based on open-ended question about caregiving arrangements when baby is 0-6mths old
	Number of main caregivers during second six months	Continuous scale based on open-ended question about planned caregiving arrangements when baby is 6-12mths old
Intentions regarding responsive care	*Parenting approach/beliefs*	20-item *Parenting Beliefs Scale* (PBS)

Beliefs Regarding Responsive Care. The extent to which participants believed sensitive, responsive caregiving was desirable was measured by the purpose-designed *Parenting Beliefs Scale*[107] (PBS) which consists of 20 statements relating to the first 12 months after birth. Participants were asked to circle the one answer ('Agree' or 'Disagree') that best fit their views in order to encourage forced-choices. Items were drawn from informal and professional contacts with parents through *Community Birth Services* and other parenting organisations in the Manawatū rohe, and were designed to capture beliefs frequently expressed by mothers. One point was given for each nurturing/responsive statement (a, c, f, g, i, k, m, n, o, s, and t) participants agreed with on the PBS. The remaining items (b, d, e, h, j, l, p, q, and r) were reverse-scored so that respondents received a point if they disagreed with the statement. The item scores were summed to produce a score out of 20, which was then converted to a percentage. Higher scores indicate a more child-centred, nurturing, and responsive approach to parenting. Half marks were assigned if a participant selected both answers, neither answer, or indicated they were not sure of their answer (for example by writing "not sure" in the margin of the questionnaire). Parenting beliefs were also measured at Time 2 (during the home visit), using the same scale. PBS items and scoring are shown in Table 19.

Table 19.

Parenting Belief Scale (PBS) Items and Scoring

PBS Item	**Scoring**	
Over the first 12 months after birth:	*Disagree*	*Agree*
a) It is best to respond to a baby/pēpi as quickly as possible	0	1
b) Babies/ngā pēpi should not be held or carried too much	1	0
c) Babies/ngā pēpi are better cared for if parents attend to their needs	0	1
d) It is best to ignore the first few minutes of crying	1	0
e) Babies/ngā pēpi can be spoiled by too much attention	1	0
f) It is best to feed 'on demand' (i.e., whenever the baby/pēpi wants)	0	1
g) The more responsive parents are, the less babies/ngā pēpi cry	0	1
h) Babies/ngā pēpi should spend time in their own room	1	0
i) Parents and other caregivers should be reliably responsive	0	1
j) It is best to feed babies/ngā pēpi on a schedule	1	0
k) All my pēpi/baby's needs should be met promptly	0	1
l) Babies/ngā pēpi must learn independence as early as possible	1	0

[107] The PBS was presented to participants as Section 9 of the *Parenting Intentions Questionnaire.*

m) A baby/pēpi should be held and carried as much as they want	0	1
n) Babies/ngā pēpi develop independence in their own time	0	1
o) Babies/ngā pēpi need care at night as well as during the day	0	1
p) Babies/ngā pēpi need to learn to wait for what they want	1	0
q) Babies/ngā pēpi must be trained to sleep through the night	1	0
r) Responding to crying makes babies/ngā pēpi cry more	1	0
s) Babies/ngā pēpi should be kept comfortable at all times	0	1
t) Babies/ngā pēpi cannot be spoiled by too much attention	0	1

The internal reliability of the *Parenting Beliefs Scale* was acceptable. The scale evidenced good internal consistency (Cronbach's alpha >0.800) on all three occasions it was used – before and after the workshop, and when completed at the home visit by participants from all study groups (both intervention and control participants). Reliability coefficients are shown in Table 20. Items were automatically excluded from the reliability analyses if they demonstrated no variability between participants at the time-point in question (for example, because all participants scored maximum points for that item) (Jamovi statistical software, The jamovi project, 2021). Only one item (s: *Babies/ngā pēpi should be kept comfortable at all times*) produced no variance across all three time-points. Items were not altered or reversed based on the outcome of the reliability analyses, even if Jamovi identified them as being negatively correlated with the total scale.[108] Scoring remained as shown in Table 19.

[108] Jamovi identified items 14 (n: *Babies/ngā pēpi develop independence in their own time)* and 16 (p: *Babies/ngā pēpi need to learn to wait for what they want*) as negatively correlated with the total scale at one or both Time 1 assessments. Reverse-scoring was recommended for item 14(n) at both the pre-test and the post-test, and item 16(p) for the post-test only, but these changes were not made. The original scoring method was retained for theoretical reasons pending further investigation with other samples.

Table 20.

Internal Consistency of the Parenting Beliefs Scale (PBS) at Three Time-Points

Time-point	**Participants**	**Study phase**	**Mean item score (SD)**	**Items excluded from analysis (numbers & names)^**	**Reliability** (Cronbach's alpha)
Time 1 (pre-test)	Intervention group mothers only	Before workshop, during pregnancy	M = 0.793 (0.188)	5(e), 11(k), 15(o), 19(s)	**α = 0.807**, based on 16 items
Time 1 (post-test)	Intervention group mothers only	After workshop, during pregnancy	M = 0.896 (0.181)	1(a), 2(b), 3(c), 5(e), 9(i), 11(k), 15(o), 18(r), 19(s), 20(t)	**α = 0.818**, based on 10 items
Time 2	Intervention and control group mothers	At home visit 11 to 24 months post birth	M = 0.900 (0.141)	9(i), 19(s)	**α = 0.823**, based on 18 items

Note. ^ items were automatically excluded by the jamovi statistical analysis package if there was no variance (i.e., all respondents gave the same answer)

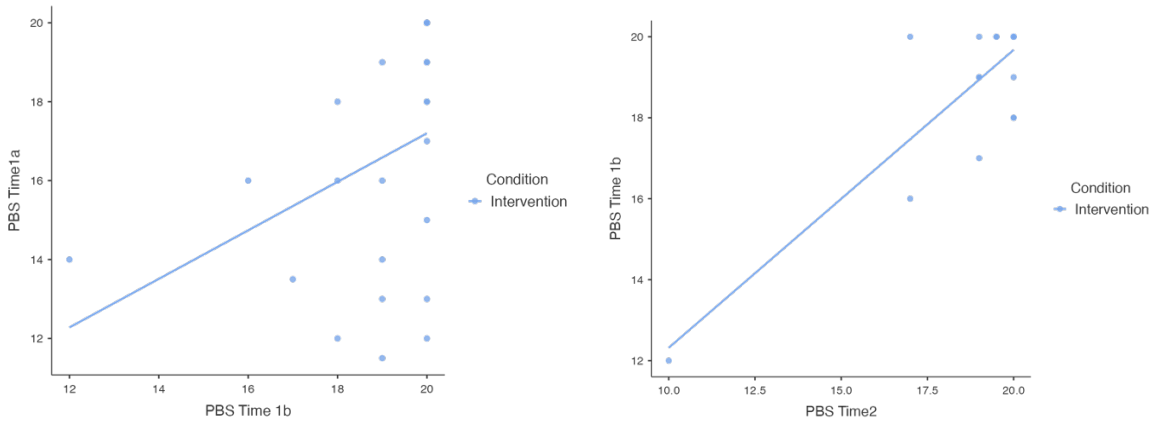
Test-retest reliability was estimated using comparisons of PBS scores across these three time points. This provided preliminary data about the measure's ability to capture both continuity and change. Continuity was not expected across the two measurements at Time 1, as these were pre- and post-tests designed to capture changes in parenting beliefs resulting from the *Parenting From the Start* workshop. A scatterplot of PBS scores at Time 1a (pre-test) and 1b (post-test) PBS scores shows a non-linear relationship where intervention-group mothers tended to score reasonably high on the PBS at post-test regardless of their (variable) pre-test score (see Figure 18a). Pearson's correlation was not appropriate given the non-linear relationship but Spearman's rank correlation (rho)[109] was statistically significant ($\rho = 0.514$, $p = .009$, n = 22), suggesting mothers' rank scores on this measure remained somewhat similar across the two assessments.

Test-retest reliability from pregnancy to the home visit (at least 11 months later) was also calculated for intervention group participants. The scatterplot can be seen in Figure 18b. The Pearson's correlation between parenting beliefs across this time period was strong and statistically significant ($r = 0.847$, $p < .001$), suggesting workshop post-test scores were maintained over many months. Spearman's rank correlation was moderately strong ($\rho = 0.460$, $p = .036$, n = 21). Given the newness of the measure, conclusions based on it are necessarily tentative, but this initial reliability data is promising.

[109] Spearman's ρ is a nonparametric measure of relationship between the rank correlation of two variables. Pearson's r is the appropriate measure of correlation for linear relationships.

Figure 18.

Scatterplots of PBS Scores at (a) Time 1 (Pre-Test and Post-Test) and (b) Time 1 (Post-Test) to Time 2.



Time 2 & 3 Measures (Follow-Up Assessments)

Maternal and Infant Characteristics. Participants recorded their date of birth and current age, gender, ethnicity, education level, and gross annual family income on the *Parenting Strategies Questionnaire* (PSQ). Educational levels were collected as ordinal level data based on the following brackets: (1) some high school, (2) completed high school, (3) a certificate/diploma/or apprenticeship, (4) undergraduate degree, and (5) postgraduate degree. Family income refers to pre-pandemic levels: (1) less than NZ$20,000, (2) $21,000 – 40,000, (3) $41,000 – 60,000, (4) $61,000 – 80,000, and (5) $81,000 or more before tax per annum. Infant sex, ethnicity, birthweight (in kilograms) and gestation (the week of pregnancy in which baby was born) were based on maternal report at the home visit. Where necessary pounds and ounces were converted to kilograms using an online weight-conversion calculator (Starship.org.nz, 2019). Gestation was recorded in completed half weeks due to variation in the accuracy of reporting.[110] Ethnicity of mothers and babies was converted to one of three categories based on open-ended responses across questionnaires at the two follow-up assessments: (1) Participants reporting Māori or Pacific Island whakapapa/ancestry, (2) Pākehā/NZ Europeans, and (3) Other ethnicity. This was a priority classification, meaning participants were assigned to a single category even if they identified multiple ethnicities. Top priority was given to the 'Māori/Pasifika' category. The 'Other' category given second priority included people of any nationality/background outside of Aotearoa and the Pacific Islands. New Zealanders who identified their family as coming from elsewhere were included in this category even if they were born in Aotearoa, in recognition of the fact their lived experience might differ from both Māori/Pasifika participants and Pākehā New Zealanders (most of whom are White, and likely benefit from a degree of social privilege even if their other identity categories such as sexual orientation and socioeconomic status place them within minority or disenfranchised groups).

[110] By convention, the length of pregnancy in Aotearoa pregnancy is usually defined as beginning from estimated conception 2 weeks post LMP (last menstrual period). Some participants reported gestation in weeks plus days, others only in weeks.

Parenting Strategies. Actual parenting strategies were secondary outcomes examined at the home visit 11-24 months post birth and final assessment 11-22 months post birth. Home visits were always completed prior to final assessments. I aimed to schedule home visits in the second half of the first year and final assessments when babies were 12 to 18 months old as these are the recommended ranges for the *Maternal Behavior Q*-Sort and *Strange Situation Procedure* respectively, but this did not always work out. Parenting strategies were measured by maternal responses on the purpose-designed *Evolved Developmental Niche Scale* (EDN Scale) and *Parenting Strategies Questionnaire* (PSQ) including items making up the *Brief EDN Scale.* All study participants were invited to complete these follow-up measures. Of the 57 women who entered the study, 80.7% (n = 46) completed the follow-up home visit including the PSQ and Brief EDN Scale, and 73.7% (n = 42) attended the final clinic assessment including the full EDN Scale.

Two versions of the *EDN Scale* were designed to capture a range of ancestral parenting practices as they might appear in modern Aotearoa New Zealand. Each EDN subscale compares individual experiences to the nurturing, sensitive, responsive, and well-supported caregiving common to hunter-gatherer cultures across continents, and assumed to constitute evolved adaptations (Hewlett & Lamb, 2009). It is important to note that I am not advocating for modern New Zealanders to adopt a nomadic hunter-gatherer lifestyle. Rather, my focus is on the function certain kinds of caregiving may have served in terms of child development. As outlined in earlier chapters, breastfeeding serves nutritional purposes as well as increasing maternal sensitivity, and promoting infant brain development. Natural birth and human breastmilk seed and feed the infant microbiome with healthy bacteria and prebiotics to promote lifelong health. Feeding on demand, and prompt/appropriate/consistent responsiveness to infant elimination needs may improve hygiene as well as promoting psychological wellbeing through increased chance of secure attachment. For instance, *EDN Scale* questions aim to capture the extent to which infant communication regarding toileting needs was recognised and responded to promptly from an early age and the extent to which the baby was kept clean rather than left to sit in their waste. In modern contexts, these practices may involve the use of objects such as a potty, toilet, or nappy, but it is the awareness of infant capability and sensitive responsiveness to moment-by-moment needs that I considered to be key ingredients in terms of optimising development. A full discussion of these categories relevant to the content validity of the scale can be found in Chapter 5.

Individual items of the full *EDN Scale* are summarised in Table 21, and then described subscale by subscale. The *Final Questionnaire* that items are drawn from can be found in Appendix I with *EDN Scale* items highlighted. Higher scores on the *EDN Scale* indicate a closer 'fit' to my conceptualisation of the human evolved developmental niche. The *Brief EDN Scale* is a shortened version based on similar items from the *Parenting Strategies Questionnaire*, when multiple questionnaires and assessments reduced the time available. Detailed comparisons of the alternate versions of the *EDN Scale* appear in Appendix J. The earlier items of the *Brief EDN Scale* provide (limited) information about the consistency of participant reports over time. Not all subscales were assessed in the *Brief EDN Scale* and the question format also differed in some cases.

Table 21.

Evolved Developmental Niche Scale Items Completed at Time 3 (Final Assessment 11-22mth Post Birth)

EDN element	Item	Measurement
Healthy pregnancy	a. Often felt stressed (r) b. Usually felt safe c. Usually ate healthy food d. Usually exercised regularly e. Sometimes drank alcohol (r) f. Sometimes used drugs (r) g. Sometimes smoked tobacco or cannabis (r)	Binary responses (0=no, 1=yes) to 9-item subscale. Items a, e, f & g are reverse-scored (r). Item scores are summed to give the *EDN Healthy Pregnancy* subscale score
Natural birth	a. Labour began naturally b. Stayed upright &/or moved around c. Gave birth at home d. Gave birth in hospital (r) e. Gave birth in place of choice f. Had caesarean section (r) g. Gave birth vaginally h. Used labour drugs or medications (r) i. Instrumental birth (forceps/suction) (r)	Binary responses (0=no, 1=yes) to 9-item subscale. Items d, f, h, and i are reverse scored. Item scores are summed to give the *EDN Natural Birth* subscale score
Early proximity (first week)	a. Baby skin-to-skin for most of first 2 hours b. Baby spent most awake time with mother c. Baby ever separated from mother unwillingly (r) d. Baby sometimes out of earshot while awake (r)	Binary responses (0=no, 1=yes) to 4-item subscale. Items c and d are reverse scored. Item scores are summed to give the *EDN Proximity* subscale score
Proximity & responsiveness during infant sleep (first year)	1. Baby slept in same room as mother… *a. from birth to 3 months* *b. between 3 and 6 months* *c. between 6 and 9 months* *d. between 9 and 12 months* 2. Baby slept in same bed as mother… 3. Responded to baby during the night…	4-point likert scales for each quartile of the first year, anchored by descriptors: (0) Never, (1) Sometimes, (2) Often, and (3) Always. The *EDN Sleep* subscale score is obtained by summing all 12 item scores (i.e., 4 items per question), giving a possible range of 0 to 36.
Responsive infant feeding (first year)	1. Baby received human milk every day for _mths 2. Baby was fed 'on demand' every day for _mths 3. Baby was fed at the breast every day for _mths	Multiple-choice responses from 0 to 12 months (half numbers permitted). The *EDN Feeding* subscale is computed by

		summing the 3 item scores (possible range 0 to 36)
Responsive toileting (first year)	1. Baby used potty/toilet for _mths before age 1	Multiple-choice response from 0 to 12 months (half numbers permitted)
	2. Mother could tell when baby needed to wee… *a. from birth to 3 months* *b. between 3 and 6 months* *c. between 6 and 9 months* *d. between 9 and 12 months* 3. Mother could tell when baby needed to poo… 4. Nappy usually changed within 5 minutes…	4-point likert scales for each quartile of the first year, anchored by descriptors: (0) Never, (1) Sometimes, (2) Often, (3) Always. The 12 items were then summed with question 1 (above), giving an *EDN Toileting* subscale score of 0 to 48
Positive care (first year)	1. Baby handled gently… *a. from birth to 3 months* *b. between 3 and 6 months* *c. between 6 and 9 months* *d. between 9 and 12 months* 2. Mother able to play & talk to baby… 3. Baby held or carried (e.g., in arms or carrier)… 4. Baby responded to promptly (within 5mins)… 5. Family/whānau member home with baby... 6. Baby had constant access to loved caregiver…	4-point likert scales for each quartile of the first year (a, b, c, d), anchored by descriptors: (0) Never, (1) Sometimes, (2) Often, (3) Always. The six questions (24 items) are summed to give an *EDN Positive Care* subscale ranging from 0 to 72, with higher scores indicating greater reported positive care
Absence of negative care (first year)	1. Baby left to cry (for more than 5mins)… *a. from birth to 3 months* (r) *b. between 3 and 6 months* (r) *c. between 6 and 9 months* (r) *d. between 9 and 12 months* (r)	Reverse-scored using 4-point likert scales for each quartile of the first year, anchored by descriptors: (0) Always, (1) Often, (2) Sometimes, (3) Never
	2. Baby picked up when they cried… *a. from birth to 3 months* *b. between 3 and 6 months* *c. between 6 and 9 months* *d. between 9 and 12 months*	4-point likert scales for each quartile of the first year, anchored by descriptors: (0) Never, (1) Sometimes, (2) Often, (3) Always
	3. Baby yelled at… *a. from birth to 3 months* (r) *b. between 3 and 6 months* (r) *c. between 6 and 9 months* (r) *d. between 9 and 12 months* (r)	Reverse-scored using 4-point likert scales for each quartile of the first year (0= Always, 1= Often, 2= Sometimes, 3= Never) so that higher scores indicate healthier infant experiences and a better fit with the human

	4. Baby hit, thrown, or shaken… *a. from birth to 3 months* (r) *b. between 3 and 6 months* (r) *c. between 6 and 9 months* (r) *d. between 9 and 12 months* (r)	evolved developmental niche. The 4 questions (16 items) are summed to give the *EDN Absence of Negative Care* subscale score (possible range 0 to 48)
Alloparenting & social support (first year)	1. Parent had enough practical support… *a. from birth to 3 months* *b. between 3 and 6 months* *c. between 6 and 9 months* *d. between 9 and 12 months* 2. Parent had enough emotional support… 3. Parent had enough time for self-care… 4. Other adults to share day-to-day parenting…	4-point likert scale for each quartile of the first year, anchored by descriptors (0) Never, (1) Sometimes, (2) Often, and (3) Always. The four questions (16 items) are summed to give the *EDN Social Support* subscale score (possible range 0 to 48)

Table 22 presents internal consistency and test-retest reliability of the *Brief EDN Scale* used at Time 2 (home visit) and the full *EDN Scale* completed at Time 3 (final assessment). Of the nine EDN subscales assessed at Time 3, internal consistency (Cronbach's alpha) was above 0.9 in two cases (*EDN Sleep* & *EDN Social Support* subscales), above 0.8 in three cases (*EDN Birth*, *EDN Feeding*, and *EDN Positive Care* subscales), and above 0.7 for two cases (*EDN Early Proximity* & *EDN Absence of Negative Care* subscales). Internal consistency for the *EDN Toileting* subscale was only moderate with all 13 items included (α = 0.593 based on all 13 items).[111] Internal consistency was particularly low for the *EDN Healthy Pregnancy* subscale (α = 0.210), where the items were intended to capture a variety of antenatal health indicators (e.g., perceived stress and safety, diet, exercise, and use of non-prescription drugs during the antenatal period) rather than assessing a single construct.

The abbreviated subscales used to form the *Brief EDN Scale* at Time 2 generally included fewer items, and internal consistency was lower at this time point in most cases. Comparing parenting strategies across time points was not a planned analysis and this information is offered only as a rough measure of test-retest reliability across alternate versions of the EDN Scale. Bearing in mind the limitations, this data nevertheless provides some evidence that parenting remained stable over time. Test-retest reliability was complicated by the different items and scales of measurement used for the *Brief EDN Scale* at Time 2 (home visit) relative to Time 3 (final assessment). Nevertheless, Pearson's correlations between the two assessments were moderate to large, positive, and highly significant (p < .001) for all subscales, ranging from r = 0.506 for *EDN Early Proximity* to r = 0.957 for *EDN Birth*. Test-

[111] Internal consistency would be higher if the first item (item 12 in the Final Questionnaire) was excluded (α = 0.822 based on 12 items). The remaining 12 items measure elimination awareness rather than infant toileting practice, which is better captured by item 1: '*For how many months (0 to 12) during their first year did your baby/pēpi urinate ('wee) or defecate ('poo') in a toilet, potty, or similar at least some of the time?*' (range 0 to 12mths). In order to sample both content domains I retained all 13 items.

retest reliability for the alternate versions of the *EDN Scale* as a whole was also reasonable (r = 0.700, p < .001), giving us some confidence respondents provided consistent information about their parenting across the two follow-up assessments.

Table 22.

Internal Consistency and Test-Retest Reliability of the Evolved Developmental Niche (EDN) Subscales

EDN subscale	**Brief EDN Scale** **Time 2 (home visit, n = 46)**		**Full EDN Scale** **Time 3 (final assess, n = 42)**		**Test-retest reliability** (Pearson's correlation Time 1 & 2)
	Mean & standard deviation (item score)	**Internal consistency** (Cronbach's alpha)	**Mean & standard deviation** (item score)	**Internal consistency** (Cronbach's alpha)	
1. Healthy pregnancy	Not included in Brief EDN	Not included in Brief EDN	0.874 (0.134)	**α = 0.210** (7 items)	Not applicable
2. Natural birth[3]	0.533 (0.295)	**α = 0.821** (8 items)	0.590 (0.273)	**α = 0.810** (9 items)	**r = 0.957*** **
3. Early proximity[3]	5.89 (1.32)	**α = 0.568** (2 items)	0.869 (0.247)	**α = 0.706** (4 items)	**r = 0.506*** **
4. Infant sleep[3]	2.77 (1.24)	**α = 0.850** (3 items)	2.21 (0.683)	**α = 0.902** (12 items)	**r = 0.810*** **
5. Infant feeding[3]	10.2 (2.78)	**α = 0.626** Based on 2/3 items[5]	10.2 (3.24)	**α = 0.837** Based on 2/3 items	**r = 0.862*** **
6. Infant toileting[3]	M = 1.10 SD = 0.678	**α = 0.728** (based on 10/11 items)	M = 1.46 SD = 0.352	**α = 0.593** Based on all 13 items[6]	**r = 0.646*** ** (all items included)
7. Positive care	Not included in Brief EDN	Not included in Brief EDN	2.63 (0.227)	**α = 0.826** Based on 22/24 items[2]	Not applicable
8. Absence of negative care	Not included in Brief EDN	Not included in Brief EDN	2.79 (0.218)	**α = 0.796** Based on 14/16 items[2]	Not applicable
9. Social support[3]	2.41 (1.08)	**α = 0.762** (based on 2 items)	1.80 (0.669)	**α = 0.948** Based on all 16 items	**r = 0.581*** **
EDN Full Scale Score[3]	Not applicable	Not applicable	Not applicable	Not applicable	**r = 0.700*****

Notes. (1) Questionnaire items from the home visit relate to infants' first 5-6mths post birth, whereas items at the final assessment relate to infants' first 12mths. Not all subscales were assessed at both time points. (2) Items

were excluded by the statistical analysis package if there was no variance (i.e., all respondents gave the same answer). (3) Indicates alternate forms with different items and/or content. (4) *p < .05, **p < .01, ***p < .001. (5) Jamovi excluded item 'feeding schedule' from the Brief EDN scale analysis, and the item 'mths fed on demand' from the Full EDN Scale analysis. (6) α = 0.822 based on 12 items.

Infant and Maternal Health Outcomes. Health outcomes such as rates of vaginal birth, number of birth interventions, admissions to the neonatal unit (NNU), infant 'colic', and exclusivity and duration of breastfeeding are summarised in Table 23. All data was self-reported on the PSQ (Appendix H) unless otherwise specified. More detailed descriptions can be found in Appendix K.

Table 23.

Secondary Health Outcomes Assessed in Pakiaka Tupuora Randomised Controlled Trial

Category	Item or scale	Measurement
Place of birth	*Planned place of birth*	Proportion of mothers stating they intended to birth (1) at home, (2) in a birth centre, & (3) in hospital
	Actual place of birth	Proportion of babies born (1) at home, (2) in a birth centre, & (3) in hospital
Birth outcomes	*Type of delivery*	Proportion of mothers experiencing (1) vaginal birth, (2) instrumental delivery (forceps or suction), & (3) surgical delivery (caesarean section)
	Total rate of interventions	Sum of 16 perinatal interventions including: (1) Prostin gel, (2) artificial rupture of membranes (ARM), (3) oxytocin drip (e.g., 'syntocinon'), or (4) Cooks catheter, (5) Entonox gas, (6) Fentanyl ('IV opioid/opioid given through a drip'), (7) Epidural ('tube into epidural space near spine'), (8) Spinal ('one-off injection into intrathecal space near spine'), (9) general anaesthetic ('put to sleep'), (10) or 'another intervention during labour or birth (e.g., Remifentanyl PCA - patient controlled analgesia[112]'), (11) caesarean section, (12) forceps/suction, (13) Local anaesthetic ('injected'), (14) Spinal ('had to go to theatre'), (15) Entonox gas, (16) Panadol &/or voltaren ('diclofenac'). Each scored one point
	a. Interventions to start labour	Proportion of mothers who had inductions (Prostin gel, ARM, Oxytocin drip, or Cooks catheter) and planned caesarean sections. Considered separately and summed.
	b. Interventions during labour	Proportion of mothers who had the following interventions during labour: (1) Entonox gas, (2) Fentanyl, (3) Epidural, (4) Spinal, (5) General anaesthetic), or (6) Forceps/suction, (7) Caesarean section, (8) another intervention during labour or birth (including augmentation via synthetic oxytocin drip). Considered separately and summed.

[112] This was an error in the questionnaire. The PCA used in the MidCentral region is actually Bupivicaine (1.25mg/mL + Fentanylcitrate 2 mcg/mL and Fentanyl). Unfortunately this was not detected until editing.

	c. Interventions after birth	Proportion of mothers who had the following interventions after birth: (1) Local anaesthetic, (2) Spinal, (13) Entonox gas, & (14) Panadol &/or voltaren. Separate and summed.
Neonatal outcomes	*Admissions to neonatal unit*	Ordinal responses to the question *'My baby/pēpi was admitted to the neonatal unit (NNU)'* where 0=No, 1=After the first week, 2=Between days 2 and 7, 3=6 to 24hrs after birth, & 4=Within the first 6 hours. Converted to a binary variable (admitted/not)
Infant health outcomes	*Infant colic (first 5-6 months)*	Four-point likert (quasi-continuous) response to the question: *'During the first 5-6 months, my baby/pēpi experienced infant 'colic' (prolonged unexplained crying)'* where 0=Never, 1=Occasionally, 2=Sometimes, & 3=Often. Range = 0 to 3
	Unexplained crying (first 12 months)	Sum of four likert scale responses: *'Did your baby/pēpi have colic or long bouts of unexplained crying... (a) from birth to 3 months? (b) between 3 and 6 months? (c) between 6 and 9 months? (d) between 9 and 12 months?'.* Each scale (a to d) was scored 0=never, 1=Sometimes, 2=Often, & 3=Always. Range = 0 to 12
Breastfeeding outcomes	*Breastfeeding duration (Time 2 & Time 3)*	PSQ items (Time 2): Breastmilk during first year (exclusive or partial). Range= 0 to 12 (completed half months) Final questionnaire item (Time 3): *'For how many months (0 to 12) during their first year did your baby/pēpi receive human breastmilk every day?'.* Range = 0 to 12 months (completed half months)
	Duration of formula use (Time 3)	Final questionnaire item (Time 3): Formula use during first year. Range 0 to 12 mths (completed half months). If only during first fortnight score 0.1 for each 3-day period including formula
	Exclusive breastfeeding (first 6-12 months)	Duration of exclusive breastfeeding during first year (completed half months). If only during first fortnight score 0.1 for each 3-day period including BF
	'Almost exclusive' breastfeeding	Duration of exclusive breastfeeding (during first year, completed half months) excluding any infant formula given during the first month
Postnatal depression screen	*Edinburgh Postnatal Depression Scale* (EPDS)	Proportion of mothers with an EPDS score over the cut-off ($\geq$ 10), average score on EPDS

Notes. All answers based on the *Parenting Strategies Questionnaire* (PSQ) and EPDS participants completed at the home visit 11 to 24 months post birth (Time 2) unless otherwise specified. Quotes in brackets were the non-technical descriptions provided for complex medical interventions.

Postnatal Depression. The 10-item Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987) was used to screen for symptoms of maternal low mood at the home visit 11 to 24 months post-birth. The brief self-report format of the EPDS asks mothers to indicate how often they experienced symptoms relating to depression and/or anxiety over the previous seven days. Possible responses range from 0 = no, not at all to 3 = yes, all the time and are summed to produce a total score between 0 and 30. The EPDS does not contain somatic symptoms that are common amongst new mothers such as lack of sleep, difficulty concentrating, and changes in appetite and weight (Cunningham et al., 2015). The present study reports cut-offs of 8 and 11 in addition to the standard 10 as proxies for possible depression as well as entering EPDS scores as a continuous variable.[113] Items 3, 4, and 5 of the EPDS - collectively referred to as EPDS-3A[114] - have been used to screen for anxiety disorders, with evidence supporting a cut-off score of 6 or more (out of 9) for women (Matthey, 2008).

The EPDS has high internal consistency (Cronbach's alpha α = .73 to .87), split-half reliability (.73 to 0.88), and moderate to high test-retest reliability (.53 to .74) over 3 to 12 weeks (Boyd et al., 2005; Cox et al., 1987; White, 2008). Evidence of convergent and discriminant validity comes from good to moderate correlations with other measures of depression, and low to moderate correlations with state anxiety. Intercorrelations with the original *Beck Depression Inventory* (BDI) range from .59 to .78, and .82 with the second edition (BDI-II), .42 to .61 with the *General Health Questionnaire* (GHQ) , and .57 to .71 with the *Zung Self-Rating Depression Scale* (Zung SDS) (See Table 4 Boyd et al., 2005, p. 145). There is also a strong, statistically-significant correlation between the EPDS and the 35-item *Postpartum Depression Screening Scale* (PDSS, r = .87, p < .001) and DSM-IV diagnoses (Spearman's rho = .67) based on structured clinical interview (White, 2008). Table 24 provides internal consistency data for my sample, including both the full EPDS score and the anxiety screen (EPDS-3A). Scores were missing for 6 participants.

[113] Appropriate cut-off scores for detecting mood disorders vary from 7 to 13 depending on sample characteristics including education and ethnicity (Logsdon et al. 2009; Pallant et al. 2006; Santos et al. 2007 cited in McBride et al., 2014; Smith-Nielsen et al., 2018). Recent validation of the Danish EPDS against both DSM-5 and ICD-10 criteria found a cut-off of 11 optimised sensitivity (the true-positive rate: 79.2%) and specificity (the true-negative rate: 94.4%) in their sample (N = 324), with a positive predictive value (PPV = the percentage of women testing positive who are correctly diagnosed) of 49% (Smith-Nielsen et al., 2018). A smaller sample of New Zealand European mothers (N = 60) produced higher positive predictive values (58 to 92%) with cut-off scores of 7 to 11 (White, 2008). Cut-off scores of 8 or 9 appeared to provide a good balance between sensitivity (80 or 70% respectively), specificity (89 or 93%), PPV (74 or 83%) and negative predictive value (92 or 88%) among white mothers in Aotearoa (See Table 3, White, 2008, p. 30).

[114] EPDS-3A includes items (3): ''I have blamed myself unnecessarily when things went wrong''; (4) ''I have been anxious or worried for no good reason''; and (5) ''I have felt scared or panicky for no very good reason''.

Table 24.

Internal Consistency of the Edinburgh Postnatal Depression Scale (EPDS) and Anxiety Screen (EPDS-3A)

EPDS	**mean**	**SD**	**Reliability** (Cronbach's alpha)
EPDS full scale (10 items)	0.656	0.418	α = 0.865
EPDS-3A (Items 3, 4 and 5)	1.07	0.552	α = 0.712

Note. The EPDS was completed at the first follow-up assessment (home visit) 11 to 24 months post birth (n = 40)

The factor structure of the English language version varies between postpartum samples, but generally indicates two or three dimensions relating to depressive symptoms, anxiety symptoms, and sometimes suicidal ideation or anhedonia (Astbury et al., 1994; Hartley et al., 2014; Lee King, 2012; Matthey, 2008; Phillips et al., 2009; Rossetal., 2003; Small et al., 2007; Tuohy & McVey, 2008, cited in Cunningham et al., 2015). Research from an Australian psychiatric mother and baby unit using exploratory and confirmatory factor analysis found variance in the factor structure within their sample (N = 636) across time periods, with evidence of a two-factor model on admission to the unit, when symptoms were more severe, and a three-factor model at discharge, when scores were lower. The authors therefore suggest that "individuals may respond differently to items depending on their level of distress" (Cunningham et al., 2015, p. 793). The present project used the standard full scale score and anxiety screen, as these are most common in the literature.

Maternal Sensitivity and Responsiveness. In light of the diverse operational definitions of caregiver sensitivity (Bohr et al., 2018), three measures were used in the present study to capture a breadth of conceptualisations: Two to provide continuity with previous attachment research, and one purpose-designed for consistency with the theoretical framework of the evolved developmental niche (EDN). The two established measures were *Ainsworth's Maternal Sensitivity Scales* (ASS; Ainsworth, 1969) and the home version of the *Mini-Maternal Behaviour Q Sort* (Mini-MBQS; Moran, 2009). The *Observational Measure of Sensitivity and Responsiveness* (OMOSAR) was developed specially for the study (OMOSAR; Morrimire, 2018). The ASS and Mini-MBQS were scored in tandem, as recommended by Pederson and colleagues (2014), with the addition of the OMOSAR afterwards. Both the home visitor (RP) and the lead researcher (LM) completed 3-days of training in their use via distance learning with Dr Heidi Bailey, Sandi Bento, and Dr David Pederson of the University of Guelph (2017). It was not possible to complete reliability certification due to confidentiality restrictions on the practice videos preventing sharing across countries.

Despite their age, the *Ainsworth Sensitivity Scales* remain the "instrument of choice" for measuring maternal sensitivity and responsiveness (Stiles, 2004, p. 196). The four ***Ainsworth Sensitivity Scales*** are designed to be completed by trained visitors based on naturalistic observations of caregiver-baby pairs (Ainsworth et al., 1978). Each scale captures a continuum of maternal skill: *Sensitivity vs Insensitivity*, *Cooperation vs Interference*, *Availability vs Ignoring and neglecting*, and *Acceptance vs Rejection*. Scores on each scale range from 1 (highly insensitive/interfering/neglecting/or rejecting) to 9 (highly sensitive/cooperative/

available/or accepting). The four scale scores were summed[115] to produce a total ASS sensitivity score between 4 and 36.

Evidence of reliability and validity is fairly strong. Previous studies have demonstrated high interobserver agreement (intraclass correlation coefficients: ICC) of .92 for *Cooperation*, .94 for *Availability*, and .93 for the *Acceptance* and *Sensitivity* scales (Bohr et al., 2018). Interrater reliability is also high (.81) when the ASS is used with adolescent mothers (Stiles, 2004). Information on test-retest reliability is more difficult to find. Masters research by Laurel Yorgason (2015) found no correlation between ASS scores when babies were 4 weeks old and 16 months old, but the maternal learning and infant developmental change between these two ages is extreme and it may not be sensible to expect test-retest reliability over such a long period. Internal consistency across the four scales was high in my sample (α = 0.925), as elaborated in Table 25.

Table 25.

Internal Consistency of the Ainsworth Sensitivity Scales (ASS)

ASS Subscale	**Mean score**	**SD**	**Reliability** (Cronbach's alpha)
1. *Sensitivity vs Insensitivity*	7.03	1.297	Overall mean = 7.26, SD = 0.988
2. *Availability vs Ignoring*	7.17	1.127	α = 0.925
3. *Acceptance vs Rejection*	7.42	0.994	
4. *Cooperation vs Interference*	7.42	0.913	

Note. The ASS was completed at the first follow-up assessment (home visit) 6 to 16 months post birth (N = 46)

Few subsequent studies have replicated the original strong correlation (*r* = .78) between the ASS and attachment security on the *Strange Situation Procedure* (Ainsworth, Bell, & Stayton, 1971; Ainsworth et al., 1978, cited in De Wolff & van IJzendoorn, 1997) although some have come close (*r* = .65, Pederson et al., 2014). Early meta-analyses with non-clinical samples found much smaller effect sizes (r = .24-.32; De Wolff & van IJzendoorn, 1997; H. H. Goldsmith & Alansky, 1987). Pederson et al (2014) suggested this may be due to the shorter durations of observation used in many replication studies. Ainsworth's original results were based on more than 15 hours of home observation per dyad, while most replications rate caregivers based on observations or video footage totalling 30 minutes or less (Mesman & Emmen, 2013). Two hours observation may be sufficient however, as no significant differences were found between raters' scores using the ASS with observation durations of 2, 4, or 6 hours (Stiles, 2004). The 90 to 120 minute duration of observation used in the present study was the maximum considered practical for a single sitting. The home visitor (RP) reported most visits were at the upper end of this range at two hours long.

[115] There is some disagreement in the literature about whether to combine scales and how. In some studies the four Ainsworth Scales are averaged rather than summed, while in others only the Sensitivity vs Insensitivity scale is used, and the four together are referred to as Ainsworth's *Maternal Care Scales* (Mesman & Emmen, 2013).

The **Mini Maternal Behavior Q-Sort** (Mini-MBQS Home; Pederson, Moran, & Bento, 1999, 2009) is a 25-item forced card-sort describing observed patterns of mother-baby interaction which generates a correlation between each dyad and a prototypically sensitive mother ranging from -1 (highly insensitive) to +1 (optimally sensitive), and a score of zero indicating no correlation with the 'ideal mother' (H. N. Bailey et al., 2009; Moran, 2009). Specific descriptions of possible maternal behaviours are rated according to their 'fit' with a particular mother-child dyad based on close observation during play, feeding, and a divided attention task (H. N. Bailey et al., 2016). Example items are: *'Responds to B's distress and non-distress signals even when engaged in some other activity such as having a conversation with the visitor'*, '*Builds on focus of B's attention*', and *'Display of affect does not match B's display of affect (e.g., smiles when B is distressed)'.* Items are sorted into five equal-sized groups via a computer spreadsheet based on the extent to which each behavioural description is considered most like (+2), like (+1), neutral (0), unlike (-1), or most unlike (-2) the caregiver-child dyad in question, and the correlation with an expert Q sort describing the 'ideal mother' is generated automatically. An alternative version (the Mini-MBQS-VR) has been used to code short (e.g., 10 minutes) segments of filmed interactions (Tarabulsy et al., 2009). Bivariate correlations between the briefer Mini-MBQS-VR and the full 90-item MBQS (Pederson & Moran, 1995) have been significant but only moderate in strength (r =.35; p < .05; Tarabulsy et al., 2009, p. 134).

The MBQS has good interrater reliability. Past research has found interobserver agreement (ICC) of .98 for the Mini MBQS-VR (Bohr et al., 2018), with slightly lower scores in a small sample of adolescent mothers (ICC = .80; Stiles, 2004). Once again, evidence of test-retest reliability was difficult to obtain. Concurrent validity is suggested by moderate associations between the Mini-MBQS-VR and the Q-Sort index of attachment security (r = .34) (Bohr et al., 2018; Tarabulsy et al., 2009). As for the ASS, a two-hour period of home observation appears sufficient when using the MBQS (Stiles, 2004). A comparison of the two measures found training time was similar (15 hours for the MBQS, 13 hours for the ASS), although completion time for a single subscale of the ASS (*Sensitivity*) averaged 5 minutes per assessment, compared with 59 minutes per assessment for the full MBQS (Stiles, 2004). In the present study the use of all four subscales of the ASS and the Mini version of the MBQS can be expected to reduce this difference. The use of a single home visitor in *Pakiaka Tupuora* (RP) precluded the calculation of intercoder reliability.

The ***Observational Measure of Sensitivity and Responsiveness*** (OMOSAR) was purpose-designed to capture information related to ancestral species-specific nurturing. Separate scores distinguish between *awareness of child needs and willingness to prioritise them* (designated 'sensitivity'), and *active behavioural steps to meet those needs promptly and consistently* (designated 'responsiveness'). Ratings are given for both daytime and night time care, and across six domains: (1) Physical comfort, (2) Physical & emotional affection, (3) Play & interaction, (4) Feeding, (5) Toileting, and (6) Sleep. Separate scores are awarded for *sensitivity* and *responsiveness* within each domain, using 5-point likert scales anchored to behavioural descriptions. Thus, there are twelve categories covering daytime caregiving, and another twelve categories relating to night time parenting. Within each category, a score of '5' indicates high sensitivity or responsiveness in that domain, and lower scores suggest lower sensitivity or responsiveness. All 24 categories are then summed to provide an estimate of the extent to which a child's needs are met overall. The maximum total score is 120 and half

marks are permitted. Attainment of high scores thus requires both awareness of a child's needs and action to consistently meet those needs across domains and during both the day and the night. The theoretical assumption is that a child will amalgamate their experiences in some way, and that more consistently sensitive and responsive caregiving will be beneficial.[116] Item descriptions for each domain are shown in Table 26.

Table 26.

Daytime & Night Time Caregiving Domains: Observational Measure of Sensitivity and Responsiveness

Domain	Category	Description of Items
1. Physical comfort	*Sensitivity*	Awareness of infant's physical comfort (e.g., whether clothing is comfortable, temperature, sensitivity to light/ noise). Compassion for infant & their preferences.
	Responsiveness	Reliability and promptness with which infant's comfort is maintained. Response to feedback such as squinting at bright light or crying because clothing squeezes.
2. Physical & Emotional Affection	*Sensitivity*	Awareness of infant bids for affection, emotional connection or physical closeness. Compassion for infant and ability to recognise what they like and don't like.
	Responsiveness	Reliability, promptness, & appropriateness of response to infant bids for affection, emotional connection or physical closeness. Response to feedback from infant.
3. Play & interaction	*Sensitivity*	Awareness of opportunities to play with infant or interact one-on-one. Ability to recognise what infant likes and doesn't like by monitoring body language & vocalisations.
	Responsiveness	Reliability and promptness of response to opportunities to play or interact one-on-one. Engagement with infant and appropriateness of response to infant's feedback.
4. Feeding	*Sensitivity*	Awareness of infant feeding cues & understanding of infant's need to feed or nurse. Empathy regarding infant's emotional experience/enjoyment of feeding/nursing.
	Responsiveness	Reliability and promptness of response to infant feeding cues and consistency with which infant's needs are met. Consider appropriateness of actions including pacing.
5. Toileting	*Sensitivity*	Awareness & understanding of infant toileting cues &/or ability to anticipate infant's need to eliminate. Compassion for infant's emotional/physical comfort re elimination.
	Responsiveness	Reliability and promptness of response to infant toileting cues and consistency with which elimination needs are met. Emotional warmth of response.

[116] It is possible that a 'good enough' parent must pass some threshold of sensitivity and responsiveness in order to facilitate secure attachment. Future research using the OMOSAR could potentially examine the component parts of caregiving to investigate their relative contributions to outcomes, but this was not attempted in the present project.

6. Sleep	*Sensitivity*	Awareness & understanding of infant's need for sleep or rest &/or ability to anticipate these needs. Compassion for infant's practical/emotional experience of sleep.
	Responsiveness	Reliability and promptness of response to tiredness cues and consistency with which infant needs for sleep/rest are met. Emotional warmth of response.

Notes. Caregiver is given a score out of 5 for each subdomain based on semi-structured interview and home observation. The term 'feeding' refers here to offering solid or mashed food, and breastfeeding, as well as feeding with a lactation aid, cup, spoon, syringe, bottle or equivalent. The term 'nursing' is used to include suckling (usually at the breast) which may or may not result in nutritional benefits. This would include, for example, an infant breastfeeding 'for comfort'. In a lactating parent this would be expected to stimulate milk production even if no milk was removed.

Scoring the OMOSAR correctly requires both observational and interviewing skills. The home visitor collates information from their observations and caregivers' answers to support ratings for each category of interest. *Sensitivity* ratings reflect the extent to which the caregiver recognises, understands, or is aware of their baby's needs or desires, including compassion for the infant and willingness to put the baby's needs first.[117] *Responsiveness* refers to the promptness, consistency, and appropriate emotional expression of the caregiver's observable behaviour. Scores for *sensitivity* and *responsiveness* may differ even within a domain. For example, a caregiver may indicate with their words that they know what their baby needs (high *sensitivity*), but still fail to meet that need within a few minutes (low *responsiveness*). Where sensitivity and responsiveness can't be assessed directly – as with night-time parenting – the home visitor bases their score on responses to the series of semi-structured interview questions. It is crucial that raters are familiar with cross-cultural variability when it comes to infant feeding (breast, lactation aid, cup, spoon, syringe, bottle), toileting (taking baby to the toilet, holding baby over a potty or bucket, holding baby over a basin or outside, using single-use nappies or cloth nappies, changing immediately, leaving the baby in a soiled nappy, ignoring or anticipating need to eliminate, responding to infant cues), and sleep (e.g., use of a wahakura, moses basket, Pēpi pod, bassinet, hammock, or cot, use of infant sleeping bags or blankets, carrying in a sling or carrier, co-sleeping or putting the baby to bed in their own room, bed-sharing or utilising a 'side-car' cot). Example questions for the semi-structured interview and a full scoring guide from the unpublished clinical manual are included in Appendix L.

The OMOSAR was piloted with the first six mother-baby dyads to evaluate scoring, and then re-scored on 5-point rather than 4-point scales to increase the range and variability. Although EDN-consistent care involves multiple kin and non-kin carers, it was only possible to directly assess maternal care in the present study. Unlike the *Ainsworth Sensitivity Scales* and *Maternal Behaviour Q-Sort*, there is no expectation all caregiving will fall to a single adult, and alloparenting does not reduce OMOSAR scores. OMOSAR scoring focuses on the quality of care received by the infant rather than whether or not this is offered by a single caregiver. Internal consistency data for the present sample is shown in Table 27. Item means show that

[117] "Whether a comment falls under sensitivity or responsiveness depends on the rater's assessment about whether the infant is able to understand the meaning. In an older infant it is likely that the *content* of a comment is understood, whereas a smaller baby may only be influenced by the *tone of voice*, *body language*, and other *observable* features. If the baby understands the meaning, it is responsiveness" (Morrimire, 2018, p. 1).

sensitivity and responsiveness scores tended to be similar within a domain, and night time caregiving consistently received lower sensitivity and responsiveness scores than daytime parenting.

Table 27.

Internal Consistency of the Observational Measure of Sensitivity and Responsiveness (OMOSAR)

OMOSAR Subscale	**Item** (range 0 to 5 per item)	**Item mean**	**Reliability** Cronbach's alpha (α)
1. Physical comfort	*a. Day time sensitivity*	3.57 (0.512)	Physical comfort subscale:
	b. Day time responsiveness	3.59 (0.590)	3.49 per item (0.561)
	c. Night time sensitivity	3.38 (0.776)	**α = 0.865**
	d. Night time responsiveness	3.45 (0.747)	
	Subscale 1	13.98 (2.25)	
2. Physical & emotional affection	*a. Day time sensitivity*	3.70 (0.637)	Physical & emotional affection subscale:
	b. Day time responsiveness	3.74 (0.673)	3.59 per item (0.791)
	c. Night time sensitivity	3.42 (0.937)	**α = 0.925**
	d. Night time responsiveness	3.50 (0.894)	
	Subscale 2	14.36 (2.88)	
3. Play & interaction	*a. Day time sensitivity*	3.61 (0.699)	Play & interaction subscale:
	b. Day time responsiveness	3.65 (0.631)	3.32 per item (0.724)
	c. Night time sensitivity	2.99 (0.992)	**α = 0.880**
	d. Night time responsiveness	3.01 (0.992)	
	Subscale 3	13.26 (2.90)	
4. Feeding	*a. Day time sensitivity*	3.98 (0.547)	Feeding subscale:
	b. Day time responsiveness	3.98 (0.596)	3.90 per item (0.660)
	c. Night time sensitivity	3.82 (0.819)	**α = 0.938**
	d. Night time responsiveness	3.85 (0.862)	
	Subscale 4	15.62 (2.64)	
5. Toileting	*a. Day time sensitivity*	2.32 (0.826)	Toileting subscale:
	b. Day time responsiveness	2.15 (0.988)	1.90 per item (0.752)

	c. Night time sensitivity	1.55 (0.724)	**α = 0.938**
	d. Night time responsiveness	1.59 (0.709)	
	Subscale 5	7.61 (3.01)	
6. Sleep	*a. Day time sensitivity*	3.84 (0.484)	Sleep subscale: 3.79 per item (0.584) **α = 0.921**
	b. Day time responsiveness	3.77 (0.627)	
	c. Night time sensitivity	3.82 (0.627)	
	d. Night time responsiveness	3.72 (0.867)	
	Subscale 6	15.14 (2.33)	
OMOSAR	Full Scale	3.33 (0.551)	**α = 0.962**

Note. Completed at the first follow-up assessment (home visit) 6 to 16 months post birth (N = 46). Means are shown with standard deviations in parentheses.

The correlation matrix shown in Table 28 outlines the relationships between the three sensitivity measures, all of which were significant ($p < .001$). The *Ainsworth Sensitivity Scales* were strongly correlated both with the *Mini-Maternal Behaviour Q-Sort* ($r = 0.826$) and the *Observational Measure of Sensitivity and Responsiveness* ($r = 0.836$). The MBQS and OMOSAR were less closely related ($r = 0.671$), but the correlation was still large. These correlations suggest convergent validity across the different operational definitions of sensitivity and responsiveness. Some of the strength of these relationships is likely due to shared measurement error arising from the same person conducting all home visits and completing all scoring.[118] The remainder may be explained by the core of attachment theory common to all, and similar (but not identical) conceptualisations of sensitivity. While the OMOSAR is new, acceptable internal consistency and convergent validity with established sensitivity measures supported its tentative use as an EDN-consistent measure of maternal sensitivity that did not penalise alloparenting.

[118] The research assistant who completed all home visits (RP) was unaware of participants' group allocation (to control or intervention condition) and was not involved in the final laboratory assessments or other aspects of the study. Nevertheless, the single-blind design was at times undermined by the participants themselves if they mentioned attending the *Parenting From the Start* workshop during pregnancy or otherwise commented on it during the visit, and potentially affected in subtle ways by the visit-by-visit debriefing process involving the lead researcher.

Table 28.

Pearson's Correlations (r) Between the Three Maternal Sensitivity Measures Used in the Study

Sensitivity measure	ASS	Mini-MBQS	OMOSAR
ASS	-		
Mini-MBQS (home)	0.826***	-	
OMOSAR	0.836***	0.671***	-

Note. All measures were completed at the home visit 6 to 16 months post birth (N = 46). * p < .05, ** p < .01, *** p < .001

Attachment security. The security of the mother-child relationship was assessed in the *Strange Situation Procedure* (SSP; Ainsworth et al., 1978) when babies were 11.5 to 22.5 months old (mean = 15.4, SD = 2.38). Although the research team aimed for the ideal age of 12 months, scheduling difficulties often resulted in delays.[119] The SSP is designed to elicit infant attachment and exploratory behaviour, and has already been described in detail in Chapter 3. The *Final Assessment Protocol* used in the present study can be found in Appendix M, and is based on the original procedure used by Mary Ainsworth (Ainsworth et al., 1978). Our protocol included checklists describing equipment, roles, and tasks to be completed prior to each final assessment, along with a full script for the Host and Stranger to follow during each procedure. Instructions for mothers were based on those from the Minnesota Longitudinal Study (Sroufe et al., 2005a), which in turn was based on the National Institute of Child Health and Human Development Study of Early Child Care, a ten site national study conducted by leaders in the field of infant/child development.

Relationships were classified into subcategories of the three 'organized' attachment patterns of secure (B), insecure-avoidant (A) and insecure-resistant (C) based on repeated viewings of the videoed procedure. Separations lasted a maximum of 3 minutes and were reduced to 30 seconds or less if the infant became very distressed. SSP videos were flagged if infants showed any possible signs of disorganization (however mild), but were not formally coded on the 9-point disorganization scale (Main & Solomon, 1990).[120] The coder (DM) and I (LM) completed 11 days of training at the University of Minnesota in 2016 covering administration, scoring, and interpretation of the SSP (ABC and D categories). The coder was certified to provide ABC classifications via the Sroufe and Carlson reliability test, and blind to study condition and other information relating to mother-baby dyads, but was not able to complete D certification within the constraints of this project.

The coder attended all 42 *Strange Situation Procedures* in person, and directed the team of research assistants who assisted in running these. I scheduled each visit via email and text message but was not present for any procedure. After all assessments were complete, the

[119] Each SSP required the simultaneous availability of mother, child, two specific adjoining rooms at the busy psychology clinic (with one-way window), and at least two trained research assistants.

[120] Coding for disorganization requires an additional certification process as well as further time classifying each dyad, by a trained coder blind to key information such as study condition. This was not possible within the constraints of this PhD.

coder (DM) viewed each video multiple times, and classified each parent-child dyad into established attachment categories. I was not present for this coding and there was no discussion of cases. The 'Stranger' in the procedure was another trained research assistant.[121] All research assistants received at least one-hour's training from the lead researcher and coder and signed *Confidentiality Forms* (an example of which can be found in Appendix N). Most were psychology students or professionals with a strong interest in parenting research (e.g., nurses, pregnancy and parenting educators). The SSP was observed through the one-way window, and video-taped by two separate cameras to enable repeated study of the interactions. Thus, the SSP required the use of appropriate consulting rooms in the psychology clinic with speakers broadcasting sound from the testing room to the observation room. One camera recorded the view through the one-way window (i.e., from the observation room, looking into the testing room). The other was positioned behind a low plywood-box wall in the testing room itself, to provide better sound and picture quality and capture the procedure from the best angle. The wall prevented curious toddlers from accessing the camera. The set-up of the room is shown in Figure 19,[122] with the plywood-box wall front left. The mother always sits in the lefthand chair, and the Stranger in the right-hand chair, so that she can enter and leave without needing to go around the dyad being tested. Both chairs were labelled to this effect. The whiteboard mounted on the wall was used to record first names, child's age, and testing date.

Figure 19.

Stills From our Demonstration Strange Situation Procedure Conducted at the Psychology Clinic



Prior to classifying the study videos, DM scored 35 'practice' procedures from international research projects and was certified as providing reliable attachment assessments. His agreement with experienced coders at the University of Minnesota was 85% for ABC categories and 87% for dichotomous classification as Secure/Insecure. The criterion for acceptable interrater reliability is 80% in both cases. Errors were related to undercoding both avoidance and resistance, meaning DM may have missed some insecure cases. Any videos initially labelled 'insecure', showing signs of possible disorganised attachment (D), or difficult to classify, were reassessed after email consultations with experienced coders. This decision was based on scoring guidelines suggesting it is better to wrongly insert an insecurely attached child into the 'secure' category than the reverse as insecurity is rarer and placing a securely attached child in the 'insecure' category can seriously reduce power (Waters, 2002). The coding procedure involved watching the testing room video recording right through,

[121] To provide consistency with previous research, the ten 'Strangers' used in this study all present as women. Exploring the effects of the Stranger's gender on the procedure was beyond the scope of this project.

[122] These three SSP photographs are stills from the testing room video camera. They are from the demonstration procedure. The one-way window is just out of view, opposite the two chairs.

followed by repeated viewings of short segments to clarify details of the babies' behaviour such as the quality of play and exploration in various parts of the procedure, emotional sharing, and requests for instrumental assistance,[123] as well as responses to separations and reunions. The second video recording, which showed the procedure from a different angle (facing the chairs, through the one-way window, with sound from the observation and testing rooms) was also viewed repeatedly in most cases – particularly when the adults obscured the testing room camera. The coder paid particular attention to the two reunion episodes (5 & 8) when considering potential attachment classifications. Interactive behaviour during reunions was scored on Ainsworth's four 7-point scales *Proximity seeking*, *Contact maintenance*, *Avoidance (of proximity and contact)*, and *Resistance (to contact and comforting)* prior to assigning a subcategory (Ainsworth et al., 1978; Waters, 2002). These are summarised in Table 29. To obtain a score of 7 on the *Proximity- and Contact-seeking Behaviour* scale, for example, an infant must demonstrate "very active effort and initiative in achieving physical contact". The scoring system requires that "[t]he baby purposefully approaches the adult, creeping, crawling, or walking... goes the whole way and actually achieves the contact through his own efforts, by clambering up on or grasping hold of the adult". The contact thus obtained must not require the assistance of the adult, and must last at least 15 seconds (Waters, 2002, p. 2). In contrast, a score of 7 on the *Resistant Behaviour* scale requires two or more of the following behaviours in the episode being coded:

a) Repeated hitting of the person, or other similar directed aggressive behavior;
b) Strong resistance to being held, shown by pushing away strongly, struggling, or strongly squirming to be put down;
c) A full-blown temper tantrum, with angry screaming – the baby either being rigid and stiff or throwing himself about, kicking the floor, batting his hands up and down, and the like;
d) Angry resistance to attempts of the adult to control the baby's posture, location, or action;
e) Strong and repeated pushing away, throwing down, or hitting at toys offered to him. (Abstracted from Ainsworth, Blehar, Waters & Wall, 1978, by Waters, 2002, p. 7).

Ratings are not made during the *Strange Situation Procedure*. Rather, each infant-caregiver dyad is assessed based on the video recording, so that subtle behaviours can be detected by repeated viewings and understood in context. The infant's interactive behaviour is scored using the four subscales, and crying in episodes 4, 6, and 7 is also timed as present or absent during each 15 second interval. Waters (2002) notes that the continuous data produced by the crying data and each interactive behaviour (rating) scale can be useful in their own right. Our coding sheet can be found in Appendix O. Each mother-baby dyad was classified at the level of subcategory (B1-4, A1-2, C1-2) to maximise detail (Ainsworth et al., 1978).

[123] Emotional sharing includes relational behaviour such as smiles and hugs, whereas instrumental assistance involves such things as help removing a block from a toy. I.e., interactions with no obvious emotional aspect.

Table 29.

Interactive Behaviour Rating Scales and Descriptions for the Strange Situation Procedure (SSP)

Scale Name	Description
Proximity- and Contact-Seeking Behaviour	Measures intensity and persistence of baby's efforts to get closer to an adult and/or (more strongly) to achieve physical contact. High scores indicate greater efforts.
Contact-Maintaining Behaviour	Measures intensity and persistence of baby's efforts to maintain contact or physical proximity with an adult (whether or not the contact was initiated by the baby). High scores indicate greater efforts.
Avoidant Behaviour	Measures intensity, duration, promptness, and persistence with which baby avoids interaction with or proximity to an adult, e.g., by moving or turning away, ignoring, hiding, or avoiding eye contact.
Resistant Behaviour	Measures extent to which the baby shows anger, aggression, or resistance towards (or rejection/distress in response to) an adult who is, or attempts to be, in contact. High scores indicate greater anger/ aggression/distress.

Information adapted from (Waters, 2002).

In addition to training, reliability certification, and detailed scripting, other efforts were taken to ensure the integrity of the *Strange Situation Procedures.* Two mothers who were not participants in the study volunteered to take part in training procedures to highlight any procedural problems prior to beginning this phase of the study and to assist with training research assistants. Both mothers signed written *Consent Forms* for themselves and their babies. These practice sessions reinforced the need for a solid wall to prevent toddlers accessing the video camera and tripod. A demonstration videotape featuring me (LM) and my 13-month-old daughter Aili was also created, and viewed by an experienced international colleague (Dr Alan Sroufe, University of Minnesota) to check the SSP was being conducted and scored correctly. Written consent was provided by Aili's father. This check resulted in a procedural error being identified: the stranger remained on the floor playing with the baby for too long in episode 2.[124] Although the coder was still able to classify this video as secure versus insecurely attached, the prolonged distraction of the child made it difficult to decide which of two attachment subcategories was most appropriate. Classic instructions note that the stranger's behaviour should be "geared to that of the baby" while the mother is out of the room, but reducing interaction where possible so the child has opportunity to notice their caregiver's absence (Ainsworth et al., 1978, p. 37). The stranger in our demonstration video was not part of the regular team, having been trained specially for this SSP to ensure she was unfamiliar to Aili, but an audit of videos I completed at the conclusion of the study found that similar (albeit less severe) errors occurred in 17% (7/42) of the real study videos[125] –

[124] Around 2 minutes 50 seconds of the 3 minute episode, leaving almost no time for Aili to show any distress at being left behind.

[125] Strangers were judged to have spent too long playing if they took more than 90 seconds to return to their chair in the absense of crying or grizzling. Keeping playing to 90 of the 180 seconds was thought to allow sufficient time for babies to display distress if they were going to.

highlighting the complexity of ensuring multiple people adhere to even a carefully scripted procedure.

As per our training in Minnesota, the coder endeavoured to prevent hard crying beyond 30 seconds duration by sending the stranger or mother back into the room early wherever necessary (Waters, 2002). The audit found that 43% of babies cried within 15 seconds of their mother leaving the room for the first time and 45% got picked up by the stranger during the initial separation (usually to offer comfort, but occasionally to move them back from the door). Playing the stranger in the SSP is a skilled role, requiring on-the-spot balancing of multiple needs such as engaging the baby in play, offering comfort, and being unobtrusive during reunions – ensuring baby is not too close to the door when mum is sent back in, but not being held or distracted, and waiting 30 seconds or more to leave so as not to disrupt the dyad's interactive behaviour. The role is harder when babies become distressed. Table 29 shows that within our sample crying was common during mothers' absence: 50% of babies cried during the first separation, and 86% during the second separation). Although the stranger's return calmed some babies (10%), most continued to cry in spite of her presence. Episode 4 (the first separation) was cut short in 38% of procedures, and Episode 6 (the second separation) in 60%. Episode 7 (when the stranger has returned but mother has not) was cut short 45% of the time.

Table 30.

Frequency of Crying and Shortened Separation Episodes in the Strange Situation Procedure (SSP)

	Crying during 1st separation (Ep 4)	Ep 4 cut short (Mum returns early)	Crying during 2nd separation (Ep 6)	Ep 6 cut short (Stranger returns early)	Crying during 2nd separation (Ep 7)	Ep 7 cut short (Mum returns early)
Percentage of babies (number)	50% (21/42)	38% (16/42)	86% (36/42)	60% (25/42)	76% (32/42)	45% (19/42)

Note. The SSP was completed at the final follow-up assessment (n = 42). Ep = episode

In terms of predicting attachment security from maternal sensitivity, shorter time-intervals between sensitivity and attachment assessments, older infants (over 12mths), and middle-class samples are related to larger effect sizes (Atkinson et al., 2000). The duration between follow-up assessments in the present study ranged from 0 to 7 months, with a median of 2 months gap[126] (M = 2.35 months, SD = 1.82). Children had a median age of 13.0 months at the time of the home visit (M = 13.50, SD = 2.26, range = 11 to 24.5, N = 46), and 15.0 months at the final assessment (M = 15.45, SD = 2.38, range = 11.5 to 22.5, N = 42).

[126] Infant age at the time of each follow-up assessment was calculated in completed half months rather than as a truly continuous variable.

Adverse Childhood Experiences. An estimate of mothers' adverse childhood experiences was provided by the 10-item version of the *Adverse Childhood Experience* (ACE) *Scale*, a measure of cumulative life stress up to and including age 18 (Felitti et al., 1998; Racine et al., 2021). The ACE Scale includes one item each relating to (1) emotional, (2) physical, and (3) sexual abuse, (4) emotional and (5) physical neglect, (6) experiencing parental separation or divorce, (7) witnessing domestic violence, and family or household dysfunction such as (8) problematic substance use, (9) mental illness or suicide, or (10) incarceration. Scores range from 0 to 10, with higher scores indicating exposure to a wider variety of traumatic experiences. The full ACE scale is presented in Appendix P.

Evidence from multiple countries indicates reasonable psychometric properties for a scale of this brevity. Among children and adolescents in Nigeria (N = 1,209), the ACE Scale[127] demonstrated internal consistency (Cronbach's alpha) of α = 0.67 (Folayan et al., 2020). In the present sample reliability was similar at α = 0.68 (mean item score = 0.22, SD = 0.20). Higher correlations between items would be unexpected given the different adverse experiences they relate to. Across three Midwest United States samples, the 10-item ACE scale demonstrated a two-factor structure, with items loading onto either child maltreatment or household dysfunction (Choi et al., 2020). Both factors were significantly related to symptoms of anxiety and depression, and cumulative ACE scores were significantly higher in two high-risk samples relative to a sample from the general population (Choi et al., 2020). Test-retest reliability[128] of the Portuguese ACE Scale was r = .60 (p < .001) in sample of institutionalised adolescents (N = 79) tested 6 months apart (Pinto et al., 2014). All participants had been removed from their families by Child Protective Services during childhood and were confirmed to have suffered abuse or neglect. Predictive validity of the scale is suggested by significant dose-response relationships between reports of adverse childhood experiences and health conditions such as heart disease, cancer, autoimmune disease, chronic lung disease, as well as substance abuse, depression, anxiety, schizophrenia and early death (Choi et al., 2020; Felitti et al., 1998; Kalmakis & Chandler, 2015; Karatekin & Almy, 2019; Rariden et al., 2021), although ACE scores have to date been assessed retrospectively. Adverse pregnancy outcomes (1.55-fold increased risk of hypertensive disorders and 2.03-fold increased risk of preterm birth) have also been associated with higher ACE scores (Miller et al., 2021).

Data Analysis

Planned analyses registered with the *Australia New Zealand Clinical Trials Register* (ANCTR) prior to data collection included comparing the intervention and control groups on two primary outcome measures: maternal sensitive responsiveness and attachment security, and a variety of secondary outcome measures: birth interventions, breastfeeding, admissions to

[127] The English language version of the ACE Scale was used in this study as schooling in Nigeria takes place in English-medium settings (Folayan et al., 2020). The ACE Scale is not copyrighted.

[128] Test-retest reliability of an earlier 8-item version of the ACE Scale among adult Americans (N = 658) with a mean age of 64 years has also been assessed, providing a similar weighted-kappa coefficient[128] of .64 when mailed the self-report questionnaire twice, an average of 20 months apart (Dube et al., 2004).

the neonatal unit (NNU[129]), postnatal depression, parenting strategies employed during the infants' first year, and scores on the *Evolved Developmental Niche Scale*. Parenting intentions (pre- vs post-test) and workshop feedback were also examined for intervention group participants. Significance tests (e.g., t-tests) were planned where possible. All analyses were performed using Jamovi statistical software for Mac version 1.6.23.0 (The jamovi project, 2021). Pre-registered details of my planned data analysis are described for each hypothesis.

Hypothesis 1: Parenting Intentions

Descriptive statistics and Paired Samples t-tests were examined to assess whether responses to the *Parenting Intentions Questionnaire* (PIQ) differed significantly between pre- and post-test. This analysis was based on data collected at Time 1 (during pregnancy), so only the intervention group were included. Various elements of the evolved developmental niche (birth, breastfeeding, infant toileting, infant sleep, babywearing, alloparenting/social support, and beliefs regarding responsiveness) were evaluated separately to help us understand 'what changed' when participants attended the antenatal workshop.

Hypothesis 2: Parenting Strategies

Descriptive statistics and Independent Samples t-tests were used to compare responses on the *Parenting Strategies Questionnaire* (PSQ) completed at the Time 2 follow-up assessment (home visit), and the *Evolved Developmental Niche* (EDN) *Scale* completed at the Time 3 final assessment (clinic visit), with the intention of ascertaining whether parenting strategies related to elements of the evolved developmental niche differed significantly between the intervention and control groups. Evaluating these variables separately and in combination tells us whether ancestral parenting practices were more evident among mothers who attended the antenatal workshop during pregnancy. This is the first step towards understanding whether the antenatal workshop changed the parenting strategies used once babies were born.

Hypothesis 3: Health Outcomes

Descriptive statistics and Independent Samples t-tests assessed whether health outcomes for the two study conditions differed at follow-up. Maternal sensitivity ratings were completed at the home visit by a research assistant blind to group allocation. Three scales were assessed individually and in combination: *Ainsworth Sensitivity Scales* (ASS), *Maternal Behaviour Q-Sort* (MBQS), *and Observational Measure of Sensitivity and Responsiveness* (OMOSAR). Attachment classifications are based on the *Ainsworth Strange Situation Procedure* (SSP), completed by different research assistants 'blind' to group allocation. Secondary outcome

[129] The neonatal unit (NNU) is a 14-bed facility within Palmerston North Hospital providing specialist nursing care to pēpi (babies) needing extra support. There are five intensive care beds and nine special care beds for pēpi from 28 weeks gestation and weighing at least 1000g (Te Pai Hauora o Ruahine o Tararua/Midcentral District Health Board, 2019).

measures were based on maternal reports at the two follow-up sessions. These included birth outcomes (rates of vaginal delivery, birth interventions), admissions to neonatal unit (NNU), infant colic, breastfeeding outcomes, and postnatal depression. Finally, *Pearson's* correlations were used to assess whether parental sensitivity and responsiveness, or any elements of the evolved developmental niche (individually or cumulatively) predicted attachment classification on the *Strange Situation Procedure*.

Reporting Statistical Significance

This is the first intervention study based on the evolved developmental niche (EDN), and the first evaluation of the *Parenting From the Start* antenatal workshops. My intention was to assess whether the workshop contributed to particular outcomes, and investigate the relationships between caregiving strategies and outcomes. This resulted in multiple comparisons involving numerous variables. Given the small sample sizes for these analyses and the exploratory nature of the research, the priority was to detect differences across groups (e.g., intervention/control) or times (e.g., pre-/post-intervention). The acceptable risk of a Type I error[130] was set at alpha = .05 for each test, so random measurement error and random sampling error would lead to incorrect rejection of the null hypothesis in no more than 5.00% of a long run of exact replications (Rubin, 2021). While more stringent alpha levels have been proposed for novel research (Benjamin et al., 2018), lowering the alpha level beyond .05 would require a larger sample size to achieve the same statistical power (88% larger for between-subjects designs with one-sided tests, 70% larger for two-sided tests), with serious time and cost implications for an already resource-intensive longitudinal project such as this (Lakens et al., 2018). Critics of restrictive alpha levels note they may reduce the breadth of research conducted and lead to overreliance on cheaper populations such as convenience samples and online participants, as well as diverting attention from more important methodological flaws such as P-hacking.[131] I rely instead on "the cumulative evaluation of findings such as converging results of multiple (replication) studies" (Lakens et al., 2018, p. 169). Conclusions based on an original study such as this are necessarily tentative, not least because some parameters cannot be estimated at the outset, but they nevertheless guide future research.

Conducting multiple statistical tests increases the risk of Type 1 errors, thus perpetuating the replication crisis in science[132] (Forstmeier et al., 2017). Although adjustment of alpha levels has become routine, corrections were not made for any analyses in this project. Rubin (2021) advises against thoughtless adjustment of alpha levels, noting it is only necessary and appropriate for disjunction testing[133] in which any one significant test result leads to rejection

[130] False positives: incorrectly rejecting the null hypothesis when there is no real difference between groups.
[131] Repeated unreported data analyses aiming to maximise 'significant' results.
[132] The number of study findings which fail to be replicated in subsequent research.
[133] Where statistical analyses and research questions involve an "at-least-one-test-significant" strategy (Dmitrienko & D'Agostino, 2013) which depends on a logical disjunction decision rule (Weber, 2007, cited in Rubin, 2021, p. 4). If all tests must return a significant result in order to reject a joint null hypothesis, alpha adjustments are not appropriate. The "all-tests-significant" strategy is a conjunction testing approach (that is, it operates on the basis of a logical conjunction decision rule. Rubin (2021) explains that "although researchers use multiple tests to test the joint union null hypothesis, they may only reject this hypothesis if and only if all of

of a joint null hypothesis.[134] All analyses in this study utilised an individual testing approach, where conclusions relate to a single comparison rather than to a 'family' or set of comparisons considered together. Where research questions and analyses relate to individual hypotheses rather than a joint null hypothesis, alpha adjustments are inappropriate and unnecessary because the probability of a Type I error occurring for each of these analyses is unaffected by the number of analyses (Rubin, 2021). Because each decision to reject each individual null hypothesis depends on no more than one significance test, none of the individual tests constitute a 'family' with respect to any single hypothesis. Consequently, it is not necessary to adjust alpha levels on the basis of any family-based error rate (familywise error rate/per family error rate). Although multiple examples of individual testing take place alongside one another in *Pakiaka Tupuora*, the logic of individual testing still applies (Rubin, 2021). Although the greater number of individual tests increases the chances of significant results, and therefore of Type I errors *overall*, this greater per family error rate has no impact on the probability of making a Type I error for each individual test (the individual, marginal, or per determination error rate, which remains constant (Rubin, 2021).

Results of the randomised controlled trial evaluating *Parenting From the Start* are reported in the following chapter.

their tests yield significant results. Hence, they only have a single opportunity to reject the joint null hypothesis at its prespecified alpha level" (pp. 6-7).

[134] A joint hypothesis (for example 'eating fruit increases IQ') consists of two or more constituent parts, such as (A) 'eating apples increases IQ', and (B) 'eating blueberries increases IQ'. The joint null hypothesis is that 'neither A nor B increases IQ', and a significant result for tests of A *or* B will lead us to reject the broader joint null hypothesis. In this scenario two tests of the same null hypothesis are being conducted (Rubin, 2021). Because the null hypothesis will be rejected if any of the constituent hypotheses are significant, there are multiple opportunities to make a Type 1 error, and it is important to know the probability of making at least one Type 1 error in the 'family' (collection) of null hypotheses (the familywise error rate; Rubin, 2021). None of my pre-registered hypotheses related to the study in its entirety, and although many variables are related theoretically, I do not group analyses to form joint conclusions in this way.

CHAPTER NINE

Results of the *Parenting From the Start* Antenatal Intervention

Ko ia kōhore nei i rapu, tē kitea
S/he who does not seek will not find

This chapter summarises statistical analyses of the three study hypotheses and their multiple parts. I begin by describing the mothers and babies who took part in the research before outlining findings relating to the primary and secondary outcome measures registered with *Australia New Zealand Clinical Trials Register* (ANZCTR) prior to recruitment. Results are presented in order of importance, starting with the two primary outcome measures: maternal sensitivity/responsiveness ratings, and patterns of infant attachment. Secondary outcomes measures from Time 2 (the home visit) and Time 3 (the final assessment) are summarised next. Finally these data are contextualised within summaries of workshop feedback and parenting intentions data from the workshop (intervention participants only). Parametric testing was used where possible, with non-parametric alternatives included alongside if statistical assumptions were not met for a particular test. Significance tests are two-sided despite the directional hypotheses, and Welch's t-tests are used in preference to Student's t-tests by default because they provide better control of Type 1 errors and statistical power when the assumption of homogeneity of variance is not met[135] (Delacre et al., 2017).

Description of the Sample

The intervention and control groups were compared on relevant demographic variables based on home visit data to check that random assignment had resulted in similar groups. Mothers ranged from 24 to 44 years old. The mean age across the sample was 32 years (SD = 4.72). The level of education was generally high (M = 3.89, SD = 0.994), with a median and mode score of 4.00 indicating half of the participants had a university degree of some kind and an undergraduate degree was the most common educational level. Gross annual family incomes within the sample as a whole were also high in general (M = 4.09, SD = 1.19 on a 5-point scale), although they fell across a spectrum of pre-COVID-19 pandemic levels from less than NZ$20,000 to NZ$81,000 or more before tax per annum. The most common income bracket was the highest, and this was also the median family income reported across the sample. Descriptive statistics for each of the study conditions are presented in Table 31.

[135] Student's t-tests produce unreliable results when variances across study conditions are not equal and/or the sample sizes of independent groups differ, and these problems may not be detected by Levene's test of homogeneity of variances (Erceg-Hurn & Mirosevich, 2008).

The majority of participants were partnered (95.8%) at the time of the home visit, with one participant from each group reporting they were single (4.2% of the total). Of the total sample, 60.4% of women were married or in a civil union, and 35.4% were in a de facto relationship.[136] Mothers in the intervention group were on average slightly older (mean difference = 0.9 years), with slightly lower educational level and family incomes than mothers in the control group (but still within the same educational/income bracket).

Table 31.

Baseline Demographic Characteristics. Maternal Age, Educational Bracket, and Family Income Bracket

	Control group (n = 24)	**Intervention group** (n = 22)
Maternal age (years)	31.5 (4.93)	32.4 (4.55)
Maternal education bracket (1 to 5)	3.96 (0.91)	3.82 (1.10)
Family income bracket (1 to 5)	4.17 (1.24)	4.00 (1.15)

Note: Data is from home visits 11 to 24 months post birth. Income is gross annual. Means are shown with standard deviations in parentheses.

In terms of ethnicity, approximately one fifth of mothers (21.7%) and one third (32.6%) of babies in the sample were identified as having Māori or Pacific Island whakapapa/ancestry, which is consistent with population figures within the Manawatū region. Just over half the mothers in the sample (52.2%) of mothers and slightly more babies (58.7%) identified as 'Pākehā', 'New Zealand European', or 'New Zealanders'. One quarter (25.0%) of mothers and 8.7% of babies were classified within the 'Other ethnicity' category. This category was too varied to separate further, but included women who described themselves as Asian, Latin American, Australian, Finnish, Hungarian, British, NZ Chinese, and Vietnamese. The intervention group included a lower proportion of Māori/Pasifika mothers and infants, and a higher proportion of participants assigned to the 'Other ethnicity' category than the control group. Mothers randomly assigned to the intervention group were slightly less likely to be classified as Pākehā/NZ European than those assigned to the control group, with the reverse pattern for infants. Percentages within each study condition are shown in Table 32.

[136] No participants described themselves as separated or divorced, although it was possible for this to be true but of lesser importance or less appealing as a relationship designation. That is, failure to select this description from the multiple-choice options available did not necessarily indicate it did not apply – the form did not ask for all applicable responses

Table 32.

Ethnicity of Participating Mothers and their Babies (N = 46 Dyads)

Ethnicity[137]	Participants	Control group	Intervention group
Māori/Pasifika	Mothers:	6/24 = 25.0%	4/22 = 18.2%
	Infants:	9/24 = 37.5%	6/22 = 27.3%
Pākehā/NZ European	Mothers:	13/24 = 54.2%	11/22 = 50.0%
	Infants:	14/24 = 58.3%	13/22 = 59.1%
Other	Mothers:	5/24 = 20.8%	7/22 = 31.8%
	Infants:	1/24 = 4.2%	3/22 = 13.6%

Note. Data is from home visit 11-24 months post birth, confirmed at final assessment.

Infant characteristics at birth were also compared across study conditions to check for any differences that might account for results on our primary and secondary outcome measures. Nearly half the babies in the sample (47.8%, or 22 out of 46) were female and the remainder (52.2%) male.[138] The intervention group had slightly more male and fewer female babies. Average birthweight and gestation were slightly lower in the intervention group than the control group. Infant demographic characteristics are summarised in Table 33.

Table 33.

Demographic Characteristics of Study Infants: Gender (%), Birthweight and Gestation

Infant characteristic	Control group	Intervention group
Gender (open-ended question)	50.00% female (12/24)	45.45% female (10/22)
	50.00% male (12/24)	54.55% male (12/22)
Birth weight (kgs)	3.71 (0.50), n = 23	3.55 (0.56), n = 21
Gestation (completed weeks)	39.7 (1.47), n = 24	39.5 (1.62), n = 22

Note: Data from home visits 11 to 24 months post birth. Means are shown with standard deviations in parentheses. n = participants with complete data

In conclusion, no pre-existing demographic differences between mothers and babies in the two study conditions seem likely to account for the differences in outcomes reported later. Mothers assigned to the two study conditions were similar in terms of age, education, and

[137] As noted in the Method, these are priority classifications, meaning each individual appears once only. Ethnicity was classified based on the following ranked order: Māori/Pasifika, then Other, then Pākehā/NZ European.

[138] Infant gender was not presented as binary, but only male and female genders were reported by mothers.

family income. The groups were also similar in terms of infant birth weight and gestation. The slight differences observed tended to favour the control group, where mothers were on average slightly younger (but all over 20 years of age), with higher educational level and family income, and the babies had slightly longer gestation and higher birth weight. The intervention group had fewer mothers and babies of Māori/Pasifika and mothers of Pākehā/NZ European descent than the control group, and more from elsewhere in the world. The experimental design successfully minimised potential confounds despite the small sample size.

Primary Outcome Measures

Maternal Sensitivity and Responsiveness

Three pre-planned analyses were conducted to compare the intervention and control groups in terms of maternal sensitivity – one for each of the three observational measures completed by the home visitor: *Ainsworth Sensitivity Scales* (ASS), *Maternal Behaviour Q-sort* (MBQS-mini), and *Observational Measure of Sensitivity and Responsiveness* (OMOSAR). A final analysis combined the measures into a single computed Sensitivity variable. Raw scores were transformed into z-scores to enable comparisons.[139] Table 34 summarises all four analyses.

Ainsworth Sensitivity Scales. The four *Ainsworth Sensitivity Scales* were summed to provide a total ASS score. Mothers with high ASS scores were considered more cooperative, available, accepting, and sensitive in home-based interactions with their baby/toddler than those with lower scores. Participants in the intervention group scored higher on maternal sensitivity than participants in the control group, but the average difference was small (0.404 standard deviations) and not statistically significant. The Shapiro-Wilk test (1965) provided no evidence to reject a null hypotheses of normality (W = 0.953, p = 0.062), so only parametric testing is reported for this measure.

Maternal Behavior Q-sort. The prediction that mothers in the intervention group would be rated more sensitive on the Mini-MBQS than those in the control group was not supported. Visual inspection of the quantile-quantile (QQ) plot[140] and the Shapiro-Wilk test indicated a significant departure from normality (W = 0.779, p < .001), so non-parametric testing is reported along with Welch's t test. Both were non-significant.

Observational Measure of Sensitivity and Responsiveness. Mothers in the intervention group received higher scores on the OMOSAR than mothers in the control group, but the difference was non-significant. The assumption of normality was tested using the Shapiro-Wilk test (W = 0.989, p = 0.928) with no evidence to reject the null hypotheses, so only parametric testing is reported for this measure.

[139] Standardised z-scores have a mean of zero and re-code each participant's test score in terms of standard deviations from the test mean.

[140] A QQ plot is a scatterplot created by graphing two sets of quantiles against one another. If both sets of quantiles came from the same distribution (e.g., normal), the points will form a line that is approximately straight.

Table 34.

Primary Health Outcomes: Maternal Sensitivity and Responsiveness (Home Visit 11-24 mths post birth)

Measure	Control group n = 24	Intervention group n = 22	Hypothesis testing & effect sizes[1]
1. Ainsworth Sensitivity Scales (ASS; sum of 4 scales)	Total score: 28.3 (4.09)	Total score: 29.9 (3.70)	Welch's t(44) = -1.39, p = .172, CI_{95} = [-3.91, 0.721][(2)] Cohen's d = -0.409
2. Maternal Behaviour Q-Sort (Mini-MBQS home)	Correlation with ideal mother: 0.585 (0.349)	Correlation with ideal mother: 0.664 (0.360)	Welch's t(43.4) = -0.756, p = .454, CI_{95} = [-0.290, 0.132] Cohen's d = -0.223 Mann Whitney U = 207, p = .214, CI_{95} = [-0.211, 0.031] Rank biserial correlation = 0.216
3. Observational Measure of Sensitivity & Responsiveness (OMOSAR)	Total score (raw & %): 77.0 (12.7) 64.2%	Total score (raw & %): 83.2 (13.3) 69.3%	Welch's t(43.2) = -1.63, p = .111, CI_{95} = [-14.0, 1.50] Cohen's d = -0.480
Combined sensitivity measure	Mean of standardised z-scores: -0.175 (0.918)	Mean of standardised z-scores: 0.191 (0.911)	Welch's t(43.7) = -1.36, p = .181, CI_{95} = [-2.73, 0.531] Cohen's d = -0.401 Mann Whitney U = 188, p = .097, CI_{95} = [-2.60, 0.231] Rank biserial correlation = 0.288

Note. (1) Two-sided Independent Samples tests based on pre-registered hypotheses. Parametric testing was used where possible, with non-parametric alternatives shown alongside if assumptions were not fully met. Mean scores are shown with standard deviations in parentheses. (2) 95% confidence interval (CI) for the mean difference (3) *= p < .05, **= p < .01.

Combined Sensitivity Measure (ASS, MBQS, OMOSAR). As per my pre-registered plan the three measures were combined to facilitate regression analysis. As discussed in Chapter 8: Methods, correlations suggested the three maternal sensitivity measures assess similar constructs. As an additional check I calculated the internal consistency of the standardised scores for each participant, as if the z-score for each sensitivity measure were three items in a single test. Cronbach's alpha was 0.913, confirming high consistency across the three measures, so I proceeded to combine them. The three scores were standardised (converted to z-scores)[141] and then averaged to create a single sensitivity variable. The mean on this computed sensitivity variable was 0.410 standard deviations lower in the control group than the intervention group. Visual inspection of QQ plots and the Shapiro-Wilk test suggested the computed sensitivity variable was not normally-distributed (W = 0.939, p = .018), so parametric and non-parametric tests are both reported (see Table 34). Both hypothesis tests were non-significant. Appendix S graphs central tendency and 95% confidence intervals across

[141] Standardardisation helped to ensure all three measures were weighted equally in the composite.

study conditions for each measure (ASS, MBQS, and OMOSAR) separately as well as for the combined sensitivity variable.

Attachment

Two analyses based on attachment outcomes were registered with the ANZCTR. The first planned analysis investigated whether study condition was related to attachment security (% of infants securely attached to their mother on the *Strange Situation Procedure*), and the second was intended to assess the predictive validity of the three sensitivity measures (separately and together) by way of a linear regression equation, with the SSP as the outcome measure. Posthoc analyses were added to distinguish between competing interpretations of the data.

None of the study babies were born prematurely, so it was not necessary to make timing adjustments for developmental stage, but scheduling issues resulting from family illness and busy lives resulted in several children being assessed outside of the ideal 12-18 month age range of the *Strange Situation Procedure*. One child completed the final lab assessment only 11.5 months post birth, and six children completed the assessments between 19 and 22.5 months. One mother-baby dyad from each study condition was unable to be classified due to procedural errors. Both of these involved older children (19 and 22.5 months old at the final assessment respectively), for whom the SSP was not entirely appropriate.

Attachment Security. Analysis 1 looked at two-way attachment security, a binary variable where each mother-child relationship was classified as either secure or insecure. Avoidant (A1 or A2) and resistant (C1 or C2) categories were combined to create the insecure group, as is common in the attachment literature. All comparisons were in the expected direction, as shown in Table 35, and the difference was large in clinical terms. 90.0% of babies in the intervention group were classified as securely attached when they reached one year of age, compared with only 63.6% of control group babies. Conversely, rates of insecure attachment were much lower in the intervention group (5.0%) than in the control group (31.8%). Disorganized attachment assessments were not available at the time of writing, but relationships flagged by the coder[142] as possibly displaying some signs of disorganization were also more common in the control group (22.7%) than the intervention group (10%). It is likely that these signs would only reach the level necessary for classification as disorganized in some cases. Attachment subcategories for every mother-child dyad are displayed in Table T1, Appendix T.

The hypothesis that study condition impacted two-way attachment security was examined for the 42 participants who completed the final assessment. Although two-way attachment security is a binary variable (securely attached/insecurely attached), a third level (cannot classify) was required to capture the two mother-baby dyads whose attachment pattern was unable to be classified due to procedural difficulties. Table T2, Appendix T shows the observed and expected counts for study condition and attachment security. Small counts in some cells

[142] Given the volunteer status of the coder (DM) it was not possible for him to complete certification following his disorganized attachment classification training within the time constraints of my PhD research.

would have rendered the Pearson chi-square test of independence inaccurate, so the Fisher exact test is reported as well. Kim (2017) states the results of a chi-square test (χ^2) are invalid when more than 20% of the expected frequencies <5, or one or more cells have expected frequencies <1, and the Fisher's exact test should be used in these situations. In my data, five of the twelve expected frequencies were below a value of 5, including one expected frequency below 1. The Fisher's exact test was marginally non-significant (p = .059). More detailed post hoc analyses looking at three-way attachment classifications, the attachment subcategory, and a computed insecurity variable were conducted to investigate this result further.

Three-way Attachment Classification. Three-way attachment security was examined by comparing observed and expected counts for secure attachment (B), insecure avoidant attachment (A), insecure resistant attachment (C), and mother-baby dyads whose attachment pattern was unable to be classified due to procedural difficulties (CC). Table T3, Appendix T shows the observed and expected counts for A, B, and C classifications by study condition. Six of the eight expected frequencies were below a value of 5 (including three expected frequencies below 1), so the assumptions of Pearson's chi-square test were not met. The Fisher exact test was significant (p = .011), with a moderate effect size (Cramer's V = 0.448).

Attachment Subcategory. All attachment classifications were coded first at the level of subcategory, and analysis at this level retains more data than a two-way (secure/insecure) or three-way (ABC) classifications. Table 35 shows the differing patterns of attachment within the intervention and control groups. B classifications are normative across cultures (Mesman et al., 2016). Subcategories B2 and B4 appeared with similar frequency in both study conditions. Some subcategories, notably B3 (usually considered the model of secure attachment), were present only in the intervention group. Others, such as the two insecure resistant categories (C1 and C2) were present only in the control group, where they constituted approximately one third of all cases. Only one child in the study (from the intervention group) was classified as avoidant (A1). This more detailed analysis involved greater degrees of freedom, however Table T4, Appendix T shows that once again, 18 out of 27 expected frequencies were below 5 (including 4 below a value of 1), retaining concerns that the assumptions of the test may have been violated. In this analysis, Fisher's exact test again reached statistical significance (p = .047). Cramer's V was 0.552, indicating a large effect size.

Table 35.

Primary Health Outcomes: Attachment Classification of Mother-Infant Dyads (11-22 Months Post Birth)

Measure	Control group n = 21	Intervention group n = 19	Hypothesis testing & confidence intervals[1]
Two-way attachment security (SSP[3])	Secure = 63.6% (14/22) Insecure = 31.8% (7/22) CC[3] = 4.6% (1/22)	Secure = 90.0% (18/20) Insecure = 5.0% (1/20) CC = 5.0% (1/20)	X^2 (2, N = 42) = 4.92, p = .086 Fisher's exact test (p = .059) Cramer's V = 0.342
Three-way attachment security (SSP)*	A = 0.0% (0/22) B = 63.6% (14/22)	A = 5.0% (1/20) B = 90.0% (18/20)	X^2 (3, N = 42) = 8.42, p = .038* Fisher's exact test (p = .011)*

	C = 31.8% (7/22) CC = 4.6% (1/22)	C = 0.0% (0/20) CC = 5.0% (1/20)	Cramer's V = 0.448
Attachment subcategory*	A1 = 0.0% (0/22) A2 = 0.0% (0/22) B1 = 9.1% (2/22) B2 = 36.4% (8/22) B3 = 0.0% (0/22) B4 = 18.2% (4/22) C1 = 22.7% (5/22) C2 = 9.1% (2/22) CC = 4.5% (1/22)	A1 = 5.0% (1/20) A2 = 0.0% (0/20) B1 = 20.0% (4/20) B2 = 35.0% (7/20) B3 = 20.0% (4/20) B4 = 15.0% (3/20) C1 = 0.0% (0/20) C2 = 0.0% (0/20) CC = 5.0% (1/20)	X^2 (7, N = 42) = 12.8, p = .077 Fisher's exact test (p = .047)* Cramer's V = 0.552
Insecurity variable[5]**	3.95 (1.50) n = 21	2.53 (1.17) n = 19	Welch's t(37.3) = 3.37, p = .002** CI_{95} = [0.568, 2.28] Cohen's d = 1.06 Mann Whitney U = 88.0, p = .002** CI_{95} =[1.000, 2.00] Rank biserial correlation = 0.559

Note. (1) Percentages within each condition are shown with actual counts in parentheses, and means with standard deviations in parentheses. (2) Chi-square tests were used for categorical variables, with Fisher's exact test also reported where statistical assumptions were not met. *p < 0.05, **p < 0.01. (3) SSP=*Strange Situation Procedure*. (4) A=avoidant attachment, B=secure attachment, C=resistant attachment, CC=cannot classify, (5) Insecurity scores were computed to equal the highest score given for resistance or avoidance in Episode 8 of the SSP.

Computed Insecurity Variable. A final posthoc analysis was completed by creating a quasi-interval-level insecurity variable. Insecure attachment can take one of two major forms: resistant (C) or avoidant (A). Therefore, based on advice from attachment expert Dr Alan Sroufe (personal communication, March 4th, 2022) resistance and avoidance scores from Episode 8 of the *Strange Situation Procedure* were examined and the larger of the two scores for each participating dyad selected. For example, if a particular mother-child pair received a resistance score of 2 and an avoidance score of 6 in the second reunion episode, they were given an insecurity score of 6 (the higher number). This new variable had a possible range of zero to 7, with higher scores indicating higher levels of insecure attachment behaviour during the SSP. The two study groups produced distributions with different shapes and sample statistics. As expected, mother-baby dyads in the in the intervention group had, on average, lower insecurity scores than those in the control group (Figure T2, Appendix T). An Independent Samples t-test was used to assess the hypothesis that intervention group babies would display lower levels of insecurity in Episode 8 of the *Strange Situation Procedure*. Levene's test of homogeneity of variances was non-significant (F = 1.16(1, 38), p = 0.287), but a significant Shapiro-Wilk test suggested a violation of the assumption of normality (W = 0.932, p = 0.018), so non-parametric equivalents are also reported. Insecurity (either resistance or avoidance) was significantly higher in the control group than the intervention group, consistent with the interpretation that attending the *Parenting From the Start* workshop during pregnancy reduced the risk of insecure interactive behaviour in the *Strange Situation* approximately 12 months later. The rank biserial correlation was 0.559, indicating a large effect size.

Regression to Test Mediation and Moderation

Based on prior research it was hypothesised that maternal sensitivity and responsiveness would mediate or moderate the relationship between study condition (intervention/control group) and infant attachment, and I pre-registered the intention to investigate these possibilities using regression.

Both mediation and moderation require the existence of a direct relationship between the independent variable (study condition) and the dependent variable (attachment), an indirect effect of the mediator/moderator (maternal sensitivity), as well as sufficient statistical power to detect these effects. Given the small number of mother-baby dyads who completed the final assessment, the power of these analyses was in doubt. Sim and colleagues investigated the minimum sample size necessary to investigate simple mediation relationships using either delta or bootstrap methods (Sim et al., 2022). Using the delta method, the minimum sample size required to detect partial mediation relationships ranged from 680 for a small effect size (of the indirect effect) to 50 for a large effect size. Detection of complete mediation would require a sample size of 670 (small effect size) to 50 (large effect size). Using the bootstrap method, the minimum sample size required to detect partial mediation relationships ranged from 560 for a small effect size to 40 for a large effect size. Detection of complete mediation would require a sample size of 560 (small effect size) to 60 (large effect size). The sample size requirements for adequate power in moderating analyses are even higher (Blake & Gangestad, 2020; Sommet et al., 2023). Thus, my sample size of 42 mother-baby dyads was unlikely to have sufficient power to detect anything but a large indirect effect of study condition on infant attachment via maternal sensitivity. This was deemed possible but unlikely based on prior research, so while tentative tests of mediation and moderation by maternal sensitivity are reported in Appendix U, they were not considered definitive. Regression failed to detect evidence that maternal sensitivity mediated or moderated the relationship between study condition and attachment insecurity, although the small sample size did not provide sufficient power to detect small or medium mediation or moderation interactions.

To sum up, data relating to the primary outcome measures provided support for some study hypotheses. Differences in two-way attachment between the control and intervention groups did not reach statistical significance, but analyses of three-way attachment security, attachment subcategory, and insecurity were all significant, with moderate to large effect sizes. This is consistent with the interpretation that maternal attendance at the *Parenting From the Start* antenatal workshop improved infant attachment outcomes a year post birth. In contrast, non-significant findings were obtained for all three measures of maternal sensitivity. Non-significant findings were also obtained for a computed sensitivity variable combining all three measures. I found no evidence that the workshop increased maternal sensitivity, or that maternal sensitivity mediated or moderated the relationship between study condition and attachment insecurity, although the later result is not trustworthy given the low power of interaction analyses.

Secondary Outcome Measures

The following sections consider measures pre-registered as secondary outcomes. I begin by comparing the intervention and control group in terms of the parenting strategies mothers reported using during their infant's first year, and health variables such as birth and feeding outcomes, admissions to the neonatal unit, and scores on a postnatal depression screen. Next I discuss differences between the parenting intentions reported by intervention group mothers immediately before and after the *Parenting From the Start* antenatal workshop. Finally, I summarise the feedback received from workshop participants.

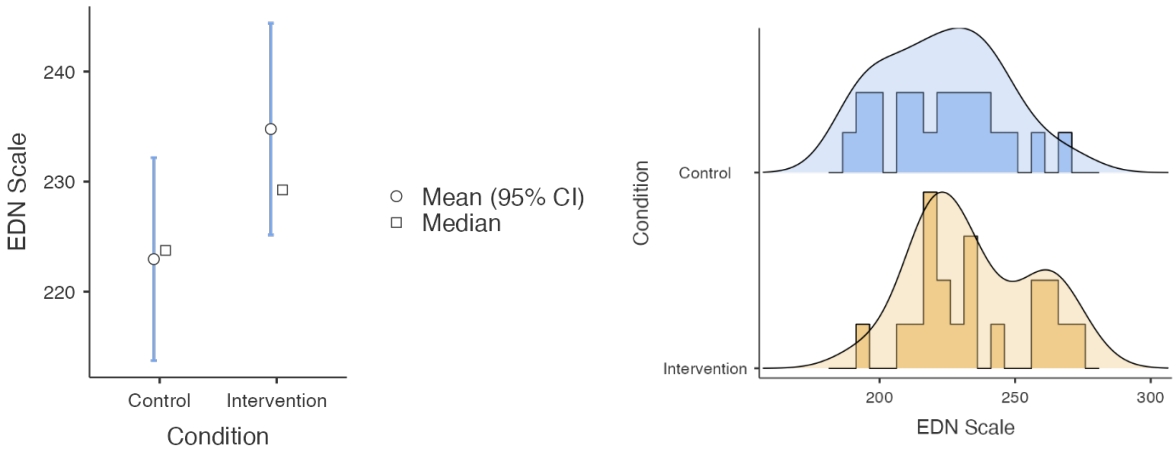
Actual Parenting Strategies: EDN-Consistent Caregiving

Hypothesis 2 predicted that ancestral parenting practices such as natural birth, co-sleeping, exclusive/extended breastfeeding, infant toileting, babywearing, and alloparenting would be increased among mothers who received the intervention relative to the control group. I expected mothers who attended the workshop before their babies were born to display an overall parenting style more consistent with the evolved developmental niche (EDN) than those in the waiting list control group. That is, I expected the intervention to increase EDN-consistent parenting *within* and *across* categories such as infant feeding, toileting, sleep, and play. Birth outcomes and infant feeding are included here in combined analyses but detailed more fully in the health outcomes section. Precedence in analysis and reporting is given to data from the final assessment as the longer follow-up provided more complete information about parenting strategies and outcomes across the first year.

Figure 20 shows measures of central tendency and spread for the *EDN Scale* total score and the shape of the two group distributions on histogram and density plots. Overall scores on the *EDN Scale* were higher on average in the intervention group than the control group but the difference was not statistically significant. The Shapiro-Wilk test (W = 0.978, p = 0.577) provided no evidence on which to reject the null hypothesis of normality, making the Independent Samples two-sided Welch's t-test appropriate, and this is reported along with descriptive statistics and hypothesis testing for all EDN subscales in Table 36. Differences in evolved parenting practices in families who did and did not attend the *Parenting From the Start* antenatal workshop were either due to chance or small enough that the study was underpowered to detect them. Of the subscales, only *Positive Care* was significantly higher for intervention group mothers than for those randomly assigned to the control group. The *Positive Care* subscale included items asking about the frequency with which babies were handled gently, played and talked to, held or carried in arms, responded to promptly (within 5 minutes), cared for at home by whānau (family), and constantly able access a caregiver they loved. The group difference on *Absence of Negative Care* subscale scores appeared statistically significant on parametric testing (Welch's t(34.5) = -2.22, p = 0.033), but a significant Shapiro-Wilk test (W = 0.914, p = 0.004) suggests the assumption of normality was violated, and non-parametric testing only approached significance (Mann-Whitney U = 150, p = .072). This complimentary infant care scale assessed the frequency with which pēpi/babies were picked up when they cried (reverse-scored), yelled at, and hit, thrown, or shaken within each quartile of the first year.

Figure 20.

Evolved Developmental Niche (EDN) Scale (a) Total Scores & (b) Distributions by Study Condition



Although not all significant, most subscale differences were in the expected direction (see Table 36). There were exceptions however. Results on the *Natural Birth* and *Early Proximity* subscales were unexpected, with lower mean scores for intervention group participants indicating some mothers may have had more medicalised birth experiences and more frequent interruptions to early bonding. Similarly (but consistent with the parenting intentions data reported below), average scores on the *Alloparenting and Social Support* subscale did not conform to the hypothesised pattern. Mothers in the intervention group gave lower ratings on social support items than mothers in the control group. Data from the earlier home visit shows that the pattern of lower reported support in the intervention group existed then too. I expand on these findings next.

Table 36.

Fit Between Reported Parenting Strategies and Evolutionary Caregiving (EDN) Across Study Conditions

EDN subscale		**Study condition**		**Hypothesis testing**
		Control (n = 22)	**Intervention** (n = 20)	Statistical significance & effect size
1.	Healthy pregnancy	5.91 (1.11)	6.35 (0.65)	Welch's t(34.5) = -1.59, *p* = 0.121, CI_{95} = [-1.00, 0.123] Cohen's d = -0.479 Mann-Whitney U = 176, *p* = 0.239, CI_{95} = [-1.00, 4.66e-5] Rank biserial correlation = 0.202
2.	Natural birth	5.41 (2.63)	5.20 (2.31)	Welch's t(40.0) = 0.274, *p* = .785, CI_{95} = [-1.33, 1.75] Cohen's d = 0.085 Mann-Whitney U = 209, *p* = .779, CI_{95} = [-1.00, 2.00]

				Rank biserial correlation = 0.052
3.	Early proximity	3.50 (0.67)	3.25 (1.37)	Welch's t(27.0) = 0.738, *p* = .467, CI_{95} = [-0.445, 0.945] Cohen's d = 0.231 Mann-Whitney U = 211, *p* = .801, CI_{95} = [-4.98e-5, 4.75e-5] Rank biserial correlation = 0.041
4.	Proximity & responsiveness during infant sleep	23.4 (8.68)	27.8 (7.16)	Welch's t(39.6) = -1.77, *p* = .084 CI_{95} = [-9.29, 0.605] Cohen's d = -0.546
5.	Responsive infant feeding	29.1 (8.65)	33.2 (5.69)	Welch's t(36.6) = -1.81, *p* = .078 CI_{95} = [-8.60, 0.480] Cohen's d = -0.555 Mann-Whitney U = 155, *p* = .077, CI_{95} = [-6.00, 4.50e-5] Rank biserial correlation = 0.298
6.	Infant toileting	17.8 (4.89)	20.9 (8.29)	Welch's t(30.2) = -1.46, *p* = .154 CI_{95} = [-7.45, 1.24] Cohen's d = -0.457 Mann-Whitney U = 171, *p* = .221, CI_{95} = [-6.00, 1.00] Rank biserial correlation = 0.223
7.	Positive care*	62.7 (5.42)	65.5 (4.03)	Welch's t(38.6) = -1.90, *p* = .064 CI_{95} = [-5.76, 0.175] Cohen's d = -0.584 Mann-Whitney U = 141, *p* = .047*, CI_{95} = [-5.00, -5.44e-5] Rank biserial correlation = 0.359
8.	Absence of negative care	44.1 (3.52)	46.1 (2.07)	Welch's t(34.5) = -2.22, *p* = .033* CI_{95} = [-3.76, -0.171] Cohen's d = -0.679 Mann-Whitney U = 150, *p* = .072, CI_{95} = [-3.00, 6.42e-5] Rank biserial correlation = 0.320
9.	Alloparenting & social support	31.0 (10.1)	26.6 (11.1)	Welch's t(38.5) = 1.35, *p* = .186 CI_{95}= [-2.23, 11.1], Cohen's d = 0.417
EDN Scale total score		223 (22.1)	235 (21.9)	Welch's t(39.7) = -1.74, *p* = .090 CI_{95}= [-25.6, 1.92], Cohen's d = -0.537

Notes. Data based on maternal reports at the final assessment (Time 3), 11-22 months post birth. Means are shown with standard deviations in parentheses. All Independent Samples t-tests are two-sided. *$p < 0.05$, **$p < 0.01$. Non-parametric tests are reported alongside Welch's t-test when a significant Shapiro-Wilk result suggested the assumption of normality was not met. CI_{95} = 95% confidence interval. Effect sizes are reported for all tests.

Actual Parenting Strategies: Alloparenting and Social Support

All participants who completed the home visit (100%, N = 46) described themselves (the biological mother) as the primary caregiver, with one participant (2.2% of the sample) adding the biological father as an additional primary caregiver. The number of caregivers per household reported at the home visit ranged from a minimum of 1 to a maximum of 3 adults (including mothers, partners, housemates, and teenage dependents). Data is missing for one intervention group participant. The majority of households in the sample contained two caregivers: 92% (22/24) of control group households and 86% (18/21) of intervention group households. No intervention group household (n = 21) reported fewer than 2 caregivers, and only 1 control group household (n = 24) had a single caregiver (the biological mother). There is little evidence of diversity in terms of family make-up in this study, with only one solo parent household and 8.89% of households (4/45) including three adults. No households in this study contained the three alloparents thought to optimise infant outcomes (Van Ijzendoorn et al., 1992). Shared care at the household level was low, usually restricted to the biological parents.

Other data from the home visit expands on the highly gendered pattern in which biological mothers undertook the bulk of childcare. Participants reported that when their babies were 6 months old they spent an average of 159 hours per week in their mother's care (SD = 17.2), compared to only 67.6 hours in the care of their other parent (SD = 46.3), 5.05 hours per week with friends and relatives (SD = 15.0), and 2.61 hours per week in paid care (SD = 7.98). Descriptive statistics are summarised in Table 37. Summed across a 7-day week, the number of hours with caregivers other than parents was so low in this sample that finer categories were collapsed for reporting purposes.[143] The three categories of (c) Grandparent/s, (d) Other relative/s, and (e) Friend or neighbour/s were combined to create a new 'Friends and relatives' variable. Similarly, the four original categories of (f) Paid 'nanny', (g) 'In home' carer, (h) Kōhanga Reo, and (i) Childcare centre were combined into a single 'Paid care' variable.

Based on anthropological reports of hunter-gatherer societies and the human baseline of the evolved developmental niche described in the *Parenting From the Start* workshops, I expected babies in the intervention group to spend more time with their mothers *and* more time with alloparents than babies from the control group.[144,145] Contrary to these hypotheses, the total number of hours per week in mothers' care was slightly lower in the intervention group than in the control group, with twice the variability, although the difference was not

[143] The total hours per week were obtained by summing hours reported across a hypothetical 7-day period (Monday to Sunday). The PSQ acknowledged that multiple caregivers might be simultaneously available to a particular child, meaning two or more caregivers may be credited with up to 24 hours of care each on any particular day. Thus the columns do not add up to 168 hours per week.

[144] Although the maximum hours per day was 24 for each caregiver, the totals for each category could potentially be higher if two or more people cared for a baby simultaneously. I did not specify any particular level of supervision or closeness necessary for an adult or older child to count as a 'caregiver' in that moment.

[145] Studies of babies in Boston and Botswana (!Kung San) found no evidence of trade-offs in EDN care by mothers and alloparents. !Kung infants were held much more by alloparents and *also* had more physical contact with their mothers than American infants (Tulkin and Kagan, 1972; Tulkin 1977; Konner, 1975, all cited in Hewlett & Lamb, 2009, pp. 24–25).

statistically significant. The medians were identical, at the maximum of 168 hours per week. Intervention group babies spent a minimum of 72 hours in their mother's care, compared with 125 hours per week in the control group. No significant differences were observed in the total number of hours spent in other caregiving situations at 6 months of age, although trends were for intervention group infants to spend fewer hours per week in the other parents care, care of friends/relatives, and paid care than control group infants. Variation across families was substantial. Time spent in the other parents' care ranged from a minimum score of zero (i.e., no co-parenting at 6 months of age) to the maximum possible of 168 hours per week. Total hours per week spent with friends/relatives and in paid care were noticeably low in comparison to the amount of time infants spent in the care of mothers and co-parents, with median scores of zero across study conditions indicating many infants received no alloparenting. As of the middle of the first year, parents in this sample were undertaking the majority of childcare, with the heaviest workload falling on mothers. According to maternal reports, shared care was a minor component of infant caregiving six months post birth in this sample.

Table 37.

Total Hours Per Week Spent in Various Caregiving Situations at 6 Months Post Birth

Total hrs per week	Control group	Intervention group	Hypothesis testing
In mother's care	160 (12.5) 125 to 168 n = 24	158 (21.5) 72 to 168 n = 22	Welch's t(33.1) = 0.251, p = .804, CI_{95} = [-9.36, 12.00] Cohen's d = 0.0748 Mann-Whitney U = 258, p = .883, CI_{95} = [-2.50, 3.76e-5] Rank biserial correlation = 0.0246
In other parent's care	73.7 (54.6) 0 to 168 n = 23	61.4 (36.0) 6 to 132 n = 22	Welch's t(38.3) = 0.896, p = .376, CI_{95} = [-15.48, 40.06] Cohen's d = 0.2659
With friends & relatives	6.19 (17.6) 0 to 86 n = 24	3.82 (11.9) 0 to 54 n = 22	Welch's t(40.6) = 0.539, p = .593, CI_{95} = [-6.52, 11.26] Cohen's d = 0.1577 Mann-Whitney U = 224, p = .280, CI_{95} = [-4.91e-5, 5.60e-5] Rank biserial correlation = 0.1534
In paid care	3.27 (8.63) 0 to 30 n = 22	1.95 (7.41) 0 to 34 n = 22	Welch's t(41.1) = 0.544, p = .590, CI_{95} = [-3.58, 6.22] Cohen's d = 0.1639 Mann-Whitney U = 231, p = .655, CI_{95} = [-1.37e-5, 5.36e-5] Rank biserial correlation = 0.0455

Notes. Data based on maternal reports at home visit (Time 2), 11-24 months post birth. Means are shown with standard deviations in parentheses. All Independent Samples t-tests are two-sided. *p < 0.05, **p < 0.01. Non-parametric tests are reported alongside Welch's t-test when a significant Shapiro-Wilk result suggested the assumption of normality was not met. CI_{95} = 95% confidence interval. Effect sizes are reported for all tests.

Additional data from the final assessment (Time 3) provides information about care across the whole of the first year. This data provides a clearer pattern of results, with wider differences between groups as the year went on. Table 38 summarises descriptive statistics and hypothesis testing for the two study conditions. In the first half of the first year the median number of non-family caregivers was zero in both study conditions. In the second half of the first year the groups diverged. While intervention group mothers continued to report exclusive maternal care (i.e., a median of zero non-family caregivers), the control group median rose to 1 additional caregiver in the 3rd and 4th quartiles. Contrary to expectations, the mean number of non-kin caregivers was lower in the intervention group than the control group in all four quartiles of infants' first year, and this difference was statistically significant in the latter three quartiles. Figure 21 illustrates the pattern of increasing differences between study conditions as the year progressed. As babies got older, the differences between the groups increased. Means for the two groups moved further apart, as control group families increasingly utilised non-family caregivers relative to intervention group participants. This pattern of results is unlikely to be due to differences in household size as the majority of households contained two adults. Results relating to alloparenting and social support conflicted with pre-registered hypotheses. Maternal reports suggest control group babies received more care from non-maternal caregivers than did babies in the intervention group. Differences between the groups became larger as the year progressed, and effect sizes also increased quartile by quartile from small to medium levels.

Table 38.

Non-Family Caregivers During the Four Quarters of the First Year Post Birth

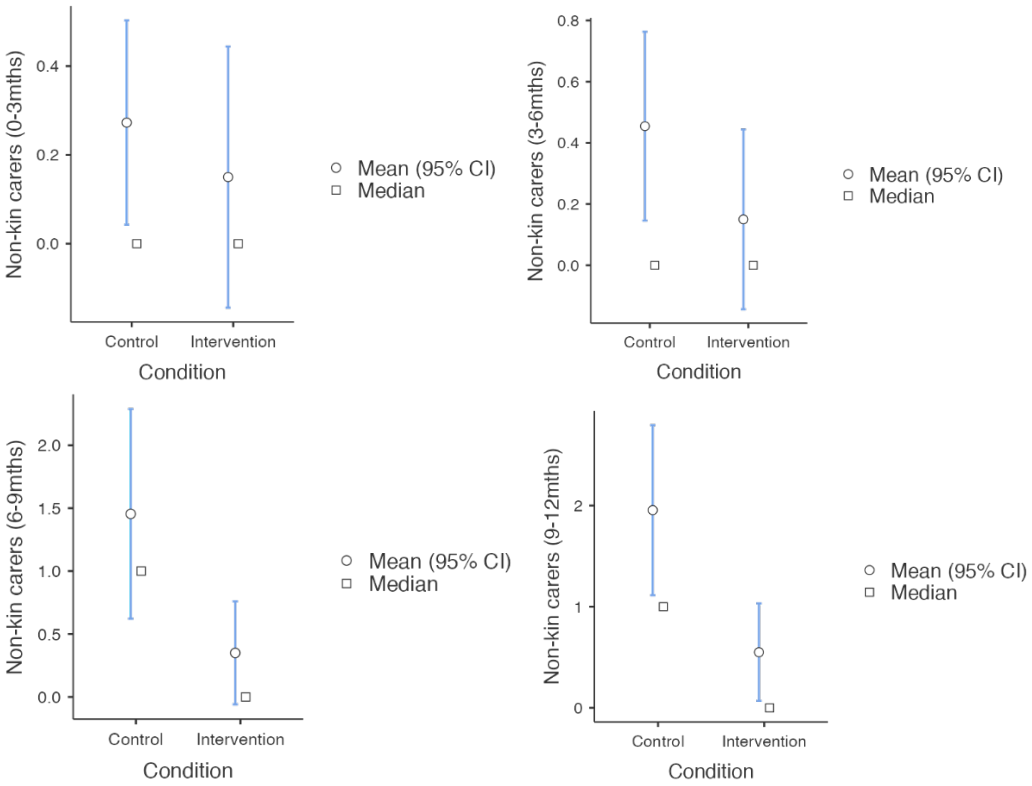
Mean hours per week	**Control group** n = 22	**Intervention group** n = 20	**Summary of difference**
Non-kin carers (0 to 3 months old)	0.27 (0.55)	0.15 (0.67)	Welch's t(36.9) = 0.644, *p* = .523, CI_{95} = [-0.263, 0.509] Cohen's d = 0.200 Mann-Whitney U = 184, *p* = .136, CI_{95} = [-3.41e-5, 3.42e-5] Rank biserial correlation = 0.166
Non-kin carers (3 to 6 months old)	0.46 (0.74)	0.15 (0.67)	Welch's t(40.0) = 1.400 , *p* = .169, CI_{95} = [-0.135, 0.744] Cohen's d = 0.432 Mann-Whitney U = 165, *p* = .043*, CI_{95} = [-4.27e-5, 4.81e-5] Rank biserial correlation = 0.252
Non-kin carers (6 to 9 months old)	1.46 (1.99)	0.35 (0.93)	Welch's t(30.4) = 2.333 , *p* = .026*, CI_{95} = [0.138, 2.071] Cohen's d = 0.710 Mann-Whitney U = 136, *p* = .016*,

			CI_{95} = [5.09e-5, 1.00] Rank biserial correlation = 0.382
Non-kin carers (9 to 12 months old)	1.96 (2.01)	0.55 (1.10)	Welch's t(33.1) = 2.842, *p* = .008**, CI_{95} = [0.399, 2.410] Cohen's d = 0.867 Mann-Whitney U = 112, *p* = .004**, CI_{95} = [3.27e-5, 2.00] Rank biserial correlation = 0.491

Note. All significance testing was two-sided and based on Independent Samples. Results were counter to pre-registered predictions. Mann-Whitney U are reported along with parametric tests where Shapiro-Wilk tests and Q-Q plots suggested the assumption of normality was not met. * $p < .05$, ** $p < .01$.

Figure 21.

Average Number of Unrelated (Non-Family) Caregivers During Each Quartile of Babies' First Year

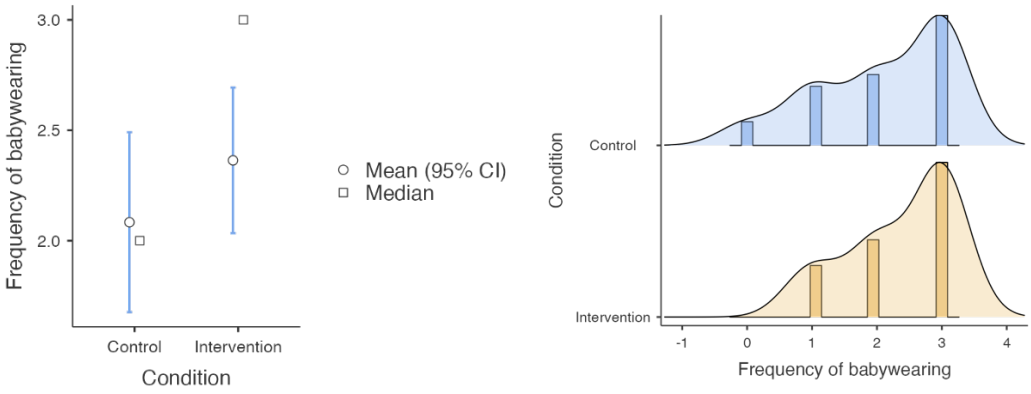


Actual Parenting Strategies: Babywearing

Contrary to predictions, differences in the frequency of infant carrying reported were not significant (see Table 39). Babywearing was common in both study conditions with normality testing confirming the significantly skewed distributions (Shapiro-Wilk = 0.905, $p < .001$) illustrated in Figure 22. Overall frequency of infant carrying as reported by mothers did not distinguish between the intervention and control groups.

Figure 22.

Frequency of Baby-Wearing Where 0=never, 1=occasionally, 2=sometimes, 3=often



Actual Parenting Strategies: Responsiveness

The second hypothesis that intervention group participants would exhibit more responsive parenting than control group mothers was best examined via the maternal sensitivity measures summarised earlier. In addition, the pre-registered *Parenting Strategies Questionnaire* (PSQ) included a 20-item scale assessing the extent to which mothers endorsed child-centred, responsive parenting beliefs. This *Parenting Beliefs Scale* (PBS) is the same completed by expectant intervention group mothers twice during pregnancy around one year earlier (immediately before and after the workshop). The PBS was repeated with all participants to allow comparisons with the control group during the 'hands on' phase of parenting that occurs post birth. Figure 23 shows the difference in PBS[146] scores by study condition and a QQ plot of residuals illustrating the sample distribution.[147] As predicted, the average scores on the *Parenting Beliefs Scale* were significantly higher in the intervention group than the control group, with a rank biserial correlation of 0.402 indicating a moderate effect size (see Table 39). Mothers in the intervention group reported more child-centred and responsive beliefs about caregiving than mothers in the control group.

[146] Control group participants did not complete the PBS at Time 1. This could have introduced a potential confound if familiarity with the PBS somehow encouraged different responses than meeting the questions for the first time (a 'selection-testing' threat to internal validity). For intervention group mothers, this section of the PSQ was identical to a section of the *Parenting Intentions Questionnaire* (PIQ) they completed during pregnancy. I consider a confound unlikely given the large time gap between the antenatal workshop and home visit (approximately a year), but cannot able to rule out the possibility entirely.

[147] A straight line on the QQ plot would indicate normally-distributed data.

Figure 23.

(a) Parenting Beliefs Scale Scores by Study Condition and (b) QQ Plot of Residuals

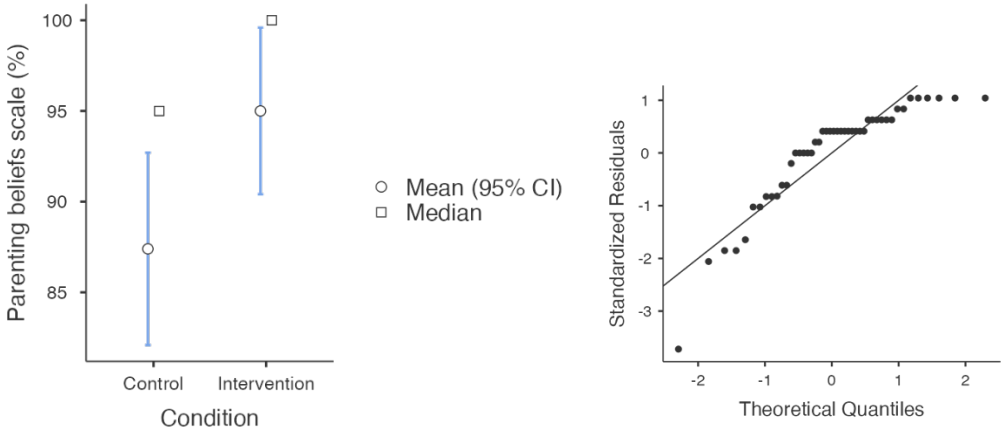


Table 39.

Secondary Outcomes: Baby-Wearing and Responsive Parenting Beliefs

	Control group n = 24	**Intervention group** n = 22	**Hypothesis testing**
Frequency of baby-wearing	1.67 (1.17)	2.09 (0.97)	Welch's t(43.6) = -1.34, *p* = .186, CI_{95} = [-1.06, 0.212], Cohen's d = -0.395 Mann-Whitney U = 210, *p* = 0.218, CI_{95} = [-1.00, 4.48e-6] Rank biserial correlation = 0.205
Responsive parenting beliefs (*Parenting Beliefs Scale* score)*	87.4% (13.3)	95.0% (11.0)	Welch's t(43.6) = -2.12, *p* = .039*, CI_{95} = [-14.8, -0.387] Cohen's d = -0.624 Mann-Whitney U = 158, *p* = .016*, CI_{95} = [-15.0, -5.01e-5] Rank biserial correlation = 0.402

Note. All significance testing was two-sided and based on Independent Samples. Home visit data collected 11 to 24 months post birth. Means are shown with standard deviations in parentheses. Mann-Whitney U are reported along with parametric tests where Shapiro-Wilk tests and/or Q-Q plots suggested the assumption of normality was not met. *p < .05, **p < .01.

Health Outcomes

Place of Birth. Retrospective self-reports on planned and actual place of birth were available for all 24 control group mothers and 22 intervention group mothers. A slightly higher proportion of women from the intervention group reported they had planned to give birth at home: 36.4% of those in the intervention group (8/22) compared with 29.2% of control group participants (7/24). Smaller numbers actually gave birth at home: 18.2% of the intervention group and 16.7% of the control group. The proportion of women reporting they had planned to have their baby in the (newly opened) birth centre was also slightly higher in the intervention group (22.7%) than the control group (20.8%). Nevertheless, in the event only one intervention group mother had her baby in the birth centre (4.5%), compared with 4 control group mothers (16.7%). Exactly half of those in the control group (12) and 40.9% of intervention group mothers (9) planned to give birth in hospital but 66.7% of women in the control group had their baby in hospital, compared with 77.3% of mothers in the intervention group. Chi-square (χ^2) tests of independence or association between the study conditions and planned/actual places of birth were non-significant (see Table 40). Sample size assumptions were met for analysis of planned place of birth (1 out of 6 expected frequencies <5) but not actual place of birth (4/6 expected frequencies <5). Data on gestation and birthweight appears in Appendix V.

Table 40.

Secondary Health Measures: Place of Birth by Study Condition

Place of birth	Control group n = 24	Intervention group n = 22	Hypothesis testing
Planned place of birth	Home = 29.2% (7) Birth centre = 20.8% (5) Hospital = 50.0% (12)	Home = 36.4% (8) Birth centre = 22.7% (5) Hospital = 40.9% (9)	$\chi^2(2) = 0.409$, $p = .815$, Cramer's V = 0.0943
Actual place of birth	Home = 16.7% (4) Birth centre = 16.7% (4) Hospital = 66.7% (16)	Home = 18.2% (4) Birth centre = 2.5% (1) Hospital = 77.3% (17)	$\chi^2(2) = 1.75$, $p = .418$, Cramer's V = 0.195 Fisher's exact test = 46, $p = .507$

Note. (1) Percentages within each condition are shown with actual counts in parentheses. (2) Chi-square tests were used for categorical variables, with Fisher's exact test also reported where statistical assumptions were not met. Effect sizes (Cramer's V) are reported regardless. *$p < 0.05$, **$p < 0.01$.

Birth Outcomes. A majority of babies in the study were born vaginally (60.9% of mothers, or 28/46). Just under one third (30.4%) had surgical births (caesarean section), and 8.7% had instrumental births (forceps or suction). The break-down by study condition is shown in Table 41. Rates of vaginal birth were 63.6% in the intervention group and 58.3% in the control group. Rates of caesarean section were similar across study conditions: 31.8% in the intervention group and 29.2% in the control group. Two women from each study condition indicated they had planned a caesarean in advance – the rest arose during the course of labour. The different rates of instrumental births in the control group (12.5%) and

the intervention group (4.5%) may have been due to chance as a chi-square test of independence was not significant, providing no evidence of an association between type of delivery (vaginal, instrumental, or surgical) and study condition (see Table 41). Two of the six expected frequencies were below 5, so Fisher's exact test is reported alongside chi-square. The hypothesis that mothers who attended the workshop would report more vaginal births was not supported.

Rates of Intervention. The mean number of medical interventions experienced was similar for mothers who attended the parenting workshop during pregnancy and women in the waiting list control group. A significant Shapiro-Wilk result (W = 0.945, p = 0.03) suggested a violation of the assumption of normality, so Mann-Whitney U is reported alongside Welch's t-test, and both were non-significant.

Potential differences between study conditions were examined in greater detail by considering three categories of medical intervention separately: interventions to start labour, interventions during labour and birth, and interventions occurring after birth. Hypothesis testing for these analyses is also shown in Table 41, and descriptive statistics are reported next.

Table 41.

Secondary Health Measures: Birth Outcomes by Study Condition

Birth outcomes	Control group n = 24	Intervention group n = 22	Hypothesis testing
Type of delivery	Vaginal = 58.3% (14) Instrumental = 12.5% (3) Surgical = 29.2% (7)	Vaginal = 63.6% (14) Instrumental = 4.5% (1) Surgical = 31.8% (7)	$\chi^2(2) = 0.915$, $p = .633$, Cramer's V = 0.141 Fisher's exact test = 46, $p = .811$
Total rate of interventions	Sum of 16 interventions: m = 3.13, SD = 2.42	Sum of 16 interventions: m = 2.91, SD = 1.80	Welch's t(42.3) = 0.345, $p = .731$, CI_{95} = [-1.05, 1.48] Cohen's d = 0.101 Mann-Whitney U = 260, $p = .938$, CI_{95} =[-1.00, 1.00] Rank biserial correlation = 0.0152
a) Interventions to start labour	Inductions & planned caesareans: 25.0% (6)	Inductions & planned caesareans: 36.4% (8)	$\chi^2(1) = 1.32$, $p = .250$, Cramer's V = 0.170
b) Interventions during labour	Sum of 8 interventions: m = 1.83, SD = 1.81	Sum of 8 interventions: m = 1.41, SD = 1.37	Welch's t(42.5) = 0.901, $p = .373$, CI_{95} = [-525, 1.374] Cohen's d = 0.264 Mann-Whitney U = 237, $p = .542$, CI_{95} =[-1.000, 1.000]

				Rank biserial correlation = 0.104
c)	Interventions after birth	Sum of 4 interventions: m = 0.905, SD = 0.700	Sum of 4 interventions: m = 1.00, SD = 0.745	Welch's t(37.0) = -0.415, p = .680, CI_{95} = [-0.560, 0.369] Cohen's d = -0.132 Mann-Whitney U = 190, p = .784, CI_{95} =[-1.87e-5, 1.54e-5], Rank biserial correlation = 0.0476

Notes. All Independent Samples hypothesis testing is two-sided. Percentages within each condition are shown with actual counts in parentheses. Chi-square tests were used for categorical variables. Non-parametric alternatives are reported alongside when the assumptions of parametric tests are not met. Effect sizes are reported regardless. *p < 0.05, **p < 0.01. Labours were induced using one or more of the following: prostin gel, artificial rupture of membranes, oxcytocin drip to start labour medically, or Cooks catheter). Labour interventions included entonox gas, fentanyl, epidural, spinal (during labour), general anaesthetic, caesarean section, forceps/suction, and 'other' (e.g., Remifentanyl PCA - patient controlled analgesia). Interventions after birth included: local anaesthetic, spinal, Entonox gas, and Panadol/voltaren. Incomplete data was included in analyses as mothers may not always remember every intervention they experienced.

Interventions to Start Labour: Inductions and Planned Caesareans. Births were coded as starting medically if they were induced or participants reported a planned caesarean. Contrary to predictions that intervention group births would more closely resemble the evolved developmental niche, 25.0% of the control group, and 36.4% of the intervention group had their labours medically induced, although this difference was not significant. All four expected frequencies for the percentage of women experiencing interventions to start labour (inductions and planned caesarean sections) were above 5, so the chi-square test of independence/association was appropriate (Table 41). Table 42 shows the five kinds of induction or medical intervention used to initiate labour and birth. Examined separately, it seems that the higher rate of births starting medically in the intervention group can mostly be attributed to greater use of synthetic oxytocin and Prostin gel.

Table 42.

Secondary Health Measures: Interventions to Start Labour

Study condition	Planned caesarean	Prostin gel	ARM	Oxytocin	Cooks catheter
Control (n = 24)	8.33% (2/24)	0% (0/22)	21.7% (5/23)	17.4% (4/23)	4.4% (1/23)
Intervention (n = 22)	9.09% (2/22)	5.0% (1/20)	23.8% (5/21)	28.6% (6/21)	0% (0/20)

Note. Number of mothers shown in parentheses after percentages. Missing data reduced some denominators.

Interventions During Labour. Despite the fact more participants in the intervention group had experienced a medical start to their labour, there were no significant differences

between study conditions in terms of the number of interventions experienced during labour and birth. Table 41 shows the average number of interventions experienced during labour by mothers in each study condition. This was computed by summing eight categories of labour intervention, giving each participant a score ranging from zero (no interventions) to 8 (in the implausible scenario they received every listed intervention). Partial data was included even where participants had failed to provide a yes/no response for one or more categories, in recognition that mothers are sometimes unsure whether or not they have experienced a particular intervention. This provided quasi-continuous data for analysis. A significant Shapiro-Wilk test and QQ plot confirmed the data were not normally distributed ($W = 0.909$, $p = 0.002$), and non-parametric tests are therefore also reported (see Table 41). The mean number of interventions during labour was slightly higher in the control group than the intervention group (see Appendix V), but the difference was non-significant.

The proportions of participants reporting specific interventions during labour are shown in Table 43. Rates of caesarean section were similar across study conditions: 29.17% in the control group and 31.82% in the intervention group. Use of Entonox gas was almost identical (just over 52% in both conditions). Use of Fentanyl, Epidurals, Spinals, General anaesthetic during labour appeared more often within the control group than the intervention group, as did instrumental deliveries (forceps or suction). Use of Fentanyl (IV opioid/opioid given through a drip) was three times as common in the control group (13.64%) as the intervention group (4.55%). Epidurals were twice as common in the control group (43.48%) compared with the intervention group (19.05%), and this difference approached significance. General anaesthetic was used only by control group participants (14.29%), and Spinals also occurred more frequently for those who had not attended the *Parenting From the Start* workshop during pregnancy (27.28% control group, 19.05% intervention group). Instrumental deliveries were more than twice as common in the control group (12.5%) as the intervention group (4.55%). In contrast, more intervention group participants appeared in the 'other intervention' category (14.29% compared with 4.76% in the control group), due to two women whose labours were augmented with synthetic oxytocin. These differences were examined in terms of the frequencies of individual interventions using chi-square tests of independence/association (see Table 43). None of the differences between study conditions were statistically significant.

Table 43.

Secondary Health Measures: Interventions During Labour

Intervention type	**Control group** (n = 24)	**Intervention group** (n = 22)	**Hypothesis testing**
Entonox gas	52.17% (12/23)	52.38% (11/21)	$\chi^2(1) = 1.89e\text{-}4$, $p = .989$, Cramer's V = 0.00207 Fisher's exact test $p = 1.000$, N = 44
Fentanyl	13.64% (3/22)	4.55% (1/22)	$\chi^2(1) = 1.10$, $p = .294$, Cramer's V = 0.158 Fisher's exact test $p = .607$, N = 44
Epidural	43.48% (10/23)	19.05% (4/21)	$\chi^2(1) = 3.02$, $p = .082$, Cramer's V = 0.262

Spinal	27.28% (6/22)	19.05% (4/21)	$\chi^2(1) = 0.407$, $p = .523$, Cramer's V = 0.0973 Fisher's exact test $p = .721$, N = 43
General anaesthetic	14.29% (3/21)	0% (0/22)	$\chi^2(1) = 3.38$, $p = .066$, Cramer's V = 0.280 Fisher's exact test $p = .108$, N = 43
Forceps/suction	12.5% (3/24)	4.55% (1/22)	$\chi^2(1) = 0.915$, $p = .339$, Cramer's V = 0.141 Fisher's exact test $p = .609$, N = 46
Caesarean (planned or emergency)	29.17% (7/24)	31.82% (7/22)	$\chi^2(1) = 0.0381$, $p = .845$, Cramer's V = 0.0288
Other	4.76% (1/21)	14.29% (3/21)	$\chi^2(1) = 1.11$, $p = .293$, Cramer's V = 0.162 Fisher's exact test $p = .606$, N = 42

Notes. Number of mothers shown in parentheses after percentages. Missing data reduced some denominators. Fisher's exact test is reported alongside chi-square where more than 20% of expected counts were <5. Effect sizes are reported regardless.

Interventions After Birth. The average number of post-birth interventions (Local anaesthetic, Spinal, Entonox gas, & Panadol &/or Voltaren) were similar in the intervention group and control group. Group differences were not in the predicted direction. Hypothesis testing did not support the prediction that intervention group mothers would experience fewer interventions following birth (see Table 41). A significant Shapiro-Wilk test (W = 0.852, $p < .001$) again confirmed the quasi-continuous variable was not normally distributed, so Mann-Whitney U results are reported alongside the two-sided Independent Samples Welch's t-test.

Admissions to Neonatal Unit. Significance testing was planned to compare intervention and control groups with regards to the proportion of infants admitted to the neonatal unit (NNU) (1) after the first week, (2) between days 2 and 7, (3) 6 to 24hrs after birth, and (4) within the first 6 hours, but the small number of infants affected (only 1 born premature and 7 admitted to NNU) led me to re-code NNU admissions as a binary variable (admitted/not admitted).

Results did not show the expected pattern. 12.5% of babies in the control group (3/24), and 18.2% from the intervention group (4/22) were admitted to the neonatal unit. One additional child from the control group was admitted to the maternity ward for jaundice during the first week and is not included as an NNU admission.[148] Two of the four expected counts were below 5, so the sample size criteria for chi-square was not met and Fisher's exact test is also reported. Both the two-sided 2x2 chi square test ($\chi^2(1) = 0.287$, $p = .592$, Cramer's V = 0.0790) and Fisher's exact test (N = 46, $p = .694$) were non-significant. The hypothesis that mothers

[148] Including this child in the control group would bring it up to 16.7%, similar to the intervention group.

who received the antenatal parenting intervention would report fewer admissions to the neonatal unit (NNU) was not supported.

Health Outcomes: Infant Colic. Time 2 data was available for all 46 mothers who completed the home visit. Infant colic was reported by 41.67% of (10/24) control group mothers and 27.23% of (6/22) intervention group mothers at the home visit. Table 44 shows that this difference in average colic scores was not significant on two-sided Independent Samples t-tests or non-parametric alternatives (Shapiro-Wilk = 0.761, p <.001). Median and mode scores of zero in both study conditions mean most mothers did not report experiencing prolonged unexplained crying at a problematic level.

Time 3 data was available for 42 participants who completed the final assessment. Results were not in the expected direction. At this later time point, maternal reports of colic symptoms were higher on average for intervention group participants (M = 1.70, SD = 2.49) than control group participants (M = 1.39, SD = 1.97). Results relating to infant colic are summarised in Table 44.

Table 44.

Secondary Health Measures: Unexplained Crying

Health outcome	Control group	Intervention group	Hypothesis testing
Infant colic - first 5-6 months[1]	Positive cases reported: 41.67% Average colic score: 0.833 (1.13)[3]	Positive cases reported: 27.23% Average colic score: 0.500 (0.964)	Welch's t(43.8) = 1.08, p = .286, CI_{95} = [-0.289, 0.956] Cohen's d = 0.318 Mann-Whitney U = 223, p = .287, CI_{95} =[-6.31e-5, 1.000] Rank biserial correlation = 0.157
Unexplained crying - first 12 months[2]	Average score: 1.39 (1.97)	Average score: 1.70 (2.49)	Welch's t(36.1) = -0.446, p = .659, CI_{95} = [-1.71, 1.10] Cohen's d = -0.137 Mann-Whitney U = 221, p = .824, CI_{95} =[-1.000, 1.000] Rank biserial correlation = 0.0391

Note. (1) Home visit data, N = 46 mother-baby dyads. (2) Final assessment data, N = 42 dyads. (3) Groups means are shown with standard deviations in parentheses. All Independent Samples tests are two-sided. Non-parametric tests are reported alongside when the assumption of normality was not met. *p < .05, **p < .05.

Breastfeeding Outcomes. Participants' breastfeeding goals and breastfeeding problems are discussed in Appendix W, as they provide context for these results but do not relate directly to pre-registered hypotheses.

Breastfeeding Duration. Duration of breastfeeding (exclusive or partial) as measured on the PSQ was restricted by the fact babies some babies were under a year old at the time of the home visit. Data was available for all 46 mothers who completed this first follow-up assessment. The median score in both groups was 12 months (the maximum value possible), reflecting lengthy breastfeeding in this sample irrespective of study condition. The difference in breastfeeding duration across study conditions was not statistically significant (see Table 45). Visual inspection of the QQ plot and a significant Shapiro-Wilk test indicated a non-normal distribution (W = 0.685, p < .001), so less powerful non-parametric testing is reported alongside Welch's t-test.

Failure to find the expected difference could have resulted from truncation of the data caused by earlier home visit timing in the second half of the first year for some families. Data from the final assessment 11 to 22 months post birth provides greater detail, although even this falls well short of the two year plus duration recommend by the World Health Organisation and is unlikely to capture the full extent of breastfeeding. Based on this more complete data average breastfeeding duration was over a month longer in the intervention group than the control group, but this difference was not statistically significant (see Table 45). The median durations remained 12 months for both groups. The Shapiro-Wilk test of normality was again significant (W = 0.667, *p* < .001) so non-parametric testing is also reported. The hypothesis that the *Parenting From the Start* workshop would increase breastfeeding durations was not supported in this sample. Figure 24 shows measures of central tendency and 95% confidence intervals for the two study conditions, and the non-normal Quartile-Quartile Plot of standardised residuals.

Table 45.

Secondary Health Measures: Infant Feeding Outcomes According to Study Condition

Breastfeeding outcomes	**Control group**	**Intervention group**	**Hypothesis testing**
Breastfeeding duration (months)	Home visit data: 9.57 (3.94)[1]	Home visit data: 10.7 (2.78)	Welch's t(39.6) = -1.08, *p* = .287, CI_{95} = [-3.14, 0.955] Cohen's d = -0.321 Mann-Whitney U = 244, *p* = .820, CI_{95} =[-1.000, 4.00e-5] Rank biserial correlation = 0.0375
	Final assessment data: 9.48 (3.95)	Final assessment data: 10.7 (3.47)	Welch's t(40.0) = -1.05, *p* = .302, CI_{95} = [-3.51, 1.12] Cohen's d = -0.322 Mann-Whitney U = 176, *p* = .181, CI_{95} =[-1.00, 2.33e-5] Rank biserial correlation = 0.200
Duration of formula use (months)	Final assessment data: 3.83 (4.75)	Final assessment data: 2.25 (4.18)	Welch's t(40.0) = 1.15, *p* = .258, CI_{95} = [-1.20, 4.37] Cohen's d = 0.354 Mann-Whitney U = 184, *p* = .340,

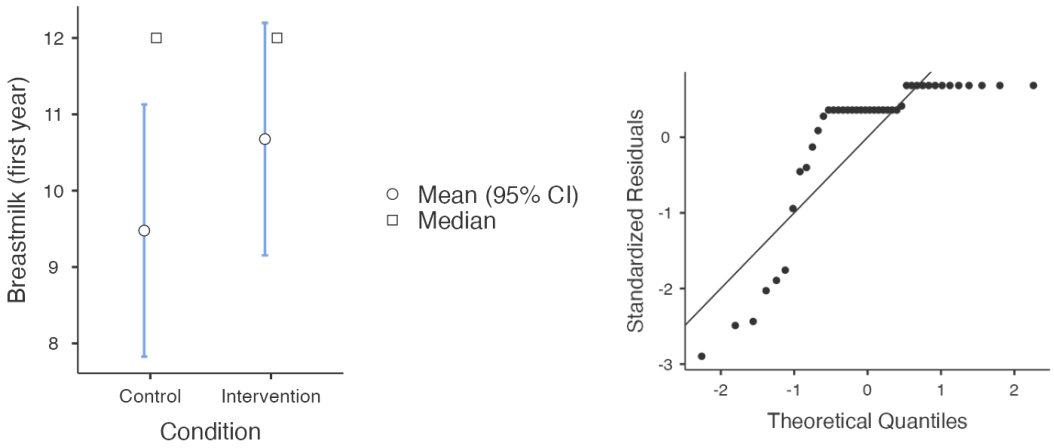
			CI_{95} =[-2.06e-5, 3.90] Rank biserial correlation = 0.166
Exclusive breastfeeding (during first 6-12 mths)	Home visit data: 3.54 (2.68)	Home visit data: 3.52 (3.22)	Welch's t(41.0) = 0.0267, *p* = .979, CI_{95} = [-1.75, 1.80] Cohen's d = 0.00793 Mann-Whitney U = 256, *p* = .858, CI_{95} =[-1.000, 1.00] Rank biserial correlation = 0.0322
'Almost exclusive' breastfeeding(2)	Home visit data: 4.38 (2.05)	Home visit data: 5.05 (2.40)	Welch's t(41.5) = -1.0131, *p* = .317, CI_{95} = [-2.01, 0.666] Cohen's d = -0.30007 Mann-Whitney U = 193, *p* = .116, CI_{95} =[-1.500, 2.95e-5] Rank biserial correlation = 0.2689

Notes. (1) Means are shown with standard deviations in parentheses. N = 45 for home visit, N = 42 for final assessment data. Independent Samples t-tests are two-sided. *p < .05, **p < .01. (2) The 'Almost exclusive BF' variable ignores artificial substitutes given during the first month. This was a posthoc analysis.

Duration of Formula Use. Formula use during the first year was similar across conditions and the difference was non-significant (see Table 45). The Shapiro-Wilk test of normality was significant (W = 0.785, p < .001), so both parametric and non-parametric tests are reported. Appendix W shows measures of central tendency and 95% confidence intervals for breastfeeding and formula use across the two study conditions.

Figure 24.

(a) Duration of Breastmilk Received During Babies' First Year (Final Assessment Data), & (b) QQ Plot

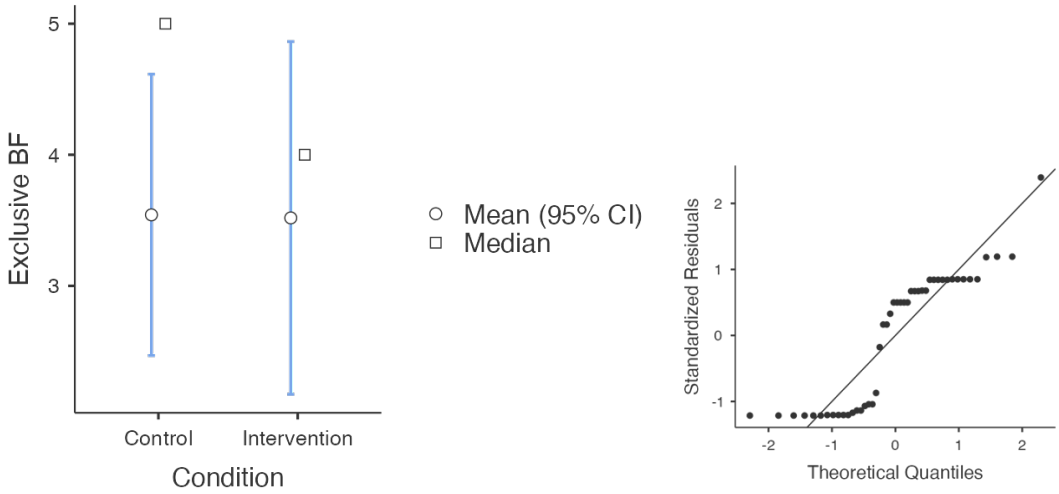


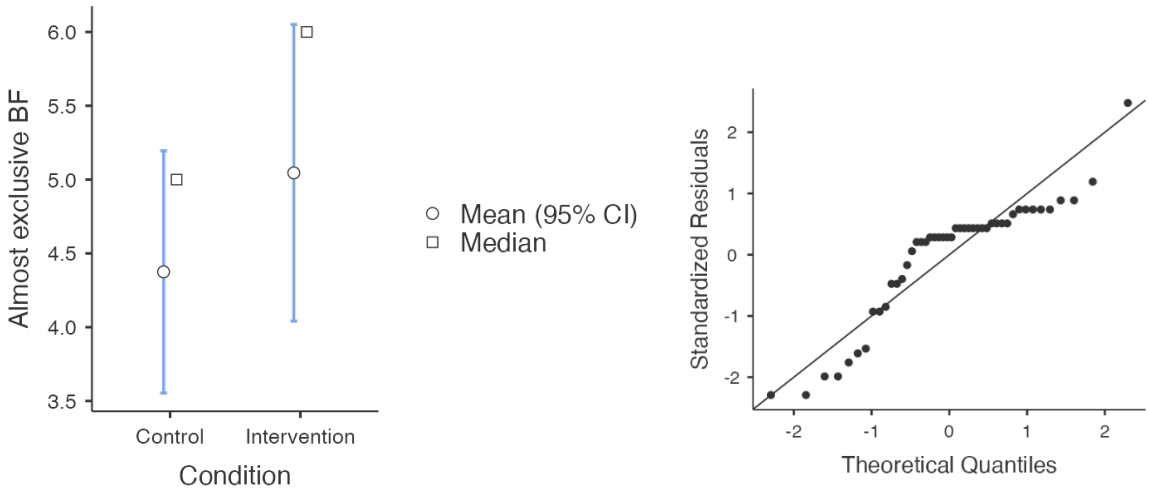
Exclusive Breastfeeding. Exclusive breastfeeding durations reported at the home visit ranged from zero to 10.5 months. The Shapiro-Wilk test of normality was significant (W = 0.831, p < .001), indicating the assumption of normality was not met, so both parametric and non-parametric hypothesis tests are reported. It was hypothesised that the duration of exclusive breastfeeding would be greater among mothers who attended the workshop during pregnancy, but the opposite result was observed. Close examination of the data and qualitative reports from mothers suggested this unexpected finding might be due to the practice of babies being offered formula before breastfeeding has been properly established. The strict definition of exclusive breastfeeding used in this study conflates babies who never breastfed exclusively with babies who were given the occasional bottle of formula during the first few weeks of life (either in hospital on the advice of health professionals, or by caregivers at home) but went on to breastfeed without supplementation. A second variable was created to distinguish between these two scenarios.

The 'Almost exclusive BF' variable ignores 'top-ups' with artificial substitutes that occurred during the first month post birth so long as the baby received nothing but human breastmilk for a period thereafter. Posthoc analysis for this variable is also shown in Table 45. The Shapiro-Wilk test of normality was significant (W = 0.868, *p* < .001), so both Welch's t test and Mann-Whitney U are reported. Both were non-significant. Figure 25 shows measures of central tendency and 95% confidence intervals across study conditions for the two variables. Note the different patterns of group medians for these two measures of exclusive breastfeeding.

Figure 25.

Months of (a) Exclusive and (b) Almost Exclusive Breastfeeding by Study Condition (Home Visit Data)





Postnatal Depression. Data was available for 40 of the 46 participants who completed the home visit. 3 women from the control group and 3 from the intervention group choose not to complete the EPDS.[149] Three participants from the control group (14.3% of those who completed the measure) and four from the intervention group (21.1% of those who completed the measure) received scores over the cut-off of 10. This difference was not in the hypothesised direction. Cut-offs of 8 and 11 are also reported in Table 46. All three cut-off scores show the same pattern. Two of the four expected frequencies in the 2x2 contingency table were below 5 for cut-offs of 10 and 11 on the EPDS, so Fisher's exact test is reported alongside chi-square for these analyses. All expected frequencies were above 5 for a cut-off score of 8.

More detailed post hoc analyses looking at actual scores on the EPDS was conducted to increase statistical power by making use of the quasi-interval level data (see Appendix X for graphs of this data). Consistent with the first comparison, the mean score on the postnatal depression screen (EPDS) was lower for the control group than the intervention group, although the difference was not significant (see Table 46). A significant Shapiro-Wilk test suggested a violation of the assumption of normality ($W = 0.897$, $p = 0.002$), so Mann-Whitney U is reported alongside Welch's t test. Both study condition means were below all three cut-off scores. Most mothers in the sample reported few symptoms of postnatal depression. The prediction that intervention group mothers would display fewer symptoms of postnatal depression was not supported.

[149] The research assistant who collected this data (RP) formed the impression some women felt they didn't need to do a postnatal screen because their mental health was fine. It was not possible to quantify this possibility, but it is worth noting that, if true, this had the potential to skew the results, with potential differences between the control and intervention group due to different levels of contact with the researcher at this point in the study.

Table 46.

Secondary Health Measures: Postnatal Depression Screening Scores by Study Condition

	Control group n = 24	Intervention group n = 22	Hypothesis testing
Average score on EPDS[1]	6.10 (4.18)[2] (3 mothers opted out)	6.76 (4.26) (3 mothers opted out)	Welch's t(37.5) = -0.498, *p* = .622, CI_{95} = [-3.33, 2.02], Cohen's d = -0.158 Mann-Whitney U = 186, *p* = .723, CI_{95} =[-3.00, 2.00], Rank biserial correlation = 0.0677
EPDS score ≥ 8	6/21 = 28.57%	7/19 = 36.84%	$\chi^2(1) = 0.311$, *p* = .577, Cramer's V = 0.0882
EPDS score ≥ 10	3/21 = 14.29%	4/19 = 21.05%	$\chi^2(1) = 0.316$, *p* = .574, Cramer's V = 0.0889 Fisher's exact test *p* = .689, N = 40
EPDS score ≥ 11	3/21 = 14.29%	4/19 = 21.05%	$\chi^2(1) = 0.316$, *p* = .574, Cramer's V = 0.0889 Fisher's exact test *p* = .689, N = 40

Note. (1) EPDS = *Edinburgh Postnatal Depression Scale* completed at the home visit 11-24 months post birth. Completion of the screening test was optional and decisions to 'opt in' may not have been independent of study condition. (2) Means are followed by standard deviations in parentheses. (3) The different cut-off scores were based on prior research. All tests are for Independent Samples and two-sided, with a non-parametric/exact alternative presented when statistical assumptions were not met. Fisher's exact test is presented alongside chi-square when greater than 20% of expected frequencies <5. Effect sizes are reported regardless of significance.

Parenting Intentions. This section outlines 'what changed' when study participants attended the antenatal workshop, by comparing their self-reported parenting intentions and beliefs immediately before and after on identical pre-test and post-test questionnaires. The *Parenting Intentions Questionnaire* (PIQ) from which this data comes can be viewed in Appendix F. This data is drawn only from intervention group mothers, as control group mothers did not attend the *Parenting From the Start* antenatal workshop. I begin with a brief description of participants' accessing of free maternity services and stage of pregnancy at the time of the workshop. Following this, parenting intentions relating to each element of the EDN are summarised one by one. Additional details of these comparisons can be found in Appendix G.

All participants in the intervention group (n = 26) were registered with a Lead Maternity Provider (LMC) by the time they attended the workshop and ranged from 1.5 to 9 months pregnant.[150] The mean duration of pregnancy was 6.44 months (SD = 1.75) when participants attended Part 1 of the workshop and 6.77 at the time they attended Part 2 (SD = 1.80).

[150] Measured in completed half months. In Aotearoa New Zealand pregnancy is usually defined as beginning from estimated conception 2 weeks post LMP (last menstrual period).

Hypothesis 1 predicted that intervention group participants would become more likely to endorse items relating to natural birth, exclusive and extended breastfeeding, infant toileting, co-sleeping, babywearing, alloparenting and responsive care. Data on responsive parenting beliefs supported this hypothesis. Participants reported significant increases in sensitive, responsive, child-centred parenting beliefs after the *Parenting From the Start* antenatal workshop compared with before. Average scores on the *Parenting Beliefs Scale* were significantly higher on the post-test (M = 95%) than the pre-test (M = 83%). A significant Shapiro-Wilk test suggested a violation of the assumption of normality (W = 0.890, $p = 0.011$), so Wilcoxon W is presented alongside a two-sided paired samples Student's t test. The effect size was large. Hypothesis testing is summarised in Table 47.

Table 47.

Parenting Intentions Immediately Before and After the Antenatal Workshop Intervention: Responsive Care

	Pre-test result	Post-test result	Hypothesis testing & effect sizes[1]
Responsive parenting beliefs (PBS)	82.8% (14.92) n = 25	94.8% (9.07) n = 25	Student's t(24.0) = -4.20, $p < .001$**, CI_{95} = [-17.9, -6.11], Cohen's d = -0.841. Wilcoxon W = 4.50, $p = .001$)**, CI_{95} = [-26.3, -10.0], Rank biserial correlation = -0.934 with 9 pairs of tied values

Notes. Two-sided paired samples Student's t-tests are accompanied by non-parametric alternatives (Wilcoxin W) where a significant Shapiro-Wilk test suggested the assumption of normality was not met. *$p < 0.05$, ** $p < 0.01$. CI_{95} = 95% confidence interval.

Changes in birth intentions over the course of the workshop intervention provided only partial support for Hypothesis 1. Planned place of birth and intended type of delivery did not differ significantly from pre-test to post-test. Shapiro-Wilk tests were significant ($p < .001$) for both planned place of birth (W = 0.547) and intended type of delivery (W = 0.308), so Wilcoxon W tests are also reported in Table 48. Intentions to use medications during labour and birth did reduce significantly from pre-test to post-test, with a moderate to large effect size. The test of normality was statistically significant, again suggesting a violation of that test assumption, so non-parametric alternatives are reported for all birth intentions.

Table 48.

Parenting Intentions Immediately Before and After the Antenatal Workshop Intervention: Birth

	Pre-test result	Post-test result	Hypothesis testing & effect size
Planned place of birth[(1)]	Home = 21.1% (6/26) Birth centre = 38.5% (10/26) Hospital = 38.5% (10/26)	Home = 24.0% (6/25) Birth centre = 44.0% (11/25) Hospital = 32.0% (8/25)	Student's t(24.0) = 1.81, $p < .083$, CI_{95} = [-0.0169, 0.257], Cohen's d = 0.362 Wilcoxon W = 6.00, $p = .149$, CI_{95} = [NaN, NaN], Rank biserial correlation = 1.00 with 22 pairs of tied values
Intended type of delivery[(2)]	Vaginal = 84.0% (21/25) Instrumental = 0% (0/25) Surgical = 16.0% (4/25)	Vaginal = 84.0% (21/25) Instrumental = 0% (0/25) Surgical = 8.0% (2/25)	Student's t(24.0) = 1.44, $p < .161$, CI_{95} = [-0.0686, 0.389], Cohen's d = 0.289 Wilcoxon W = 3.00, $p = .364$, CI_{95} = [NaN, NaN], Rank biserial correlation = 1.00 with 23 pairs of tied values
Planned use of medications during labour[(3)]	2.28 (1.24)[(3)] n = 25	2.02 (1.15) n = 25	Student's t(24.0) = 2.24, $p < .034$*, CI_{95} = [0.0208, 0.499], Cohen's d = 0.449 Wilcoxon W = 26.5, $p = .041$*, CI_{95} = [5.73e-5, 1.75], Rank biserial correlation = 0.893 with 18 pairs of tied values

Notes. Two-sided paired samples Student's t-tests are accompanied by non-parametric alternatives (Wilcoxin W) where a significant Shapiro-Wilk test suggested the assumption of normality was not met. *$p < 0.05$, **$p < 0.01$. CI_{95} = 95% confidence interval. Means are followed by standard deviations in parentheses. (1) Ordinal scale where 1=home, 2=birth centre, 3=hospital. (2) Ordinal scale where 1=vaginal, 2=forceps/suction, 3=caesarean section, 4=any. (3) Likert scale where 1= definitely not, 2= probably not, 3= maybe, 4= probably, 5= definitely.

Consistent with Hypothesis 1, intentions to practice infant toileting increased significantly following the workshop, although the differences were small. Table 49 summarises hypothesis testing relating to infant toileting. Normality tests for all three measures were significant: overall intention to practice elimination communication (EC; W = 0.824, $p < .001$), and the intended frequency of infant toileting (EC) during the day (W = 0.913, $p = .035$) and night (W = 0.831, $p < .001$) so Wilcoxon W tests are reported as non-parametric alternatives.

Table 49.

Parenting Intentions Immediately Before and After the Antenatal Workshop Intervention: Infant Toileting

	Pre-test result n = 25	**Post-test result** n = 25	**Hypothesis testing & effect sizes**[2]
Intention to practice infant toileting[3]**	1.08 (0.812)[1]	1.72 (0.737)	Student's t(24.0) = -3.72, p < .001**, CI_{95} = [-0.995, -0.285], Cohen's d = -0.744 Wilcoxon W = 14.5, p = .004**, CI_{95} = [-1.50, -1.000], Rank biserial correlation = -0.787 with 9 pairs of tied values
Planned frequency of infant toileting (day)[4]**	0.92 (1.22)	1.64 (1.00)	Student's t(24.0) = -2.82, p = .009**, CI_{95} = [-1.25, -0.194], Cohen's d = -0.565 Wilcoxon W = 28.0, p = .020**, CI_{95} = [-2.00, -2.58e-5], Rank biserial correlation = -0.634 with 8 pairs of tied values
Planned frequency of infant toileting (night)[4]	0.60 (1.04)	1.16 (1.03)	Student's t(24.0) = -2.22, p < .036*, CI_{95} = [-1.08, -0.0395], Cohen's d = -0.444 Wilcoxon W = 23.5, p = .066, CI_{95} = [-2.00, 6.37e-5], Rank biserial correlation = -0.552 with 11 pairs of tied values

Notes. (1) Means are shown with standard deviations in parentheses. (2) Two-sided Paired Samples Student's t-tests were used where possible, with additional non-parametric alternatives if the assumption of normality was not met. *p < 0.05, ** p< 0.01. (3) Likert scale where 0=No, not at all, 1=Don't know, 2=Yes part time, 3=Yes full time (4) Likert scale where 0=never, 1=occasionally, 2=sometimes, 3=often, 4=always

Intentions regarding close proximity between mothers and their infants partially supported Hypothesis 1. Although intentions to bed share (about which I gave no prediction) did not differ significantly from pre-test to post-test, expectant mothers planned to share a bedroom with their babies (room-share) significantly more often after attending the parenting workshop than before. There were also significant reductions in the extent of planned separations during infants' daytime (but not night-time) sleeps. Hypothesis testing is summarised in Table 50. Shapiro-Wilk tests of normality were significant for all infant sleep variables, so non-parametric and parametric tests are both reported for intention to room share (W = 0.731, p < .001), intention to bed share (W = 0.837, p < .001), planned frequency of daytime (W = 0.809, p < .001), and night time separations (W = 0., p < .001).

Table 50.

Parenting Intentions Immediately Before and After the Antenatal Workshop Intervention: Close Proximity

	Pre-test result	Post-test result	Hypothesis testing & effect sizes[2]
Intention to room-share (night)*	3.28 (0.98)[1] n = 25	3.56 (0.87) n = 25	Student's t(24.0) = -2.28, p = .032*, CI_{95} = [-0.533, -0.0267], Cohen's d = -0.456 Wilcoxon W = 4.00, p = .042*, CI_{95} = [-1.50, -5.24e-5], Rank biserial correlation = -0.778 with 17 pairs of tied values
Intention to bed-share (night)	1.19 (1.48) n = 24	1.21 (1.32) n = 24	Student's t(23.0) = -0.135, p < .894, CI_{95} = [-0.341, 0.300], Cohen's d = -0.0275 Wilcoxon W = 30.0, p = .813, CI_{95} = [-1.00, 0.500], Rank biserial correlation = -0.0909 with 13 pairs of tied values
Planned frequency of separation during sleep (day)*	1.83 (1.24) n = 24	1.29 (1.04) n = 24	Student's t(23.0) = 3.19, p < .004*, CI_{95} = [0.190, 0.893], Cohen's d = 0.650 Wilcoxon W = 62.0, p = .009*, CI_{95} = [0.500, 1.50], Rank biserial correlation = 0.879 with 13 pairs of tied values
Planned frequency of separation during sleep (night)	1.28 (1.34) n = 23	0.91 (1.08) n = 23	Student's t(22.0) = 1.90, p = .070, CI_{95} = [-0.0335, 0.773], Cohen's d = 0.397 Wilcoxon W = 37.0, p = .091, CI_{95} = [-1.39e-5, 2.00], Rank biserial correlation = 0.644 with 14 pairs of tied values

Notes. (1) Means are shown with standard deviations in parentheses. (2) Two-sided paired samples Student's t-tests are reported alongside non-parametric alternatives for all tests as assumptions of normality were not met. Significant results are shown in bold. *p < 0.05, **p < 0.01.

Changes in feeding intentions were more complex. The strength of intention to breastfeed may have been subject to a ceiling effect which provided little opportunity for improvement. Most participants were highly committed to breastfeeding at the start of the workshop, and no change was observed on this measure. Shapiro-Wilk tests suggested a violation of the assumption of normality (W = 0.390, p < .001). Similarly, no improvement was possible in the promptness with which mothers planned to initiate breastfeeding as all participants planned to breastfeed from birth (0 months). The intention to feed formula decreased in strength after the workshop compared with scores beforehand, and this change was statistically significant on Student's t test and marginally non-significant on Wilcoxon W. The latter result may be more appropriate as the assumption of normality was not met (W = 0.734, p < .001). The age at which mothers planned to introduce formula did not change significantly (Shapiro-Wilk test of normality = 0.597, p < .001). Mothers planned to breastfeed for significantly longer durations after the workshop than before (Shapiro-Wilk = 0.786, p < .001), and the difference of more than two months is clinically meaningful. Hypothesis testing relating to infant feeding is summarised in Table 51.

Table 51.

Parenting Intentions Immediately Before and After the Antenatal Workshop Intervention: Infant Feeding

	Pre-test result	Post-test result	Hypothesis testing & effect sizes[2]
Intention to breastfeed	4.88 (0.33)[1] n = 25	4.88 (0.44) n = 25	Student's t(24.0) = 0.00, *p* = 1.000, CI_{95} = [-0.119, 0.119], Cohen's d = 0.00 Wilcoxon W = 1.50, *p* = 1.000, CI_{95} = [0.00, 0.00], Rank biserial correlation = 0.00 with 23 pairs of tied values
Intention to formula feed	2.18 (0.92) n = 25	1.92 (0.95) n = 25	Student's t(24.0) = 2.18, *p* = .040*, CI_{95} = [0.0135, 0.507], Cohen's d = 0.435 Wilcoxon W = 31.5, *p* = .057, CI_{95} = [-2.54e-5, 1.50], Rank biserial correlation = 0.750 with 17 pairs of values tied
Planned initiation of breastfeeding	0.00mths (0.00) n = 25	0.00mths (0.00) n = 25	Not applicable – no variation
Planned initiation of formula feeding	10.1mths (4.67) n = 21	11.1mths (3.61) n = 21	Student's t(20.0) = -1.44, *p* = .165, CI_{95} = [-2.45, 0.447], Cohen's d = -0.315 Wilcoxon W = 2.00, *p* = .178, CI_{95} = [-8.50, -1.000], Rank biserial correlation = -0.733 with 16 pairs of values tied
Planned duration of breastfeeding (any)**	15.9mths (8.21) n = 24	18.0mths (9.09) n = 24	Student's t(23.0) = -2.67, *p* = .014**, CI_{95} = [-3.74, -0.471], Cohen's d = -0.544 Wilcoxon W = 1.00, *p* = .019**, CI_{95} = [-9.00, -2.25], Rank biserial correlation = -0.944 with 16 pairs of values tied
Planned duration of breastfeeding (exclusive)	6.17mths (2.67) n = 23	5.93mths (1.69) n = 23	Student's t(22.0) = 0.474, *p* = .640, CI_{95} = [-0.808, 1.29], Cohen's d = 0.0988 Wilcoxon W = 30.0, *p* = .838, CI_{95} = [-2.50, 3.75], Rank biserial correlation = 0.0909 with 13 pairs of values tied

Notes. (1) Means are shown with standard deviations in parentheses. (2) Two-sided paired samples Student's t-tests are reported with non-parametric alternatives when the assumption of normality was not met. *$p < 0.05$, **$p < 0.01$. NaN = 'not a number' error in Jamovi 1.6.23.0

Results relating to the planned duration of exclusive breastfeeding were complicated by three mothers who initially planned to feed nothing but breastmilk for a full year (twice the duration recommended by WHO). With these 3 outliers on the pre-test included, the average planned duration of exclusive breastfeeding decreased following the workshop. Having covered breastfeeding research and WHO guidelines as part of the *Parenting From the Start* intervention, these mothers no longer planned to feed breastmilk alone for 12 months. Although this result was unexpected, it does suggest the intervention promoted evidence-based parenting. A second analysis was performed with these outliers removed. Without

these outliers influencing the pre-test average, the trend reversed to indicate a small increase in duration of exclusive breastfeeding on the post-test, but the difference was not significant (Student's t(19.0) = -0.846, p = .408, CI_{95} = [-1.13, 0.479], Cohen's d = -0.189). The Shapiro-Wilk test was again significant (W = 0.794, p <.001), so a non-parametric alternative was also performed (Wilcoxon W = 11.0, with 12 pairs of values tied, p = 0.362), CI_{95} = [-3.00, 2.00], Rank biserial correlation = -0.389 with 12 pairs of values tied) and was again non-significant.

Intentions regarding alloparenting did not support Hypothesis 1. The theory of the evolved developmental niche posits that shared care and high levels of social support are our evolutionary norm as humans. Based on the inclusion of this information in the *Parenting From the Start* workshop I predicted mothers would plan higher levels of shared care after the workshop than before. As for the reports of actual parenting post birth (reported earlier in this chapter), the trend was in the opposite direction. Findings are summarised in Table 52. While attending the workshop appeared to increase expectant mothers' responsive, child-centered caregiving beliefs, there was no evidence of increased intention to make use of alloparents to assist with this care. Significant Shapiro-Wilk tests suggested the assumption of normality was violated for the number of caregivers in both the first (W = 0.618, p <.001) and second (W = 0.768, p < .001) half of babies' first year, so non-parametric tests are reported alongside two-sided paired-samples Student t-tests. All were non-significant.

Table 52.

Parenting Intentions Immediately Before and After the Antenatal Workshop Intervention: Shared Care

	Pre-test result	**Post-test result**	**Hypothesis testing**[2]
Number of main caregivers (first 6 months post birth)	1 caregiver = 57.7% (15/26) 2 caregivers = 30.8% (8/26) 3 caregivers = 7.7% (2/26) 4 caregivers = 0% (0/26) 5 caregivers = 3.8% (1/26) 1.64 (0.95)[1], n = 25	1 caregiver = 56.0% (14/25) 2 caregivers = 32.0% (8/25) 3 caregivers = 12.0% (3/25) 4 caregivers = 0% (0/25) 5 caregivers = 0% (0/25) 1.56 (0.71), n = 25	Student's t(24.0) = 0.700, p = .491, CI_{95} = [-0.156, 0.316], Cohen's d = Wilcoxon W = 10.0, p = .572, CI_{95} =[-1.00, 1.50], Rank biserial correlation = 0.333 with 20 pairs of values tied
Number of main caregivers (6-12mths post birth)	1 caregiver = 50.0% (13/26) 2 caregivers = 26.9% (7/26) 3 caregivers = 11.5% (3/26) 4 caregivers = 7.7% (2/26) 5 caregivers = 3.8% (1/26) 6 caregivers = 0% (0/26) 1.92 (1.15), n = 25	1 caregiver = 56.0% (14/25) 2 caregivers = 32.0% (8/25) 3 caregivers = 8.0% (2/25) 4 caregivers = 0% (0/25) 5 caregivers = 0% (0/25) 6 caregivers = 4.0% (1/25) 1.68 (1.11), n = 25	Student's t(24.0) = 1.14, p = .265, CI_{95} = [-0.194, 0.674], Cohen's d = 0.228 Wilcoxon W = 26.5, p = .254, CI_{95} =[-1.00, 2.50], Rank biserial correlation = 0.472 with 17 pairs of values tied

Notes. (1) Means are shown with standard deviations in parentheses. (2) Two-sided paired samples Student's t-tests are reported with non-parametric alternatives where significant Shapiro-Wilk tests suggested the assumption of normality was not met. *p < 0.05, **p < 0.01.

Workshop feedback

All twenty six intervention group participants attended the *Parenting From the Start* antenatal workshop, accompanied by partners, support people/whānau, and community members who approximately doubled the total numbers who attended Parts 1 (n = 55) and 2 (n = 48). Only data from participants themselves is presented in this thesis, as other attendees were not a formal part of the research project. Quantitative data is summarised below and detailed qualitative responses can be found in Appendix R. Workshop feedback was a pre-registered secondary outcome measure. Planned analyses looked at the percentage of participants who endorsed particular responses.

Feedback on the *overall quality of the workshop* was high, with mean scores of 4.69 for Part 1 and 4.62 for Part 2, suggesting the *Parenting From the Start* antenatal workshops were well received. The median and mode scores were 5 (excellent) for both Part 1 and Part 2 of the workshop. Descriptive statistics summarising all quantitative workshop feedback are shown in Table 53. Participants reported the workshop had *increased their ability to make informed choices* about parenting, *increased their parenting knowledge*, and *increased their parenting confidence.* They described the workshops as *culturally-appropriate for Aotearoa New Zealand*, and confirmed information was presented in a *non-judgemental* way. They were *glad they attended* and *thought the workshops should be offered to other parents.* All distributions were significantly negatively skewed (Shapiro-Wilk p <.001) with mean, median, and mode scores ranging from 4 (agree) to 5 (strongly agree) across questions.

Table 53.

Summary of Participant Feedback on the Antenatal Workshop (n = 26 Expectant Mothers)

Feedback question	***Parenting From the Start* workshop:**	
	Part 1	**Part 2**
Overall quality	4.69 (0.55)	4.62 (0.50)
Increased informed choice	4.42 (0.50)	4.58 (0.50)
Increased parenting knowledge	4.46 (0.51)	4.65 (0.49)
Increased parenting confidence	4.17 (0.62)	4.35 (0.69)
Culturally appropriate for Aotearoa NZ	4.73 (0.45)	4.88 (0.33)
Presented in a non-judgemental way	4.69 (0.47)	4.69 (0.62)
I am glad I attended	4.77 (0.43)	4.69 (0.55)
I think this workshop should be offered to other parents	4.69 (0.55)	4.77 (0.43)
I think the workshop should be free to consumers if possible	100%	100%

Note. All ratings except overall quality were based on 5-point likert scales where 4 = agree and 5 = strongly agree. Means are shown with standard deviations in parentheses.

The extensive qualitative feedback presented in Appendix R strengthens the impression that the *Parenting From the Start* antenatal workshops were well received by participants, including those with Māori/Pasifika ancestry. Topics were seen as interesting, useful and

evidence-based and the atmosphere at the workshops was perceived as welcoming and professional.

CHAPTER TEN

Discussion and Conclusions

Whāia te mātauranga hei oranga mō koutou
Seek after learning for the sake of your wellbeing

Pakiaka Tupuora explored the roots of healthy development in a small sample of 57 mothers and their babies. Numerous intervention studies suggest that parenting can be improved (Gregory et al., 2020; Jugovac et al., 2022; Kohlhoff & Cibralic, 2021; Schoemaker et al., 2020), and I set about to build on these by disseminating good quality information and resources to parents and their support people, to enable informed choice around caregiving. This chapter considers the two phases of my doctoral study, and what the results mean. The development of the *Parenting From the Start* intervention is discussed first. The evaluation of the intervention via participant feedback, pre- and post-test measures, and a randomised controlled trial follows.

Development of the Intervention

What kind of format is appropriate for sharing evidence-based, respectful, empowering, preventative information and resources in a cheap, replicable, culturally-appropriate, and effective manner? I settled on a one-day antenatal parenting workshop incorporating a gifted sling. Multiple spiralling literature reviews were needed to ensure all my criteria were met in the final intervention design. Te Ao Māori (the Māori world) is the tuakana (elder sibling) of Te Ao Pākehā (the non-Māori world) in Aotearoa, and a partnership approach required valuing of scientific evidence, historical context, and Indigenous perspectives. I tried to create a workshop appropriate for, and supportive of, both Māori and non-Māori. Scholarship relating to traditional Māori caregiving set the direction for a bicultural parenting intervention acknowledging the commonalities between recent evolutionary theories of child development and Māori caregiving practices around the time European colonialism in Aotearoa began. Cross-cultural perspectives within attachment theory were another source of inspiration for the project. These highlighted conceptual weaknesses in the area of alloparenting. The newer transdisciplinary theory of the evolved developmental niche (Narvaez et al., 2012a; Narvaez, Gleason, et al., 2013; Narvaez, Wang, et al., 2013; Narvaez, Fuentes, et al., 2014) offered a more complete and useful theoretical base to an evidence-based intervention honouring ancestral and modern traditions of shared care. Nevertheless, the cross-cultural literature acknowledged attachment's ongoing importance for babies everywhere – noting that non-Western and Indigenous research supports the value of early relationships. As discussed in Chapter 4, non-Western cultural groups achieve high rates of secure attachment on the *Strange Situation Procedure* (SSP). This 'gold-standard' measure of infant-caregiver relationships was therefore deemed appropriate as the key outcome for the study. I then widened the lens beyond attachment to examine both protective positive experiences and adversity in terms of their impact on future health and wellbeing. Defining

an effective intervention as one that reduces harm, improves wellbeing, and/or promotes healthy development, my discussion of adverse childhood experiences and optimisation explains why I felt these were realistic aims for a brief, multimodal intervention.

With the help of my doctoral supervisors, particularly clinical psychologists Kevin Ronan and Shane Harvey, I went round in circles firming up and adjusting the workshop topics and activities until they were fit for purpose. I reflected regularly on the process I followed, recognising that I could not endorse a partnership approach honouring *Te Tiriti o Waitangi* while working only with other tau iwi (non-Māori). Cultural consultation with my co-supervisor Natasha Tassel-Matamua was complimented by other kōrero (talks). I discussed my plans with Māori and Pasifika academics and mentors, including many conversations with Māori childbirth educator Aileen Devonshire in the course of our pregnancy and parenting governance work. I attended my Level 5 (fifth year) language course at *Te Wānanga o Aotearoa* with my tamariki in tow, and enjoyed many valuable chats relating to caregiving in the multi-age contexts of our monthly noho marae (marae stays). I built relationships with the wider Māori community as my children attended Kōhanga Reo and Kura Kaupapa Māori (immersion education for preschoolers and primary-intermediate students), and tried to absorb and honour the wisdom I found in these spaces. Finally I ran a pilot workshop to seek direct feedback from a range of stakeholders, including Māori language experts and health professionals. Every one of these interactions supported my learning, and led to improvements in the final workshop design.

Parenting From the Start is brief (able to be offered in a single day), replicable, and based on the best multidisciplinary evidence I could access. The timing during pregnancy preceeds many possible adversities, while maximising the chance a preventative intervention will be immediately relevant to the expectant parents who participate. The partnership approach aimed to support participants of all ethnic and cultural groups, but tangata whenua (local people; Māori) in particular. The hui format of the workshop (Lacey et al., 2011; Pitama et al., 2017) lends itself to a respectful and empowering approach where people take an active part in proceedings, and multiple parenting strategies can be presented to facilitate informed choice. The process of development is never completely 'finished', and minor refinements were made over the course of the eight workshops I delivered to consumers and their support people. In the interests of academic rigour this participant-led change was balanced with clear scripting and detailed fidelity checks to ensure consistency and allow the intervention to be offered again in the future. My final goal that the intervention should be effective could not be assessed in advance, but as the design for *Parenting From the Start* became increasingly clear, I turned to evaluating its impact.

Evaluation of the Intervention

The choice of a randomised controlled trial allowed me to conduct credible tests of causal effects by comparing health outcomes between mothers who attended the *Parenting From the Start* workshop during pregnancy and a control group who were randomly assigned to a waiting list, while pre-test/post-test data on parenting intentions shows 'what changed' when mothers attended *Parenting From the Start*. Pre-registered analyses are discussed in the context of their support or non-support for my three overarching hypotheses.

Workshop Feedback

Workshop feedback was treated as a secondary outcome measure even though it was not included in preregistered hypotheses because acceptability to participants was considered a necessary, although not sufficient, requirement of any successful parenting intervention. *Parenting From the Start* was well-received, with high ratings suggesting the intervention was appreciated by expectant mothers. Specifically, participants reported the antenatal workshop increased their ability to make informed choices about parenting, their parenting knowledge, and their confidence. Participants judged it culturally-appropriate for Aotearoa New Zealand, and confirmed information was presented in a non-judgemental way. They reported being glad they attended and thought the workshops should be offered to other parents. All stated the workshops should continue to be offered free in the future if possible. Qualitative feedback on the workshop strengthened the impression the intervention was useful to participants, and that the elements of the evolved developmental niche were salient.

Parenting Intentions

Hypothesis 1 was that the *Parenting From the Start* parenting intervention (workshop plus gifted sling) would alter antenatal parenting intentions was partially supported. I expected workshop participants to describe more EDN-consistent intentions after the workshop than before, with intervention participants significantly more likely to endorse items relating to natural birth, exclusive/extended breastfeeding, infant toileting, co-sleeping, alloparenting, babywearing, and responsive care. Comparisons of the identical pre- and post-tests (*Parenting Intentions Questionnaire*) completed immediately before and after the workshop indicated some changes in parenting intentions relating to childbirth. Given the multiple variables related to hypothesis 1, these are summarised by category.

Labour and Birth. Hypothesis 1 was not supported by results relating to planned place of birth or intended type of delivery, with no significant differences observed from pre-test to post-test. A significant reduction in the planned use of medication during labour was observed, however, suggesting perhaps that providing research-based information about the iatrogenic risks associated with medical intervention may influence the intentions of some expectant mothers. As with the changes in other parenting intentions reported in this chapter, it is not possible to determine what prompted the change. Pre-tests and post-tests were completed one day or one week apart, however, making maturation and other workshop-unrelated factors implausible explanations for the changed scores.

Infant Feeding. Changes in infant feeding intentions were complex, providing limited support for hypothesis 1. Most of the expectant mothers randomly assigned to the intervention group were highly committed to breastfeeding at the start of the workshop, and no change was observed on this variable. Similarly, no improvement was possible in the promptness with which mothers planned to initiate breastfeeding as all participants planned to breastfeed from birth. This is consistent with the high rates of breastfeeding initiation observed in the general birthing population in Aotearoa (97%) and may further reflect the

high levels of education in my sample (Castro et al., 2017). The finding that mothers planned to breastfeed for significantly longer durations after the workshop than before provides tentative indications that *Parenting From the Start* could form part of the solution to early cessation of breastfeeding. The difference of just over two months is clinically meaningful and could lead to health benefits for mothers and babies, and the effect size (Cohen's d = -0.544) was moderately large. Participants' intention to feed formula also decreased in strength after the workshop compared with scores beforehand. This effect was significant on parametric testing, and approached significance (p = .057) on non-parametric testing. The age post birth at which mothers planned to introduce formula did not change significantly, however. Planned durations of exclusive breastfeeding did not increase significantly following the antenatal workshop, but the average duration planned was already near the WHO recommendation of 6 months prior to the workshop, so an increase was not needed or likely in this sample. In the wider New Zealand population, only 16% of babies receive 6-months of exclusive breastfeeding (Castro et al., 2017), making improvements desirable.

Infant Toileting. Intentions to practice infant toileting increased significantly on two of the three measures, partially supporting hypothesis 1. Overall intention to practice elimination communication (EC), and planned frequency of day-time infant toileting were both higher following the workshop, but the increase in frequency of planned night-time EC was not significant. These differences were all small however, and the clinical meaning is unclear based on this preliminary data.

Close Proximity. Intentions regarding close proximity between mothers and their infants also partially supported hypothesis 1. Significant reductions were observed in planned frequency of separations during infants' daytime (but not night-time) naps during the first year post birth. Changes in planned frequency of separation during night-time naps approached statistical significance on both parametric and non-parametric testing however. Close physical proximity day and night is a key element of the human evolved developmental niche, and a necessary prerequisite to sensitive responsive caregiving. It appears the research-based information provided during the *Parenting From the Start* workshops may have motivated mothers to keep their babies closer than they had originally intended. This change may apply only to day time caregiving, or my small study may have had insufficient power to detect a real difference in night-time parenting. The next finding supports the latter explanation, as expectant mothers did plan more night-time proximity after the workshop compared with before, even though this was not captured by these initial questions.

Co-Sleeping. Co-sleeping results provide some additional support for hypothesis 1. Although intentions to bed-share (about which I gave no prediction) did not differ significantly from pre-test to post-test, expectant mothers planned to share a bedroom with their babies (room-share) significantly more often after attending the parenting workshop than before. Assuming this result related to the relevant section of the workshop (an assumption that remains untested), it is noteworthy that open discussion of co-sleeping and the risks and benefits of different sleep set-ups did not increase mothers' plans to bed-share, which *Manatū Hauora* (New Zealand Ministry of Health) considers dangerous, but may have strengthened plans to room-share, which *Manatū Hauora* considers protective.

Alloparenting. Parenting intentions relating to alloparenting did not support hypotheses 1. The theory of the evolved developmental niche posits that shared care and high levels of social support are our evolutionary norm as humans, but despite the inclusion of this information in the *Parenting From the Start* workshop mothers did not plan higher levels of shared care after the workshop than before. Results were in the opposite direction, although not statistically significant at this time point. This is a theme I will return to later in the discussion.

Babywearing. Despite being mentioned in pre-registration, caregiving plans related to infant carrying were not assessed on the *Parenting Intentions Questionnaire*. This deviation from the pre-registered research protocol was not noticed until the conclusion of the study.

Responsive Care. Responsive care at Time 1 was only assessed in terms of parenting beliefs, which is a somewhat inadequate proxy for mothers 'plans for responsive care' (the variable that was pre-registered). Nevertheless, results for parenting beliefs did support hypothesis 1. Longitudinal data showed that the significant increase in responsive parenting beliefs after the workshop relative to before was also maintained over the first year post birth. Attending the workshop appeared to cause a shift, impacting expectant mothers acceptance of statements relating to the desirability of sensitive, nurturing, responsive, child-centered caregiving, which are key elements of the human evolved developmental niche.

Parenting Strategies

Hypothesis 2 was that antenatal parenting intervention would alter actual parenting strategies across the infant's first year. Specifically, I hypothesised that evolved parenting practices such as natural birth, co-sleeping, exclusive/extended breastfeeding, infant toileting, babywearing, and alloparenting would be increased among new parents who received the intervention relative to the control group. This retrospective information from the two follow-ups at Time 2 (home visit) and Time 3 (psychology clinic assessment) provides snapshots of caregiving several months apart and asking about the first 6 months and 12 months post birth respectively. Most parenting strategies were unaffected by the intervention. This may reflect a common pattern where changing attitudes or beliefs is feasible, but doing so does not necessarily lead to behaviour change, in part because there are many other constraints on behaviour.

Infant Care. One exception to the pattern of null findings was that intervention group mothers described significantly more *Positive Care* at Time 3 than control group mothers, but this was the only one of nine domains on the *Evolved Developmental Niche Scale* (EDN Scale) to clearly support hypothesis 2. The complimentary *Absence of Negative Care* subscale approached significance.

Other Elements of the Evolved Developmental Niche. Intervention group scores did not differ significantly in the EDN domains *Health Pregnancy, Proximity and Responsiveness during Infant Sleep, Responsive Infant Feeding,* or *Infant Toileting*.

Two remaining EDN subscales, *Natural Birth* and *Early Proximity* also failed to support hypothesis 2. While the differences between the intervention and control groups were not statistically significant, the trends in these domains unexpectedly favoured the control group. These null findings are relevant to concerns that emphasising informed parental choices during pregnancy and birth may leave some mothers feeling they have 'failed' if they end up giving birth in hospital, using medications, receiving medical interventions, or spending time apart from their infant. In this sample such experiences were just as likely among mothers who attended the *Parenting From the Start* antenatal workshop as in the control group. Nevertheless, as we will return to, the longer-term attachment outcomes were better in the intervention group. Clearly it is not necessary for early parenting to be perfectly aligned with the human evolved developmental niche in order for benefits to accrue. Informing parents about babies' evolved needs (or some other aspect of the workshop intervention) led to higher rates of secure attachment *despite* an equal frequency of less 'natural' births and frequent interruptions to bonding. This is reassuring because it suggests a degree of flexibility on the part of the infant, and that parents need not fear aiming for a parenting experience closer to the evolutionary norm. This study found no evidence of harm to mother-infant relationships where a desired birth or parenting plan failed to eventuate.

Alloparenting. The *Alloparenting and Social Support* subscale did not support hypothesis 2; producing results that were non-significant but in the opposite direction to that expected. While maternal care was the norm across the sample in the first half of the first year, from then on the groups diverged somewhat. Intervention group mothers continued to report almost exclusive maternal care (a median of zero non-family caregivers), but the mean number of non-kin carers in the control group rose significantly higher than the intervention group mean in the second, third, and fourth quartiles of the first year. Control group families increasingly utilised non-family paid caregivers, while intervention group participants did so significantly less frequently. Effect sizes for this difference were also progressively larger as time went on. This pattern of results is unlikely to be due to differences in household size, as the majority of households contained two adults.

Babywearing. Contrary to hypothesis 2, gifting slings (*Moby Wraps*) did not appear to increase infant carrying in the present study. Babywearing was common in both study conditions and the higher mean in the intervention group was not significantly different from the control group mean.

Responsive Care. The longitudinal repeat of the *Parenting Beliefs Scale* used with intervention mothers during pregnancy supported hypothesis 2. Intervention group mothers obtained significantly higher scores than control group mothers at the home visit (11 to 24 months post birth), with a moderate effect size (Cohen's d = -0.624, Rank biserial correlation = 0.402). This provides evidence of more responsive and child-centred parenting beliefs among mothers who attended the *Parenting From the Start* workshop than among controls.

Health Outcomes

Hypothesis 3 was that the antenatal parenting intervention would improve health outcomes for mothers and infants. The most important prediction - that infants in the intervention

group would be significantly more likely to be classified as securely attached by blind observers at one year of age – was supported. My expectation that this relationship would be mediated or moderated by parental sensitivity and responsiveness was not supported. I hypothesised that mothers who received the antenatal parenting intervention would report higher rates of vaginal birth, fewer birth interventions, fewer admissions to the neonatal unit (NNU), and less 'colic', as well as greater exclusivity and duration of breastfeeding. I also expected that mothers in the intervention group would be rated more sensitive and responsive to their infants by a blind observer, and would be less likely to suffer from postnatal depression. None of the differences in these secondary outcomes were statistically significant.

Primary Outcomes. One-year-olds in the intervention group were significantly more likely to be securely attached to their mothers, although this difference was not detected at the bluntest level of two-way attachment security (secure/insecure/cannot classify). Despite the clinically meaningful 25% difference between study conditions, with 90% of one-year-olds from the intervention group classified as securely attached to their mothers on the *Strange Situation Procedure* compared with 64% of children from the control group, Fisher's exact test was marginally non-significant (p = .059). Analyses based on more detailed data suggests that this result was due to a lack of statistical power to detect the effect when considered at this level, as rates of attachment security were significantly different across study conditions when analysed in terms of three-way attachment security (ABC/cannot classify; Fisher's exact p = .011, Cramer's V = 0.448) and attachment subcategory (Fisher's exact p = .047, Cramer's V = 0.552). The computed insecurity variable based on Episode 8 of the *Strange Situation Procedure* (the second reunion) also significantly differentiated between the amount of resistance or avoidance visible in intervention and control group children (Mann Whitney U = 88.0, p = .002** CI95 =[1.000, 2.00], Rank biserial correlation = 0.559). These results are consistent with the interpretation that the *Parenting From the Start* antenatal workshop improved dyadic relationships over the first 12 months post-birth. Effect sizes increased as analyses became more detailed, ranging from medium to large (Elsherif et al., 2023). The impact was substantial in real terms despite the small sample size of 42 families remaining at the conclusion of the study. This is impressive for a brief intervention targeting the mothers of unborn babies, and suggests that this preventative workshop-based approach was effective at improving early relationships. Maternal sensitivity results did not support hypothesis 3, however. While scores on all three sensitivity measures were higher in the intervention group, differences from the control group were non-significant. Exploratory analyses failed to detect evidence that maternal sensitivity mediated or moderated the relationship between study condition and attachment insecurity, although the small sample size did not provide sufficient power to detect small or medium main effects or interactions.

Secondary Outcome Measures. Hypothesis 3 was not supported by the results relating to secondary health outcomes. Admissions to the neonatal unit, and rates of postnatal depression were both unaffected by study condition. Predictions that *Parenting From the Start* would increase rates of 'natural' (non-institutional, less medical, vaginal) birth were not supported. There were no significant differences in planned place of birth (home, birth centre, or hospital), type of delivery (vaginal, instrumental, or surgical), or rates of labour and birth interventions. The prediction that infant colic (defined as prolonged unexplained crying) would be reduced for mothers who had attended the *Parenting From the Start*

antenatal workshop was not supported. Despite the changed parenting intentions reported above, no evidence of improved health outcomes relating to infant feeding were observed. Differences in the duration of any breastfeeding, exclusive breastfeeding, and formula use were not statistically significant.

Implications

Secure attachment relationships appear to be normative in Aotearoa, as they are elsewhere, and the finding that infant-caregiver dyads in New Zealand can be classified in the *Strange Situation Procedure* using the usual ABC categories adds further support to the claim attachment is a universal phenomenon (Mesman et al., 2016). The much higher proportions of children with resistant compared with avoidant attachment suggests Aotearoa may fall closer to East Asian parenting styles than to those of the US and Western Europe, where avoidance is consistently more common than resistance (Kondo-Ikemura et al., 2018). Higher rates of resistant attachment are to be expected in cultural contexts where sensitive responding is present to some extent, but not able to be achieved consistently enough. The almost complete lack of avoidant attachment in the present sample could indicate bias in classification due to the single coder, but would also be expected if some degree of attuned emotional support of infants is expected in this sociohistorical setting, so that fewer children experience the chronic rejection and/or unavailability of caregiving thought to lead to avoidant attachment. The preponderance of resistant attachment classifications in the present study may also be sample-specific, and relate to higher income families and/or higher maternal education. Rates of resistant attachment may also be reduced when disorganized attachment is coded correctly, with some resistant infants re-classified into the disorganized category (Granqvist et al., 2017). Alternatively, the early assumption that avoidance constitutes the second most 'normal' infant attachment category may perhaps have been culturally-specific; becoming less defensible as cross-cultural research increases.

One of the goals of the present study was to replicate the successful intervention by Anisfeld and colleagues (1990), in which low-income mothers gifted infant baby carriers in the hospital after giving birth had significantly higher rates of secure attachment on the *Strange Situation Procedure* 13 months later (83% secure) than control group mothers gifted infant car seats (38% secure). The results obtained in the present project are not entirely consistent with this earlier research. While both randomised controlled trials obtained large differences in attachment outcomes between the intervention and control groups despite small sample sizes, the present research demonstrated these attachment gains without a statistically significant difference in babywearing (Mann-Whitney U = 210, p = 0.218). This raises questions about mechanisms of action. One explanation for the non-significant difference across conditions is that babywearing did not affect outcomes in my research, with other aspects of the *Parenting From the Start* workshop constituting more important components of the intervention. A second possibility is that the high levels of babywearing in both my study conditions represent a 'ceiling effect' whereby the benefits of infant carrying were already present in both groups and could not be further improved. According to this explanation, the high rates of babywearing in my control group left me with no true comparison to families who did not use slings/carriers. A third possible explanation for the present findings is that my study lacked sufficient power to detect a small- or medium-sized

effect of study condition on babywearing. Consistent with this possibility, babywearing scores did show a trend in the expected direction, with slightly higher scores in the intervention group (M = 2.09, SD = 0.97) than the control group (M = 1.67, SD = 1.17). A third possibility is that my simple self-report measures of babywearing were inadequate and thus unable to capture real differences between the groups. This is also quite possible, as my study depended on a 4-point likert scale to classify use of slings/wraps/baby carriers during the first six months post birth (0=never, 1=occasionally, 2=sometimes, 3=often), rather than objective measures quantifying the time babies spent being carried during the intervention period. The data I collected do not allow me to distinguish between these possible explanations.

A further difference is that the Anisfeld sling intervention (1990) doubled rates of secure infant attachment. This 45% difference was even larger than the 26% difference attained in the present research. The higher socioeconomic brackets of my participants may go some way to explaining both the more limited scope for improvement and the higher rates of secure attachment across conditions in my study. The proportion of control group babies classified as securely attached in my sample (64%) is similar to the international average (Van IJzendoorn & Sagi-Schwartz, 2008), whereas Anisfeld and colleagues had a lower income sample and lower rates of security in the control group (38%). My study adds to international findings that, on average, only around two thirds of babies become securely attached to their primary caregiver at the age of one year. This figure, which leaves considerable room for improvement, is considered usual even in higher income settings, making attachment interventions important across a wide socioeconomic spectrum.

The present results reinforce previous research findings which suggest the provision of evidence-based, culturally-appropriate parenting information and/or resources can improve long-term attachment outcomes for children, but the mechanisms of change remain unclear. Unlike the study by Anisfeld and colleagues (1990), my two study conditions also did not differ significantly in terms of maternal sensitivity and responsiveness, casting doubt on sensitivity as a mechanism of action. What explanations does this leave us with? The following discussion considers other findings from the study and what they suggest about variables which might have influenced the development of infant attachment over the first year of life, given I did not obtain support for a babywearing – sensitivity – attachment pathway as expected.

The findings relating to alloparenting and social support were unexpected. Previous studies of babies in Boston and Botswana (!Kung San) found no evidence of trade-offs in EDN care by mothers and alloparents. !Kung infants were held much more by alloparents, while also experiencing more physical contact with their mothers than American infants (Hewlett & Lamb, 2009). The present results suggest this may not hold for the very different cultural context of Aotearoa New Zealand. Mothers in my study reported that, at 6 months post births, their infants spent only 5 hours per week with friends and relatives (M = 5.05, SD = 15.0), and just over half this amount of time in paid care (M = 2.61, SD = 7.98). Most care was provided by the mothers themselves (M = 159 hours per week, SD = 17.2), followed by the other parent (M = 67.6, SD = 46.3), with no significant differences between the control and intervention groups. Shared care beyond a second parent was thus very low overall in my mostly urban sample, unlike the Indigenous and hunter-gatherer contexts described in Chapters 2 and 3. Furthermore, the current results suggest families did make trade-offs between maternal and allomaternal care. While intervention group mothers continued to care for their toddlers

from 3 to 12 months post birth, control group mothers were significantly more likely to employ non-kin carers in the second, third, and fourth quartiles of the first year. The increasingly large differences between study conditions, and increasingly large effect sizes, suggest divergent caregiving strategies depending on whether or not mothers had attended the *Parenting From the Start* workshop.

These findings again have several possible explanations, perhaps being due to a tension present in the workshop content and/or to wider cultural factors. Although *Parenting From the Start* devoted considerable attention to the positive impact of shared care and caregiving by adults other than the biological mother, this was presented alongside information about the long-term impacts of early attachment relationships, and discussion of attributes differentiating alloparents from unfamiliar and uncommitted carers (stability, warmth, availability, responsiveness). While high levels of support may have seemed attractive to intervention group mothers,[151] I speculate that such support is difficult to access within modern urban society. Intervention group participants offered many examples of this during workshop discussions. With increased understanding about the importance of secure attachment relationships, and a lack of access to stable trusted alloparents, intervention group mothers may have chosen to spend more time with their children in the latter part of the first year, while control group mothers without this information recruited paid carers to assist. As discussed in the workshop, staff in Early Childhood Education (ECE) centres, Kōhanga Reo (Māori immersion preschools run according to Māori values), and home care are often poorly paid. ECE centres also differ in whether or not they accept babies under the age of 2, and whether or not they aim to have children attach to specific teachers. Qualifications, experience, and understandings of attachment vary widely, impacting stability of care, the sensitivity and responsiveness of care,[152] and development of secondary attachment relationships in these settings. Meta-analysis suggests that the quality of care (operationally defined as a combination of child-teacher ratios and teacher qualifications) is key to positive child outcomes, although benefits of early childhood education in group-based centres mostly accrue for children from families with lower socioeconomic status (Van Huizen & Plantenga, 2018). Attachment-specific research suggests that secure secondary attachment relationships are formed when childcare providers are empathetic, and when caregiver empathy towards the child increases over time, and secure attachments still occur at lower rates than in primary parenting relationships (Ahnert & Lamb, 2000).

Unfortunately, my data does not tell me whether mothers were reluctant to pass on care to others, or whether they were unable to make use of shared care. Are mothers who have knowledge of infant brain development and attachment needs more cautious with the care of their child? Could they not locate suitable alloparents? Was paid care not regarded as 'good enough' by intervention group mothers? The interpretation that intervention group mothers chose to provide care themselves is supported by parenting intentions data, which failed to show any increased intention to make use of alloparents after the workshop compared with

[151] My speculation here is based on mothers' comments during the workshop discussions suggesting they could see the appeal of being supported in their parenting by trusted alloparents (related and unrelated adults and older children) with ongoing relationships to the family.

[152] During the period I delivered the *Parenting From the Start* antenatal workshops my husband worked as an ECE teacher, and our third child attended a local ECE center, giving me first- (and second-) hand glimpses into these settings to supplement my academic knowledge.

before. Mothers' intention to make use of alloparents actually decreased slightly on the post-test compared to the pre-test, although the change was non-significant. Rather than promoting shared care as expected, the intervention seems to have increased maternal care.[153]

One clear consequence of the intervention was increased desirability of sensitive, responsive, child-centered caregiving on conclusion of the workshop, which remained significantly higher than control scores a year later. This nurturing approach to child-rearing is the key theme of the human evolved developmental niche, and a logical message to 'take away' from the antenatal workshop. While it is possible that these parenting beliefs changed without altering behaviour, parenting beliefs also constitute a possible mechanism through which infant attachment trajectories were altered in this study. The increased commitment to sensitive, child-centred, responsive care may have altered maternal behaviour in some way. One possible example is that these changed parenting beliefs altered decision-making about child care options. Providing evidence-based information to parents may have increased mothers' commitments to responsive care, and thus reduced placement of infants in paid care during the latter parts of the first year. Another possible explanation for higher scores on the *Parenting Belief Scale* is social desirability bias in reporting by mothers who had attended the workshop, perhaps because they knew more about the kinds of parenting considered healthy versus suboptimal. While this could account for the more responsive parenting beliefs reported by the intervention group after the workshop than before, social desirability bias cannot explain the significantly better attachment outcomes observed in the intervention group, as these arose from independent assessment by a coder who was blind to study condition.

A second possible mechanism of change relates to the variable I called 'positive care', which was significantly increased in the intervention group relative to the control group. The *Positive Care* subscale included items asking about the frequency with which babies were handled gently, played with and talked to, held or carried, responded to promptly (i.e., within 5 minutes), cared for at home with whānau/family, and had constant access to loved caregivers within each quartile of the first year. Again, this type of responsive, nurturing care by well-known adults exemplifies the human evolved developmental niche. While conclusions are necessarily speculative based on my current data, it does not seem unreasonable that nurturing parenting beliefs, translated into these kinds of nurturing caregiving behaviours, might positively impact the development of infant attachment over the first year of life. Given the limitations of statistical power in the present study it is worth noting that the effect on the *Absence of Negative Care* subscale also approached significance. It is possible that a larger study would find that variation in other infant care behaviours are also important, such as picking up pēpi/babies when they cry (associated with attunement and responsiveness), and that infant experiences such as being yelled at, and hit, thrown, or shaken can also be altered by a brief preventative intervention such as *Parenting From the Start*.

Some study results invite additional reflection. The detailed data I was able to collect on mothers' intentions regarding infant sleep makes it clear that some parents planned to bed-

[153] More spontaneous alloparenting such as informal one-off 'play dates' or child minding was not captured by my questionnaires.

share at least some of the time, both before and after attending the workshop. I argue that it is much better they do so having openly discussed specific potential risks, such as a baby being smothered under bedding, or having their airway restricted if their neck is tilted too far forwards. The *Parenting From the Start* antenatal workshop placed sleep in cultural and historical context – considering the way sleeping spaces differ between the low-technology hunter-gatherer contexts our ancestors evolved in and modern bedrooms with soft mattresses on raised beds incorporating duvets, blankets, and pillows. Expectant parents who attended the workshop were able to reflect on the new risks created by these changes. Babies can sink into soft mattresses or roll into cracks at the edges of beds or couches. They can fall from raised beds or out of cots. Toys and pillows in their sleep space can cover their faces and obstruct breathing. These risks are accentuated by poverty (which may be a marker for cold, damp houses, among other things) and exposure to second-hand smoke. As a clinician I have worked with parents who slept with their baby on a mattress on the floor of the one room of the house that was heated during winter, with mould and low temperatures in other parts of the home far more obvious concerns than sudden unexplained death in infancy (SUDI). Research to date has often failed to discriminate between families who co-sleep by choice and those with inadequate options, yet the solutions may look very different. Where options are limited, we need to increase them. Where co-sleeping is a valued cultural practice, telling parents not to co-sleep simply may drive the practice underground without producing benefits (Ball & Volpe, 2013). My approach was to discuss pros and cons of common infant sleep options in a non-judgemental way. This format allows for multiple unique solutions. For instance, futons on the floor and 'side-car' cots are options which allow parent and child to sleep adjacent to one another for maximum supervision and easy-access for night-time breastfeeds. A futon reduces the risk of falling and smothering as a result of being firm and low to the ground. A 'side-car' is achieved when one side of a cot is removed and the cot is attached firmly to the side of an adult bed with any gaps carefully filled. Side-car cots allow a parent to comfort their child, hear them breathe, and easily pick them up/put them down. The three remaining sides of the cot prevent falls, and ensure the baby has their own sleep space. Wahakura (woven flax baskets) and pēpi pods (plastic sleeping boxes) placed in an adult bed provide similar safe spaces, with gaps in the weaving of wahakura also providing excellent ventilation. In-person feedback regarding this element of the workshop was particularly enthusiastic. Offering parents the chance to consider a 'smorgasboard' of infant sleep options appeared successful as an empowering intervention that left participants free to change their minds and/or consider nuance in their caregiving.

A final general implication of the present results concerns the kind of pregnancy and parenting-related health information we provide to families. Although the *Parenting From the Start* antenatal intervention was brief (<8 hours total), it covered material in far more depth than regular antenatal classes. It also differed from public health campaigns such as 'back to sleep' which advocate a single sleeping position (face up) as safe and correct. In *Parenting From the Start* participants were not told how to parent, but rather provided with sufficient detail to make informed parenting choices. This approach resulted in statistically significant changes in certain parenting intentions and beliefs, higher ratings of positive care over the infants' first year, and dramatically improved attachment outcomes. It is possible that explaining how responsive parenting practices support infant development is sufficient to produce change in these areas. If disseminating evidence-based information about what babies need to expectant mothers alters their reported parenting beliefs and behaviours even

when (or perhaps because) no specific advice or recommendations are given, a more empowering and respectful approach to public health messaging may be possible in which consumers are provided with clear and detailed descriptions of the positive and negative outcomes associated with particular caregiving behaviours and trusted to make good decisions for their families. This approach may be more acceptable to groups with a history of damaging and unequal relationships with health professionals than simplified, instructional public health messages advocating a single 'right' way to parent. Where choices deviate from those deemed 'best', research could explore the reasons for this and recommend ways to remove obstacles, or changes to the criteria for desirable outcomes.

Strengths and Limitations of the Study

In the context of a bicultural partnership, the decision to utilise an experimental methodology has some disadvantages which I acknowledge up front. There is a long history of scientific experimentation on Indigenous communities which understandably results in distrust. Randomised controlled trials (RCTs) do not have the same relational ethical values as Kaupapa Māori approaches, although the two have been combined (e.g., Broughton et al., 2021). While my choice of a randomised controlled trial was intended to dignify the contributions of participants and maximise future accessibility of the intervention if the evidence supported this, the limitations of RCTs include a lack of depth and nuance, and often a failure to consider relationships as ongoing and vital. Randomised controlled trials require the complexity of life to be simplified into a limited number of pre-determined variables and relationships. For that reason I built in qualitative aspects such as open-ended feedback to ensure I heard from my participants about their experience of motherhood. The quantity of data produced in the study was extensive – covering many details of parenting not reported here but providing rich contextual background for the analyses. The decision to include these extra questions was based on my desire to better understand the context within which mothers conducted their parenting, and their thoughts and preferences relating to aspects of caregiving. The full range of written questions asked can be found in Appendices F, H, and I. The use of two follow-up periods in the two locations of home (Time 2) and a local psychology clinic (Time 3) further enabled my team and I to gather detailed information about each mother-baby dyad. A limitation of this detailed approach is that the study involved multiple comparisons as a result of having three time points, two primary outcome variables and many secondary outcome measures. The resulting multiple analyses mean that "some statistically significant findings are likely to result from chance alone" (Moher et al., 2010, p. 20).

A key limitation of the present study was the small sample size, which reduced from 57 to 42 mother-baby dyads over 12-24 months of longitudinal follow-up. This sample size did not provide sufficient statistical power to detect small or medium effect sizes, which may have obscured real differences between study conditions in some areas. For example, based on prior research I expected the relationship between study condition and infant attachment outcome to be mediated or moderated by parental sensitivity and responsiveness, but this was not the case. The small sample size and limited power were not really sufficient for this analysis, however, introducing potential Type II errors.

Despite the limitations acknowledged above, the experimental design was also a strength of the study, allowing stronger conclusions than non-quantitative and correlational methods. Substantial differences between intervention and control group families were present even though the sample size was small. Intervention group mothers reported more nurturing parenting beliefs, and significantly higher levels of positive care, while intervention group infants were significantly more likely to be assigned to a secure attachment category at one year of age. None of the pre-existing demographic factors recorded account for these findings. The 'waiting list' control and random assignment to study groups minimised potential confounds, and we can have some confidence that improvements are in fact due to the *Parenting From the Start* antenatal workshop intervention.

Assuming the workshop caused these change, the 'active ingredients' of the intervention cannot be determined by the presently available data, however. I cannot tell which aspects of the workshop impacted parenting intentions and strategies, or attachment outcomes. Additional more detailed research on the *Parenting From the Start* workshops would be needed to examine this, as well as the more general question of replicability.

In terms of generalisability, the present results may apply to other expectant mothers in the Manawatū and Horowhenua regions (the population from which the sample was drawn), but perhaps not to those with lower family incomes or more limited formal education, as these segments of the community were not well-represented in my sample. All participants self-identified as women (although this was not one of my eligibility criteria), limiting the generalisability of the present results. Despite the explicit valuing of multiple caregivers and shared care, only birthing people were eligible for participation in the present research. Non-birthing parents and alloparents may have had different parenting intentions, used different parenting strategies, and/or formed different attachment relationships. The geographical location of Aotearoa New Zealand is both a strength and a limitation, as the mix of cultures present in our small Southern hemisphere country differs from other Western nations. The results presented here may not generalise to other contexts, but do help to fill a gap in the picture of attachment outcomes painted in Chapter 4.

Another key limitation of this study relates to the most important primary outcome measure. The antenatal workshop set out to intervene for the optimisation of secure attachment, because of the long-term benefits to wellbeing (Cassidy & Shaver, 2008; Sroufe et al., 2005a). No New Zealand research utilising the 'gold-standard' *Strange Situation Procedure* could be located, and there was no pre-existing local capacity to conduct these procedures. While I and the coder for the study (DM) completed international training to run and score the SSP, my coder was only able to complete certification for coding ABC (organized) attachment patterns within the time limits of my doctoral research, and I could not participate in coding due to the risk of bias. The lack of full ABCD (organized/disorganized) attachment classifications is a limitation of the research because it prevented the identification of children with disorganized attachments to their primary caregiver. Not only is disorganization associated with poorer outcomes than insecure attachment, it could potentially alter the group membership of a dyad. Although relatively unlikely, a securely attached child who also shows strong signs of disorganization would be placed in the 'insecure' category despite their primary classification as secure in the analyses included in the present report.

In addition, measurement of secondary outcome measures was not always ideal. In particular, financial constraints prevented me from incorporating objective measures of carrier use. The lack of quantitative babywearing measures such as a pedometer sewn into the gifted slings to monitor actual use was a limitation of the present research which prevents firm conclusions about the frequency and importance of infant carrying in this sample. Participants likely had a range of ideas of what it meant to report they used a baby sling or carrier 'often' over the first six months post birth. Increased measurement error, combined with the small sample size, reduces the credibility of findings in this area. My measurements of infant colic (unexplained crying) and infant toileting were similarly blunt. These limitations are unfortunate, as infant toileting has been proposed as a parenting strategy to prevent symptoms of 'colic' (Jordan, 2014), and my study is unable to move this discussion forwards.

Financial and practical constraints also limited the duration of follow-up in the present research. For example, the lengthy breastfeeding and truncated follow-up (the median duration was 12 months, the maximum possible in my short study) may each have reduced the likelihood of obtaining significant differences in this area. The relatively extended breastfeeding in my sample is consistent with previous research findings of longer breastfeeding duration among mothers with more years of formal education (Castro et al., 2017).

Recommendations for Further Research

Further studies with larger and more diverse samples of mothers and others will be necessary to determine the generalisability of results. In particular, independent replication of the study, as per CONSORT guidelines (Schulz et al., 2010) is important. Further longitudinal follow-up of the *Pakiaka Tupuora* sample would be useful to determine whether attachment advantages and more nurturing parenting beliefs and behaviours are maintained over time, for example in the physiological or neuropsychological profiles of participants who were infants in the present study. Further investigation with this and subsequent samples would permit evaluation of the extent to which the intervention produces societal benefits such as improved caregiving, or reduced rates of psychological problems and mental illness, physical health problems, antisocial and criminal behaviour. A larger sample size and additional study conditions will be necessary to determine which aspects of the intervention are most useful. Multiple intervention groups including some receiving the workshop or gifted sling alone (without the other) would contribute useful data about the active ingredients of the intervention.

Similarly, further intervention research with a larger sample is needed to determine whether the *Parenting From the Start* antenatal workshop impacts attachment via maternal sensitivity and responsiveness, or other means such as parenting beliefs and positive care. Such research should incorporate the variable of autonomy support, which recent studies suggest may also impact attachment outcomes (Whipple et al., 2011), as well as broader caregiver abilities such as insight (Koren-Karie et al., 2002) which may impact sensitivity. Full classification of attachment including the disorganized category (ABCD) is important for assessing both this and future samples. Ideally such research would consider alloparents as well as co-parents such as fathers, as the evolved developmental niche suggests shared care is an ancestral

parenting strategy with many advantages. Future research could usefully expand on my mother-centric approach by including and assessing other potential attachment figures such as co-parents, early childhood educators, and grandparents, and by looking at 'attachment teams' caring for a particular child as systems, rather than examining individual relationships devoid of alloparenting context. Such research would advance our understanding of how children are affected by multiple attachment relationships. Past research in Holland and Israel suggests that additional secure attachments within a network confer benefits, and to some extent compensate for insecure relationships (Van Ijzendoorn et al., 1992). Further studies in this area could interrogate these results, exploring whether attachment teams (networks) consistently improve the predictive power of attachment, whether the presence of multiple secure attachments consistently confers advantages, and how experiences of multiple caregivers are combined in mental representations of attachment.

The results of the present study suggest similarly high levels of babywearing across the intervention and control groups, which may reflect increased popularity of baby slings/carriers in the wider cohort of New Zealand parents, combined perhaps with high accessibility among the (mostly high-income) families in this sample. This may not hold in other samples. Infant carrying requires access to modern babywearing tools such as soft-structured baby carriers or the skill to utilise local resources such as a long length of appropriate material with which to 'tie' a baby onto your front, back, or side. Some cultural/geographic communities may lack both the financial resources for modern carriers and knowledge of less expensive alternatives. Thus, accessibility of infant carrying as a caregiving option should continue to be considered carefully in future research, and gifting of slings should not be discounted given the success of such interventions in prior research (Anisfeld et al., 1990; Esposito et al., 2013; Hunziker & Barr, 1986; Ohmura et al., 2022b; Pisacane et al., 2012; Riem et al., 2021; Williams, 2020). The previously described benefits of babywearing in terms of reduced crying, increased rates of attachment security, and increased breastfeeding make infant carrying an intervention worthy of further research in larger and more diverse samples, despite the null findings here.

In the related area of infant 'colic', objective measures of infant crying at regular intervals post birth would provide more useful data than the retrospective maternal reports used in *Pakiaka Tupuora*. It is possible that parents' memory of crying may be less reliable as the time since infancy increases, and many months had elapsed by the time mothers completed their follow-up assessments in this study.

In terms of more general measurement issues, there may be value in studying both daytime and night-time caregiving. As we saw with parenting intentions regarding caregiving proximity, they can diverge. Despite null findings in the present sample, the *Observational Measure of Sensitivity and Responsiveness* (OMOSAR) developed for this study produced similar results to established sensitivity measures (*Ainsworth's Sensitivity Scales* and the *Mini-Maternal Behaviour Q-Sort*), with which it was correlated, suggesting a degree of convergent validity. Further research investigating the evolved developmental niche and attachment may wish to consider further a more formal process of design inspired by this measure's use of multiple caregiving domains assessed with regards to both day- and at night-time behaviour. In addition, future research could explore obstacles which prevent parents from putting their

intentions into action, as there is often a 'gap' between parenting beliefs and practice. Several examples of this are provided next.

Firstly, qualitative and informal feedback from the workshop suggested the concept of offering babies toileting opportunities from birth was new to many expectant parents. My data did not explore obstacles (such as lack of community knowledge) or supports mothers may have faced in attempting infant toileting once their baby was born. Participants who attended *Parenting From the Start* had access to a single journal article summarising research related to infant toileting (Pugmire, 2014), but their access to more comprehensive resources and expertise relating to the practicalities of elimination communication once their baby arrived likely varied and was probably low given the rarity of infant toileting in this country. There is a lack of research tracking outcomes of infant toileting, but the opportunities for parental attunement and responsiveness make it an area worthy of future study.

Another example of the 'gap' between parenting intentions during pregnancy and the actual caregiving strategies employed relates to medication use during labour. The significant reduction in the planned use of labour medication which occurred in the intervention group was not followed by an actual reduction in medication use during labour relative to the control group, although the difference in rates of epidurals (19% intervention group; 43% control group) approached significance. If this gap between parenting intentions and parenting strategies is still present in larger samples, it is worthy of additional investigation. Future research could consider whether wider structural factors, such as a lack of support for natural birthing, midwifery shortages, or the hospital context, prevented mothers from achieving their goals. Similarly, the importance of breastfeeding to long-term health justifies further intervention research looking at whether psychoeducation relating to the evolved developmental niche, and/or use of baby carriers/slings can increase breastfeeding rates in New Zealand samples with sufficient statistical power, as mothers who attended the *Parenting From the Start* antenatal workshop planned to breastfeed for significantly longer durations, and reported their intention to feed artificial breastmilk substitutes was weakened following the workshop, but did not achieve these changes at detectable levels during the first year post birth. Prior research suggests that infant carrying can increase breastfeeding duration (Pisacane et al., 2012), so reasons for this 'gap' again deserve elucidation.

Parenting beliefs and intentions data suggests that attending *Parenting From the Start* motivated expectant mothers to plan more responsive, child-centered caregiving, but to undertake this work themselves, and this is the pattern intervention group participants followed after their babies were born. Whether this was a matter of choice or necessity is a good question. Follow up research investigating caregiving patterns of mothers and others at multiple time points, with semi-structured qualitative questions on possible reasons for this, would provide more nuanced information about the impact of parenting interventions such as *Parenting From the Start* and/or 'parenting as usual'. Studies exploring parental preferences and constraining factors would also be valuable. Discrepancies between optimal/preferred and actual levels of social support are worthy of ongoing study given the impact of such support on mothers and babies. This is an area where cultural differences are likely to be important. Māori have maintained alloparenting as normative cultural practice and taonga (treasure), and may have greater capacity to support one another's children in networks of healthy relationships. I did not examine data on cultural differences in this area,

but I note the potential to explore cultural strengths in future studies. Attention to economic factors will also be a crucial element of such research, as parenting decisions may be impacted by the availability of employment, safe and affordable housing, parental leave, and related societal variables.

My final recommendations relate to the *Parenting Beliefs Scale* (PBS), another of the measures purpose-designed for *Pakiaka Tupuora*. Given its brevity (20 binary items) and ability to distinguish between study conditions, further refinement and research may be warranted to explore predictive validity for caregiver and child outcomes such as attachment.[154] The lack of variability on some items may be unique to this sample or could suggest a need for further item development to increase the range of scores obtained within and across studies.

Conclusions

In conclusion, *Pakiaka Tupuora* suggests that an antenatal workshop intervention based on the theory of the evolved developmental niche constitutes a feasible approach for significantly improving infant attachment. The predictive power of attachment for ongoing development (Ding et al., 2014; Meng et al., 2015; Puig et al., 2013; Sroufe et al., 2005a; Tabachnick et al., 2019) points to the intervention's potential for cumulative positive impacts. This is the first intervention of its kind, and the positive impacts observed in this small randomized controlled trial support wider roll-outs of *Parenting From the Start* workshops, with additional evaluation focused on the extent to which the findings are replicated in other samples and with other versions of the intervention, as well as consideration of which elements constitute 'active ingredients'. The outcomes of this thesis echo decades of scientific findings relating to infancy and childhood. Early experiences matter because they influence development. What is new is the approach to intervention. *Parenting From the Start* aimed to improve outcomes children and caregivers through the provision of multidisciplinary, evidence-based, culturally-appropriate parenting information and resources. The study demonstrates the effectiveness of a respectful partnership approach which honours Indigenous knowledge alongside scientific knowledge. Further, it demonstrates that improvements can be obtained when parents are empowered with information and tools and trusted to make decisions in the best interests of their whānau. This is an ethical alternative to the more common approach of telling parents what to do, and one that sidesteps problems associated with participant 'resistance' to particular concepts. In *Parenting From the Start*, participants were offered information in evolutionary, sociohistorical, and neuropsychological context – enabling them to see the connections between caregiving choices and child development. Changes to parenting intentions and beliefs during the antenatal workshop, positive care in the first year post birth, and higher rates of secure attachment classifications at 12 months suggest that support need not be expensive or arduous to be effective. A single day appears to be sufficient to improve child outcomes on a scale that, if replicated, could be game-changing for pēpi born in Aotearoa.

[154] Test-retest reliability data for the PBS suggests it also captured initial variability in the intervention group, change over the course of the antenatal workshop, and consistency over more than 11 to 24 months until intervention group mothers were re-assessed at the home visit.

The project adds support to the idea that altering parenting alters the trajectory of children's psychological development. If shifting children onto smoother life paths is possible by targeting interventions in the antenatal period, when difficulties can be prevented, this may decrease the burden on health, legal, and education systems and break intergenerational cycles of inadequate caregiving and poor outcomes.

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APPENDIX A: Sample Participant Information Pack (Group D Version)

MASSEY UNIVERSITY

Parenting From The Start

PARTICIPANT INFORMATION SHEET AND CONSENT FORM

Lead researcher introduction



Kia ora! My name is Leith and I'm a registered clinical psychologist and mother of three. I'm interested in the resources and caregiving strategies used by new parents. For my PhD in psychology I'm studying whether providing additional evidence-based information and free resources improves outcomes over babies' first year of life. The purpose of this research is to benefit families/whānau in our region by supporting them in their parenting, right from the start.

Invitation to take part

I would like to invite you to take part in this research project, which will follow several groups of new mothers through pregnancy, birth, and early parenting. Groups will receive different information and resources at different times so that we can see what new parents find most helpful. Your participation will help us learn more about what strategies local parents use and how this relates to health outcomes for pēpi/babies and their whānau. Whether or not you take part is your choice. If you don't want to take part, you don't have to give a reason, and it won't affect the care you receive. If you do want to take part now, but change your mind later, you can pull out of the study at any time.

This *Participant Information Sheet* will help you decide if you'd like to take part. It sets out why we are doing the study, what your participation would involve, what the benefits and risks to you might be, and what would happen after the study ends. We can go through this information with you and answer any questions you may have. You do not have to decide today whether or not you will participate in this study. Before you decide you may want to talk about the study with other people, such as family/whānau, friends, or healthcare providers. Feel free to do this.

If you agree to take part in this study you will be asked to sign the *Consent Form* on the last page of this document and will be given a copy to keep. This document is 9 pages long. Please make sure you have read and understood all of the pages.

Why we are doing the study

Parenting is a very important job because our tamariki/children are the citizens of the future. In order to support parents as they raise their tamariki/children we need to learn more about the kinds of strategies they are using and what kinds of information and resources they find helpful. What is right for one whānau/family may not be right for another, but we think knowing a little about the science of parenting may be useful to you on your parenting journey, so we have designed a workshop to introduce you to some key ideas and to get you thinking about your options. This research involves following expectant mothers from pregnancy until their babies are 12-18 months old to see whether the workshop and resources we're offering have benefits.

Who can take part

You are welcome to sign up for this study yourself – you don't need to be asked. In order to participate you must be pregnant, able to read and write in English, live within 60 minutes drive of Palmerston North, be willing to remain involved in the study until your baby/pēpi is 12-18 months old, be expecting a normal pregnancy and birth, and have no serious health conditions. Only people who are pregnant can sign up for the study, but their partners, whānau and/or support people are welcome to attend the workshop along with them. We are hoping to recruit up to 200 parent-infant pairs in order to produce scientifically robust data.

What would be involved



If you choose to take part in this study:

- You will attend a free, evidence-based parenting course about infant brain development and the choices you can make during pregnancy, birth, and your first year of parenting. The course will take one full day or two half days;
- You will complete a questionnaire *before* and *after* the workshop as well as a brief *Feedback Form* to let us know what you liked/didn't like;
- We will visit you at home when your baby/pēpi is 4-6 months old, for 60-90 minutes total. This visit will involve two questionnaires, talking about parenting, and the researcher completing several observational measures;

- You will visit our research centre for 30-60 minutes when your baby/pēpi is 12-18 months old to fill out two more questionnaires and take part in a standardised waiting room observation called the *Strange Situation Procedure* (see page 4); &

- You will receive a summary of key findings at the end of the study and more detail about your own results if you would like them.

Project procedures

Participants will need to take part in all stages of the study. Your baby/pēpi will be observed alongside you on two occasions, and (briefly) without you present during the final assessment. If you decide to be involved, you will be asked to give written consent for your baby/pēpi as well as for yourself. You will be involved at three time points:

1. **While you are hapū/pregnant you will attend a parenting workshop**. Workshops will take about 8 hours total and may be offered over a single day or split into two sessions, depending on the preferences of participants and host organisations. Your support people and/or family/whānau members are welcome to attend this workshop with you. Each family/whānau will receive a free parenting resource to take home and keep. We will provide food/kai, and you will have a choice of dates and times.

   The workshop summarises evidence-based information about a range of parenting options to do with infant feeding, sleep, toileting, and care. In the workshop you will hear about parenting in other cultures and back through our evolutionary history as mammals and *Homo sapiens*. I will show you short videos and give you the chance to meet other people expecting their first baby. The workshop provides an introduction to the science of parenting: what we know about the outcomes of particular parenting practices, and why different choices can be right for different pēpi/babies and whānau/families.

   The workshop is based on the latest multi-disciplinary theory of child development, and incorporates research from psychology, neuroscience, biology, anthropology and other fields. Participants will be encouraged to reflect on the kinds of parenting they want to do and why, and to consider what babies need to grow up happy and healthy. The workshop does not advocate a single 'right' way to care for children – one size does not fit all when it comes to parenting, and studies showing group differences cannot tell us what is best for particular individuals. The workshop will include a consideration of pros and cons and why parents might consider various options. Knowing about the research can help us think about how best to meet our pēpi/baby's needs within the constraints of modern life. Our goal is for you to be empowered to make informed decisions about what is best for your own family/whānau.

   We acknowledge Māori as the tāngata whenua (Indigenous people) of Aotearoa New Zealand. The workshop will begin with a bilingual mihi/greeting and will include time for relationship building (whakawhanaungatanga). Māori words and proverbs may be used alongside their English translations. Non-religious karakia/blessings may also be

used at the beginning and end of the workshop and before sharing food, which will be provided at no cost as a koha/gift to all participants. You don't need any prior knowledge of Māori language or culture in order to take part in this study. People of all ethnicities, beliefs, and cultural backgrounds are welcome to participate in this research and attend the workshops.

2. **When your baby/pēpi is 4 to 6 months old you will be visited in your home** at a convenient time. During this visit, which will last 60 to 90 minutes, the researcher or assistant will talk with you about parenting, observe you and your pēpi/baby together, and ask you to complete some questionnaires, including a short screening questionnaire for postnatal depression (which is optional). You can have support people or family/whānau members present during this visit. They will not be asked to provide data for the study.

3. **When your baby/pēpi is 12 to 18 months old you will visit our research centre in Palmerston North**. This session will last 30 to 60 minutes, and will involve filling in some final questionnaires and being videoed for 21 minutes with your baby/pēpi in the *Strange Situation Procedure*. We will show you where the video cameras are and then record your pēpi/baby playing near you in a waiting room. We will ask you to leave the room twice, for up to 3 minutes each time, so that we can record your baby/pēpi alone and in the company of a female research assistant. If your baby gets upset you will be able to return to them. This visit will need to involve just you and your pēpi/baby in order to ensure your data is usable. During this assessment we are interested in the baby's behaviour rather than yours, so we can learn about the relationship strategies they have developed.

Once people sign up to the study, we will initiate all contacts. If you choose to take part, you will not need to remember to organise anything. We will contact you to arrange a convenient time for each workshop or assessment visit. Please let Leith know as soon as possible if you need to re-schedule.

Potential participants in this study have been randomly assigned to one of two groups at the point they receive this *Information Sheet*. The researcher doesn't know which group people are assigned to until then or when their *Consent Form* is returned. This is done to avoid any bias or systematic differences between the groups. The experiences of the two groups will differ in terms of workshop content and timing to help us understand what works best. The research assistant who conducts the final assessments will not know which group you are in, to prevent any distortion of the results.

The information and resources in *Parenting From the Start* workshops are different from those provided in regular 'antenatal classes' and other places, and are being trialed to see whether parents benefit from extra support. At the conclusion of the study these workshops may be offered in the community at a cost (e.g., $250 per individual, couple or family/whānau). You are welcome to attend other antenatal education during the study, or not, as you prefer. Being involved in this study will not prevent you from accessing any other information or services.

It would be great if every participant was able to remain in the study until the end, but we understand that might not always be possible, and you can withdraw from the study at any time without having to give a reason. Any data already collected would remain in the study unless you ask for it to be removed. We really appreciate your generosity in contributing to this research and your involvement is very valuable, so we would love to hear your suggestions about how to make it as easy as possible for you to stay in the study!

Data and how we will manage it

During the study we will collect data about your parenting approach, infant and family health, symptoms of postnatal depression (if you choose to do the screening questionnaire), and the caregiving strategies you have found helpful. This will include asking you about your birth as well as infant feeding and sleep practices. We will also ask about your parenting plans while you are still pregnant/hapū. We will need to take audio and video recordings of both you and your pēpi/baby during the final session in order to study your pēpi/baby's behaviour in depth.

At the end of the study we will share the major findings with you in case they are useful on your future parenting journey, and the findings will also be shared (without using participants' names) with local organisations and published in journal articles, presentations, and reports. You will have the opportunity to find out more about your personal data, and data relating to your pēpi/baby if you want to.

Data will be stored in secure locations such as password-protected computers and locked offices, and kept by the *Massey University School of Psychology* for at least ten years before being destroyed. Names will be separated from other data before analysis in order to reduce the possibility of bias and will not be published or shared with others without your permission.

You may be contacted in the future with an invitation to participate in follow-up studies, but you will be under no obligation to do so. De-identified data from the current study may be shared with other researchers to enable further analyses, but your names and contact details will remain private.

Some *Strange Situation Procedure* videos may need to be shared with researchers at other universities and research institutions (probably the University of Minnesota) as a 'reliability check'. That is, we want to be sure that the assessment is completed according to international guidelines. This is necessary because very few local professionals are trained to do these video assessments, which are the 'gold standard' measure of infant relationships. Videos will only be shared with people who have appropriate qualifications/experience and have signed a confidentiality agreement to say they will not share personal details or show the videos to others. Videos will be identified by a unique number or code, but the recording itself is likely to include your first names because your names will be used to address you during the procedure. Your surname would not usually appear on the video. Videos will be destroyed/digital files deleted once the reliability check is complete. If you do not wish your video to be checked, we will respect your wishes. You can indicate your preference on the *Consent Form* at the end of this document.

Possible risks and benefits

We do not expect you or your pēpi/baby to suffer any harm as a result of taking part, but reflecting on your parenting may cause discomfort for some people – especially if you were mistreated or neglected as a child/tamaiti yourself. Parents may also experience guilt/grief or other emotions if their parenting does not go as planned or is criticised by others. Community organisations such as *Te Aroha Noa* and the *Youth One Stop Shop* may be able to provide counseling or support if you need it at any point. We can help you access this support if you ask us to. Please let us know if any part of the study causes you distress so that we can record this and take appropriate action.

The first follow-up session (when babies are 4-6 months old) includes a brief screening questionnaire asking about symptoms of postnatal depression. You do not have to complete this questionnaire if you don't want to, and there is no need to give a reason. If you choose to complete the postnatal depression questionnaire we will tell you the result. If your score suggests the possibility of postnatal depression, our standard practice is to help you contact an appropriate support service in the community, or make a referral on your behalf. That service may ask you to complete more accurate measures, as the screening questionnaire cannot provide a diagnosis of postnatal depression. Getting help for postnatal depression is important for you and for your baby/pēpi, as depression can affect your ability to parent.

Babies/ngā pēpi may be momentarily distressed by *The Strange Situation Procedure,* which forms part of the final assessment in this study. This procedure is designed to activate the infant's attachment systems by introducing a strange place, a strange person, and then having you (the caregiver) leave the room for up to 3 minutes at a time. Some pēpi/babies cry when their caregiver leaves the room. It is standard practice to cut episodes short (e.g., to 30 seconds) if a pēpi/baby is very distressed, and you will be able to return to your baby/pēpi if you want to at any stage.

The workshops we are evaluating are designed to benefit new parents. You will be provided with evidence-based information and resources that are not available to other parents, and which may not be available or may not be free after the study. This intervention may increase your parenting confidence and/or your ability to make informed choices during pregnancy and your pēpi/baby's first year. The workshop is unlikely to provide all the information and support you require on your parenting journey. Some parenting choices carry risks and we recommend you consider carefully the best option for your family/whānau and seek other advice as necessary.

What happens if something goes wrong

If you were injured in this study, which is unlikely, you would be eligible **to apply** for compensation from ACC just as you would be if you were injured in an accident at work or at home. This does not mean that your claim will automatically be accepted. You will have to lodge a claim with ACC, which may take some time to assess. If your claim is accepted, you will receive funding to assist in your recovery. If you have private health or life insurance, you may wish to check with your insurer that taking part in this study won't affect your cover.

Confidentiality and dissemination of results

All researchers and assistants involved in the study will be bound by professional ethics and/or signed confidentiality agreements saying they will not share any personal information with those outside the research team. The main limit of confidentiality is our duty to keep people safe. If a member of the research team felt that you or another person was in danger they would, in the first instance, attempt to discuss the issue with the people involved, and then ensure appropriate action was taken. In order to protect the health and safety of all individuals involved in the study it might be necessary to make a referral to a support or government agency even if we did not have permission to do so. At times health professionals can be ordered by the Courts to release information, and this is also a potential limit to confidentiality.

The aim of this research is to increase our knowledge of parenting and to benefit parents both immediately and in the future. In order to do this, results must be shared so that other people can learn from them. The results of this study will be shared in a variety of ways. Publication will involve partially de-identified data which will not identify individuals. Articles about this research will be submitted to peer-reviewed journals and may also be reported in presentations, lectures, books, articles, websites, and other formats. <u>All participants will receive a summary of the main findings within approximately 6 months of the research being completed. You are welcome to contact us if you would like further information about what we found</u>.

Who is paying for the study

<u>The workshop, resources, and food/kai provided as part of this study will be provided free of charge as a koha (gift) in appreciation of the time you put in</u>. This research has been funded by a variety of scholarships and grants which were awarded based on the merit of the project. The two organisations that provided most of the funding were Massey University and *Te Hāhi Tūhauwiri/The Aotearoa New Zealand Religious Society of Friends (Quakers)*. These organisations will not have access to research data, and do not have any financial interest in the outcome. The study was designed by the lead researcher with support from four experienced supervisors: Dr Shane Harvey (Clinical Psychologist and Director of the Massey University Psychology Clinic), Dr Natasha Tassell-Matamua (Māori Researcher and Senior Lecturer, Massey University), Dr Cheryl Benn (Midwife, Lactation Consultant, & Midwifery

Advisor to MidCentral DHB), and Professor Kevin Ronan (Clinical Psychologist and Director of the Clinical Masters Training Programme at CQ University, Queensland).

Participant's rights

You do not have to accept this invitation. If you decide to participate, you have the right to:

- decline to answer any particular question;
- withdraw from the study at any time;
- ask any questions about the study at any time during participation;
- provide information on the understanding that your name will not be used unless you give permission to the researchers;
- be given access to a summary of the project findings when it is concluded.

We welcome your feedback about the study at any point.

Study contacts

If you have any questions, concerns or complaints about this project, you can contact:

Lead researcher:

Leith Anna Morrimire
School of Psychology
Massey University
Private Bag 11-222
Palmerston North 4442

Main supervisor:

Dr Shane Harvey
Massey Psychology Clinic
Massey University
Private Bag 11-222
Palmerston North 4442

Other contacts

If you want to talk to someone who isn't involved with the study, you can contact an independent health and disability advocate on:

Phone:	0800 555 050
Fax:	0800 2 SUPPORT (0800 2787 7678)
Email:	advocacy@hdc.org.nz

For Māori health support please contact:

Name:	Māori Health Service
Address:	Palmerston North Hospital
	50 Ruahine Street, P.N.
Phone:	(06) 06 356 9169

For counselling services please contact TAN (all ages) or YOSS (under 24 years):

Organisation:	Te Aroha Noa (TAN)	Youth One Stop Shop (YOSS)
Address:	12-32 Brentwood Ave, P.N.	31 Princess Street, P.N.
Phone:	(06) 358 2255	(06) 355 5906
Email:	reception@tearohanoa.org.nz	info@yoss.org.nz

You can also contact the health and disability ethics committee (HDEC) that approved this study on:

Phone:	0800 4 ETHICS
Email:	hdecs@moh.govt.nz

*This project has been reviewed and approved by the Southern Health & Disability Ethics Committee (HDEC), Application **16/STH/186**. If you have any concerns about the conduct of this research, please contact the researchers or the Chair, Southern HDEC, telephone 0800 4 ETHICS, email hdecs@moh.govt.nz.*

Parenting From The Start

PARTICIPANT CONSENT FORM – GROUP D

I have read the *Information Sheet* and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I confirm that I understand the *Information Sheet* and have been given sufficient time to get advice from a support person and consider whether or not to take part.

I understand that taking part in this study is voluntary (my choice), and that I may withdraw from the study at any time.

I agree to participate in this study under the conditions set out in the *Information Sheet*, and I am happy for my baby/pēpi to participate alongside me once s/he is born.

I agree to attend a one-day parenting workshop and complete a questionnaire before and after the workshop, as well as a brief feedback form about the workshop.

I agree to take part in both follow-up assessments along with my baby/pēpi:

1. At my home when my baby/pēpi is 4-6 months old. This 60-90 minute session will involve filling out two questionnaires, talking about parenting, and a one-off observation of me with my baby/pēpi.

2. At a research centre in Palmerston North when my baby/pēpi is 12-18 months old. This 30-60 minute session will involve filling out two more questionnaires and taking part in the *Strange Situation Procedure*.

I give permission for the research team to collect and analyse information about my pregnancy, birth, parenting, and health during these assessments, and to make video and sound recordings of us as part of the *Strange Situation Procedure*. I understand I will be asked to give written permission on behalf of my baby/pēpi.

I give permission for our *Strange Situation Procedure* video to be viewed by other professionals as part of a reliability check: [please tick one] Yes ☐ or No ☐

Signature: _____ **Date:** _____

Full Name - printed _____

APPENDIX B: Locality Assessments Checklist

Parenting From The Start

LOCALITY ASSESSMENT FORM

Authorising person:	
Organisation:	
Service details:	

I understand that *Parenting From the Start* is a doctoral research project being run in the Manawatū/Horowhenua region, and that participants will be first-time mothers who meet the entry criteria set out in the *Screening Questionnaire* and *Information Sheets*.

I confirm that I have read these documents and had the opportunity to ask questions about the study, and I understand that I may ask further questions at any time.

I confirm that I am authorised to make decisions on behalf of the organisation named above.

Our locality is able to support this research in the following way/s:

Displaying *Advertising Posters* about the study	Yes	Maybe	No
Handing out *Advertising Posters* to people expecting a baby	Yes	Maybe	No
Collecting in *Screening Questionnaires*	Yes	Maybe	No
Providing a venue for one or more parenting workshops	Yes	Maybe	No
Providing kai/food for workshop participants	Yes	Maybe	No
Assisting with participant transport (pick-ups/drop-offs)	Yes	Maybe	No
Making a koha/financial contribution towards the research	Yes	Maybe	No

Name (please print):			
Signature:		**Date:**	

LOCALITY ASSESSMENT CHECKLIST:

Before the study commences at a given locality in New Zealand, it must be authorised by that locality in HDEC Online Forms (https://nz.ethicsform.org/SignIn.aspx). Locality authorisation confirms that the locality is suitable for the safe and effective conduct of the study, and that local research governance issues have been addressed.

We have discussed:

The locations in which *Advertising Posters* will be displayed (how many and what sizes would be useful?)	Yes	No
Whether/how information about the study will be given to clients (ideally posters will be handed directly to potential participants)	Yes	No
What clients will be told about the study (e.g., all participants will receive free information & resources, but experiences & timing will differ depending on the group they are assigned to).	Yes	No
Whether *Screening Questionnaires* will be held on site (ideally partner organisations will give these out to potential participants).	Yes	No
Whether staff will assist with completion of *Screening Questionnaires* (will training be required to ensure staff understand the form?)	Yes	No
How completed *Screening Questionnaires* will be kept secure (where will the sealed envelopes be stored for pick-up?)	Yes	No
What kinds of records partner organisations will keep (e.g., regarding attendance at workshops)	Yes	No
Confidentiality of information (what will be shared & with whom – the research team will not be able to share participant information)	Yes	No
Whether the partner organisation can offer support if participants report distress associated with or affecting their parenting	Yes	No
How results will be shared at the end of the study (all participants and partner organisations will receive a letter summarising the results)	Yes	No

Name & title:			
Signature:		**Date:**	
Organisation:			

APPENDIX C: Summary of Project Funding Sources

Sources of funding for the *Parenting From the Start* research project are outlined in the Table C1. Midway through the project I was approached by my past clinical supervisor, Robyn Salisbury, with a spontaneous offer of funding for my present and ongoing work in this area. In response to this offer, my husband, colleague Aileen Devonshire, and I launched the *Pakiaka Tupuora – Parenting From the Start* incorporated Trust to support and continue the mahi (work) described in this thesis. The trust derives it's income from koha/donations, particularly an ongoing gift of all author royalties from the book *Free to be Children*, edited by Robyn. All other grants and scholarships were pre-existing entities I applied for and was awarded through a competitive process. Unused funds were returned, and organisations providing scholarships and grants made no contribution to research design, analysis, or other decision-making, and had no access to raw data.

Table C1.

Funding Obtained for Pakiaka Tupuora *Research Project*

Name of scholarship or grant	Purpose & description	Total amount
Margaret Caverhill Scholarship	*Lead researcher's PhD fees*	$20,000
Massey University Doctoral Scholarship	*Lead researcher's living costs*	$75,000
Massey University Travel Abroad Bursary	*Lead researcher's travel to University of Minnesota for SSP (attachment) training*	$1,750
Jaycee Trust Travelling Fellowship	*Research assistant's travel to University of Minnesota for SSP (attachment) training*	$5,000
Massey University School of Psychology Postgraduate Research Funds	*Course fees for SSP trainings and accommodation for 16 nights in Minneapolis, U.S. (two people).*	$6,000
Researcher's personal contribution	*Food & transport within the United States*	$1,500
Society of Friends (Quakers) Aotearoa NZ Testimonies Fund Grant	*Parenting resources for participants (200x slings/books @ $40 each)*	$8,000
Researcher's personal contribution	*Weighted life-sized baby dolls (x13) and HDMI cables for parenting workshops*	$311
Society of Friends (Quakers) Aotearoa NZ Education Fund	*Grant to pay for maternal sensitivity training*	$1,600
Researcher's personal contribution	*Payments to research assistant (RP) for 46 home visits plus report time ($88 per visit)*	$4048
Koha from Robert and Mayan Shraders	*Contribution to new laptop*	$500
Pakiaka Tupuora – Parenting From the Start PhD Grant	*Laptop & software for data analysis* *Lead researcher's living costs*	$10,000
	Total funding obtained =	$133,709

Note. Catering for the 7 kanohi-ki-te-kanohi (face-to-face) workshops is not shown here. Ingredients were paid for by the lead researcher (LM) and all cooking and preperation undertaken by a research assistant (DM).

APPENDIX D: Final Assessment Letter (Control Groups A and C)

Parenting From The Start

OVERVIEW OF FINAL FOLLOW-UP ASSESSMENTS

Kia ora!

Thank you so much for taking part in the home visits. It is exciting to see such rich data coming in – showcasing the diversity and importance of caregiving in our region. It will be some time before the youngest pēpi/babies in the study are visited - longitudinal studies take a while! Meanwhile, older pēpi/babies are now due for their **final follow-up assessment**, which is scheduled to take place when babies/ngā pēpi are **12 to 18 months old**. We will contact you to arrange a convenient time for you to bring your baby/toddler in to see us. This email is just to let you know that your assessment is coming up, and what to expect when you visit. The final assessments will be run by several of my research assistants, who have received special training and signed confidentiality agreements. This is to protect the study from bias, so it would be helpful if you can avoid mentioning which of the study groups you are in. All data will come back to me for analysis and interpretation of the results.

The venue for the final assessment is the **Massey Psychology Clinic, Bernard Chambers B, Massey University, Palmerston North**. A map of the Massey University campus showing the location of the Psychology Clinic is attached. Free parking is available in the carpark in front of the Psychology Clinic, which is accessed through the barrier arm on the left at the start of Library Road. The code to open the barrier arm is **####**. You can use one of the car parks numbered **51-56**. If those parks are full the back-up parks are numbers **17-24**. Please feel free to feed or change your baby/pēpi once you arrive at the Clinic, or use the bathroom yourself so that you are both comfortable for the assessment. We are happy to wait, so please don't feel rushed. Once you are ready, a member of the *Parenting From the Start* research team will show you the rooms we'll be using during your visit.

Your session will last **up to an hour**, and will involve being videoed for 21 minutes with your baby/pēpi in the *Strange Situation Procedure* and filling out two final questionnaires. We will show you where the video cameras are and then record your pēpi/baby playing near you in a waiting room-type setting. We will ask you to leave the room twice, for up to 3 minutes each time, so that we can record your baby/pēpi alone and in the company of a female research assistant. When you are not in the room you will be able to watch your baby/pēpi through the one-way mirror window, so you can see and hear what they're doing. Some babies are not bothered by the procedure. Many enjoy playing with the toys we provide. If your baby/pēpi gets upset you will be able to return to them, and it is usual practice to cut the separation episodes short if there is 30 seconds of hard crying that isn't settling. The videoed procedure allows us to observe all the babies in a standardised situation, so we can see their play/exploration and learn about the relationship strategies they have developed over their first year of life. I am happy to discuss your baby's video with you at a later date if you have any questions.

This assessment will need to involve just you and your pēpi/baby in order to ensure your data is usable. The videoed procedure is not valid if the baby/toddler knows there are other family members or caregivers in the building, as it can confuse them. Please let us know if you wish to bring a support person or have other children to look after that day so that we can figure something out. We are happy to assist with transport if that would be helpful, work around nap times, etc. We really value your involvement and want to make it easy for you to take part.

The final questionnaires for the study will ask about your parenting experiences and approach over the first year, as well as your own early childhood experiences. I would be grateful if you could complete every question, even if you are not sure of the best answer. You are most welcome to write notes on the paper if that would be useful in clarifying your answers. Please feel free to get in touch with me at any time if you would like to discuss the assessments.

If you would like to talk through any aspect of your parenting after the final visit, you are eligible for a **free one-on-one consultation**, at your convenience. I would expect these to take about an hour, and I'm happy to meet at my office or somewhere else in in Palmerston North.

Thank you so much for your support of this research, which we hope will lead to improved support for local parents now and in the future. I look forward to reporting back the key findings.

Ngā mihi mahana/warm greetings,

Leith

Leith Morrimire
BA(Hons), MA, PGDipClinPsych
Registered Clinical Psychologist
Lead Researcher at Parenting From the Start

APPENDIX E: Sample Workshop Feedback Form

Parenting From The Start

WORKSHOP FEEDBACK FORM – Part 1

The workshop you are attending is being offered to people expecting a baby/pēpi, during pregnancy, as part of our parenting research. We would value your opinion regarding whether the information and resources offered are useful to expectant parents and their whānau/support people. Please circle one answer for each question.

Workshop quality

1. Overall I would rate Part 1 of this parenting workshop:

Very Bad	Bad	Okay	Good	Excellent

2. Part 1 of this workshop has increased my ability to make informed choices:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

3. Part 1 of this workshop has increased my parenting knowledge:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

4. Part 1 of this workshop has increased my parenting confidence:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

5. Part 1 of this workshop was culturally appropriate for Aotearoa New Zealand:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

6. Part 1 of this workshop was presented in a non-judgemental way:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

7. I am glad I attended Part 1 of this workshop:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

Workshop availability

8. I think Part 1 of this parenting workshop should be offered to other parents:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

9. I think Part 1 of the workshop should be free if possible *[please circle one]:*

Yes	No

Sling availability

10. I think the *Moby Wrap* slings should be offered to other parents:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

11. I think the *Moby Wraps* should be free if possible *[please circle one answer]:*

Yes	No

Workshop feedback

12. The thing/s I liked **most** about Part 1 of this workshop were:

13. The thing/s I liked **least** about Part 1 of this workshop were:

14. Topics I found most interesting &/or useful in Part 1 were:

15. How would you describe Part 1 of the workshop to other parents who were considering attending?

16. I am happy for my comments in Question 15 to be used anonymously in advertising *[tick]:*

17. My ethnicity is

18. I am a:

Participant	Partner	Support person

Parenting From The Start

PARENTING INTENTIONS QUESTIONNAIRE (PIQ)

People have different ideas about parenting. This questionnaire asks you about your intentions (that is, what you think you might do) during your baby's first twelve months after birth. There is no one 'right' way to parent and there are no right or wrong responses. Please give the answer that is most true for you so we can learn more about parenting in Aotearoa New Zealand, and how to support families/whānau. **For each question, write or circle the answer/s that fit your plans most closely**.

Your personal details will be kept private. Only group data (from many participants combined) will be published. **Please answer every question, even if you're not sure.** Start by completing the personal and contact details below so that we can ensure your data stays together and that we are able to contact you later in the study. Thank you for your valuable contributions! This questionnaire will take 10-15 minutes.

Participant Contact Details					
Full name:					
Date of birth:					
Gender:			Ethnicity:		
Marital status:	Married/civil union	Defacto partner	Divorced/separated	Widowed	Single
Number of adults in household:	1	2	3	4	5+
Highest education:	Some high school	Finished high school	Certificate/ diploma/apprenticeship	Undergraduate degree	Postgraduate degree
Annual family income (before tax):	Less than $20,000	$21,000 – $40,000	$41,000 – $60,000	$61,000 - $80,000	$81,000 or more
Landline number:			Cell number:		
Postal address:					
Postcode:			Today's date:		
Baby's due date:			I'm filling this out: *[circle 1]*	Before the workshop	After the workshop

Section 1: Pregnancy, Labour and Birth

For each question, please circle and/or write the <u>one</u> answer that fits you best.

1. I am currently _____ months pregnant/hapū.

2. I have booked with a *Lead Maternity Carer* (LMC):

Yes	No

3. I intend to labour: *[note: 'home' includes any non-institutional setting]*

At home	In a birth centre	In hospital

4. I plan to give birth: *[note: 'home' includes any non-institutional setting]*

At home	In a birth centre	In hospital

5. I plan to deliver my baby/pēpi:

Vaginally	With forceps/suction	By caesarean section

6. I plan to use prescribed drugs/medications (e.g., epidural) during labour and birth:

Definitely not	Probably not	Maybe	Probably	Definitely

7. I am confident in my ability to give birth naturally (i.e., vaginally and without drugs)

Definitely not	Probably not	Maybe	Somewhat	Definitely

8. I feel anxious about giving birth:

Definitely not	Probably not	Maybe	Somewhat	Definitely

9. I plan to have one or more non-medical support people (e.g., partner, family member, friend, doula) with me during labour and birth:

Definitely not	Probably not	Maybe	Probably	Definitely

Section 2: Infant Feeding

For the following questions, please circle and/or write the one answer that fits you best.

10. I plan to breastfeed my baby/pēpi:

Definitely not	Probably not	Maybe	Probably	Definitely

11. I plan to feed my baby/pēpi formula:

Definitely not	Probably not	Maybe	Probably	Definitely

12. I plan to start using breastmilk from:

Baby's birth	_____ weeks old	_____ months old	Never

13. I plan to start using formula from:

Baby's birth	_____ weeks old	_____ months old	Never

14. I plan to introduce other foods ('solids'), either mashed or whole, from:

Baby's birth	_____ weeks old	_____ months old	Never

15. I plan to breastfeed for _____ years, _____ months, or _____ weeks *[complete one]*.

16. My baby will receive nothing but breastmilk for _____ years, _____ months, or _____ weeks.

17. I am confident in my ability to breastfeed:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

18. Most of my close friends and family/whānau: *[circle more than one answer if your close friends and family/whānau are evenly split into two or more of these groups, otherwise circle just one]*.

Breastfeed	Formula-feed	Feed breast milk & formula

Section 3: Infant Sleep

19. How often during the day will my baby/pēpi sleep: *[please circle one answer on each line]*

a) In the same room as me (or another adult)	Never	Occasionally	Sometimes	Often	Always
b) In the same bed as me (or another adult)	Never	Occasionally	Sometimes	Often	Always
c) In a room by themselves	Never	Occasionally	Sometimes	Often	Always

20. How often at night will my baby/pēpi sleep: *[please circle one answer on each line]*

a) In the same room as me (or another adult)	Never	Occasionally	Sometimes	Often	Always
b) In the same bed as me (or another adult)	Never	Occasionally	Sometimes	Often	Always
c) In a room by themselves	Never	Occasionally	Sometimes	Often	Always

21. How often overall will my baby/pēpi sleep in/on: *[please circle one answer on each line]*

a) A wahakura (flax basket) or moses basket	Never	Occasionally	Sometimes	Often	Always
b) A Pēpi Pod (lined box)	Never	Occasionally	Sometimes	Often	Always
c) A cot or basinet	Never	Occasionally	Sometimes	Often	Always
d) A couch, chair or beanbag	Never	Occasionally	Sometimes	Often	Always
e) A baby hammock	Never	Occasionally	Sometimes	Often	Always
f) An adult bed (raised up off the floor)	Never	Occasionally	Sometimes	Often	Always
g) A futon or low bed (on or close to the floor)	Never	Occasionally	Sometimes	Often	Always
h) A sling, wrap, or baby carrier	Never	Occasionally	Sometimes	Often	Always
i) A caregiver's arms	Never	Occasionally	Sometimes	Often	Always
j) Other *(please specify)*	Never	Occasionally	Sometimes	Often	Always

22. I will put my baby/pēpi down to sleep:

On his/her *front*	On his/her *back*	On his/her *side*	Combination/other *

** Please specify the position/s in which you will put your baby/pēpi down to sleep:*

_____

23. Keeping my baby/pēpi close during the night (in the same **room**) is important to me:

Agree	Not sure	Disagree

24. Keeping my baby/pēpi close during the night (in the same **bed**) is important to me:

Agree	Not sure	Disagree

Section 4: Infant Toileting

Please circle the best answer to describe your plans during the first 12 months.

25. During the day, my baby/pēpi will urinate ('wee') and defecate ('poo'):

a) In a single-use ('disposable') nappy	Never	Occasionally	Sometimes	Often	Always
b) In a re-usable ('cloth') nappy	Never	Occasionally	Sometimes	Often	Always
c) In a toilet, basin, potty, or container	Never	Occasionally	Sometimes	Often	Always
d) On a cloth or pad	Never	Occasionally	Sometimes	Often	Always
e) Other *(please specify):*	Never	Occasionally	Sometimes	Often	Always

26. During the night, my baby/pēpi will urinate ('wee') and defecate ('poo'):

a) In a single-use ('disposable') nappy	Never	Occasionally	Sometimes	Often	Always
b) In a re-usable ('cloth') nappy	Never	Occasionally	Sometimes	Often	Always
c) In a toilet, basin, potty, or container	Never	Occasionally	Sometimes	Often	Always

d) On a cloth or pad	Never	Occasionally	Sometimes	Often	Always
e) Other *(please specify):*	Never	Occasionally	Sometimes	Often	Always

27. I intend to practice infant toileting (also called 'elimination communication' or 'natural infant hygiene') starting soon after birth: *[please circle one answer only]*

Yes, full-time	Yes, part-time	No, not at all	Don't know

28. I am confident in my ability to practice infant toileting: *[please circle one answer only]*

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

Section 5: Infant Care

29. I intend to return to work for _____ hours per week when my baby/pēpi is:

Newborn	_____ week/s old	_____ month/s old	Not during the first year

30. I would prefer to return to work for _____ hours per week from:

Newborn	_____ week/s old	_____ month/s old	Not during the first year

31. The person/people who will spend the most time looking after my baby/pēpi during their first 4 to 6 months will be: *[please write their name/s below and explain their relationship to your baby/pēpi]*

Caregiver/s:	*e.g., me*
Relationship to baby:	*e.g., māmā/mother*

32. The person/people who will spend the most time looking after my baby/pēpi from 6 to 12 months will be: *[please write their name/s below and explain their relationship to your baby/pēpi]*:

Caregiver/s:	*e.g., my parents*
Relationship to baby:	*e.g., Grandparents*

33. Other people who will care for my baby/pēpi regularly during the first 12 months:

First name	**Relationship to baby/pēpi**	**Details of care** (e.g., hrs per week)
e.g., Ana	*Kaiāwhina at Kōhanga Reo*	*20 hours a week from 3 months old*

34. My level of social/emotional support over the first 12 months of parenting will be:

Very low	Low	High	Very high

35. The number of adults living in our house who will help care for my baby/pēpi will be:

1	2	3	4	5+

Section 6: Parenting Beliefs

For each question, please circle the one answer that best fits your views.

36. Over the first 12 months after birth:

a) It is best to respond to a baby/pēpi as quickly as possible	Agree	Disagree
b) Babies/ngā pēpi should not be held or carried too much	Agree	Disagree
c) Babies/ngā pēpi are better cared for if parents attend to their needs	Agree	Disagree
d) It is best to ignore the first few minutes of crying	Agree	Disagree
e) Babies/ngā pēpi can be spoiled by too much attention	Agree	Disagree
f) It is best to feed 'on demand' (i.e., whenever the baby/pēpi wants)	Agree	Disagree
g) The more responsive parents are, the less babies/ngā pēpi cry	Agree	Disagree
h) Babies/ngā pēpi should spend time in their own room	Agree	Disagree
i) Parents and other caregivers should be reliably responsive	Agree	Disagree
j) It is best to feed babies/ngā pēpi on a schedule	Agree	Disagree
k) All my pēpi/baby's needs should be met promptly	Agree	Disagree

l) Babies/ngā pēpi must learn independence as early as possible	Agree	Disagree
m) A baby/pēpi should be held and carried as much as they want	Agree	Disagree
n) Babies/ngā pēpi develop independence in their own time	Agree	Disagree
o) Babies/ngā pēpi need care at night as well as during the day	Agree	Disagree
p) Babies/ngā pēpi need to learn to wait for what they want	Agree	Disagree
q) Babies/ngā pēpi must be trained to sleep through the night	Agree	Disagree
r) Responding to crying makes babies/ngā pēpi cry more	Agree	Disagree
s) Babies/ngā pēpi should be kept comfortable at all times	Agree	Disagree
t) Babies/ngā pēpi cannot be spoiled by too much attention	Agree	Disagree

Section 7: Parenting Confidence

For each question, please circle and/or write the <u>one</u> answer that fits you best.

37. I am confident in my ability to parent well:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

38. I feel I have the knowledge I need to parent well:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

39. I am looking forward to becoming a parent:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

40. I believe that parenting well is important:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

41. I would like more parenting information:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

Please describe _____

42. I feel I need more support (e.g., practical, emotional, financial) in caring for my baby/pēpi:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

Please describe _____

_____

_____

Thank you for taking part! Your answers are greatly appreciated :)

APPENDIX G: Parenting Intentions Assessed During Pregnancy (Intervention Group)

Birth Intentions

Based on the discussion in earlier chapters, the kind of 'natural birth' present in the human evolved developmental niche was operationally defined as non-institutional, vaginal, and unmedicated. Birth intentions were thus examined in several ways: (1) planned place of birth (home, birth centre, or hospital), (2) the kind of delivery planned (vaginal, instrumental, or surgical), and (3) planned use of medications during labour and birth.

Planned Place of Birth. Planned place of birth was plotted on an ordinal scale ranging from 1 to 3 to assess the hypothesis that expectant mothers were more likely to endorse items relating to natural birth after the workshop than before. Home births received a score of 1 (least medical), indicating the option most strongly associated with physiologically normal vaginal birth. Hospital births, which have the highest likelihood of medical intervention and instrumental or surgical delivery, were rated 3 (most medical). Women planning a normal midwife-attended birth within the 'bedroom and ensuite' set-up of the newly operational birth centre[155] were given the intermediate score of 2.

Planned Type of Delivery. Secondly, mothers recorded the kind of delivery intervention they were planning immediately before and after the workshop. The three categories were ordered according to the degree of medical intervention involved, from least to most: (1) vaginal, (2) instrumental (delivered with forceps and/or suction, and (3) surgical (born by caesarean section). It was predicted that reviewing the science of physiologically normal birth during the antenatal workshop would encourage participants to choose less medical deliveries

Planned Use of Medications. Thirdly participants reported on planned use of medications during labour and birth, as assessed by 5-point likert scale response to the statement 'I plan to use prescribed drugs/medications (e.g., epidural) during labour and birth': (1) definitely not, (2) probably not, (3) maybe, (4) probably, (5) definitely. It was predicted that considering the history of human and mammalian birth from an evolutionary perspective during the antenatal workshop would encourage participants to consider a more 'natural' approach involving non-invasive techniques (e.g., massage, water, support) and their own powerful hormonal responses to labour rather than pain medications.

Feeding Intentions. Hypothesis 1 included the prediction that intervention group participants would be more likely to plan exclusive and extended breastfeeding after the workshop than before. It was expected that engaging with the scientific information relating to breastfeeding benefits and the health risks of artificial alternatives during the workshop would support plans to avoid infant formula in favour of human milk. Infant feeding was examined in several ways: (1) Intention to breastfeed and (conversely) formula-feed (assessed separately), (2) age at which mothers planned to begin breastfeeding and/or formula-feeding, and (3) intended length of breastfeeding (both partial and exclusive).

[155] The first birthing centre in the region became operational after the first couple (?) of workshops, so was available as an option for most, but not all study participants.

Intention to Breastfeed. The intention to breastfeed was measured via 5-point likert scale responses to the statement *'I plan to breastfeed my baby/pēpi'*: (1) definitely not, (2) probably not, (3) maybe, (4) probably, (5) definitely. The strength of commitment to breastfeeding was expected to increase after the workshop intervention relative to before.

Intention to Formula-Feed. The intention to formula-feed was measured via 5-point likert scale responses to the statement *'I plan to feed my baby/pēpi formula'*: (1) definitely not, (2) probably not, (3) maybe, (4) probably, (5) definitely. The strength of commitment to formula feeding was expected to decrease after the workshop intervention relative to before.

Planned Initiation of Breastfeeding and Formula-Feeding. Planned initiation of breastfeeding and formula-feeding were measured by asking expectant mothers to complete the statements '*I plan to start using breastmilk from…*' and '*I plan to start using formula from…'* with one of four options: (1) Baby's birth, (2)__ weeks old, (3) _ months old, (4) Never. Answers were rounded to the nearest half month, with a score of 13 indicating mothers did not plan to use formula during their infant's first year of life, if at all. Where change occurred over the course of the workshop, I expected them to involve plans to initiate breastfeeding earlier, and formula later, compared to the pre-test baseline.

Planned Duration of Breastfeeding. Intended length of (partial or exclusive) breastfeeding was assessed via responses to the statement: '*I plan to breastfeed for __ years, __ months, or__ weeks [complete one]*', with answers rounded to the nearest half month. If an age range was provided, the mean was used. The *Parenting From the Start* workshop summarised research-findings relating to infant feeding, including the World Health Organisation (WHO) recommendation that all babies are breastfed for 2 years and beyond. As noted in Chapter 7, most New Zealand babies do not receive this length of breastfeeding. Thus, it was predicted that length of intended breastfeeding would increase following the workshop intervention.

Planned Length of Exclusive Breastfeeding. Intended length of exclusive breastfeeding was assessed via responses to the statement: *'My baby will receive nothing but breastmilk for __ years, __ months, or __ weeks'*. Answers were rounded to the nearest half month. If an age range was provided, the mean was used. The WHO recommendation, covered in the workshop, is that all babies receive nothing but human breastmilk and essential medications for the first 6 months of life. Based on this standard and the evidence on which it rests, the intended length of exclusive breastfeeding was expected to increase on the post-test relative to participants' pre-test responses.

Toileting Intentions

Hypothesis 1 included the prediction that intervention group participants would be more likely to endorse items relating to infant toileting after the workshop than before. It was expected that learning about infant toileting options during the workshop would support plans to reduce dependence on nappies and attempt elimination communication (EC). Although normal within many cultures, and likely part of the human evolved developmental niche, infant toileting is sufficiently unusual in Aotearoa New Zealand that many parents reported hearing about it for the first time during the workshop.

Because of the newness of this area of research it was unclear how best to measure infant toileting. Therefore, the intention to practice infant toileting was operationally defined both as (1) an overall intention to practice infant toileting, and (2) the frequency with which mothers planned to use a toilet, basin, potty, or container during the day and at night.

Intention to Practice Infant Toileting. Participant's overall intention was assessed via responses to the statement: *'I intend to practice infant toileting (also called 'elimination communication' or 'natural infant hygiene') starting soon after birth: [please circle one answer only]'.* The multiple-choice answers were arranged on an ordinal scale from (0) No, not at all, to (1) Don't know, (2) Yes part time, and (3) Yes full time. Thus, higher scores indicate increases in extent to which expectant mothers planned to offer their infants toileting opportunities (e.g., hold them over a potty or basin) from birth. Participants were asked to describe their plans during the first 12 months.

Planned Frequency of Day-time and Night-time Infant Toileting. The frequency with which mothers planned to offer day-time and night-time toileting opportunities to their newborn was assessed via two other questionnaire items in the infant toileting section: '*During the day, my baby/pēpi will urinate ('wee') and defecate ('poo') in a toilet, basin, potty, or container* and *During the night, my baby/pēpi will urinate ('wee') and defecate ('poo') in a toilet, basin, potty, or container'.* Participants were asked to describe their plans during the first 12 months Responses were anchored by a 5-point likert scale ranging from (0) never, (1) occasionally, (2) sometimes, (3) often, to (4) always. Scores were expected to increase following the workshop, relative to the pre-test response.

Intentions Regarding Close Proximity: Co-sleeping

Hypothesis 1 included the prediction that intervention group participants would be more likely to plan to keep their babies close after attending the workshop than before. It was expected that thinking about how close physical proximity facilitates responsive care would support plans to minimise separations and keep baby nearby day and night, as was the norm in ancestral societies. Comparing co-sleeping/proximity intentions before and after the intervention was a planned comparison, registered with ANZCTR prior to recruitment. Analysis is based on all 26 participants randomly assigned to the intervention group.

Co-sleeping is variably defined in the literature as (1) room-sharing or (2) bed-sharing, so both were measured. From a theoretical point of view, room-sharing is the key variable, as hunter-

gatherer societies such as those our ancestors are thought to have occupied did not use 'beds' in the modern Western sense of a raised piece of furniture complete with mattress, pillow/s, and sheets/blankets/duvets. Anthropological reports of modern hunter-gatherers suggest they adults and children sleep together on mats or directly on the ground as well as maintaining close proximity for the majority of the day (Narvaez et al., 2012b; Narvaez, Fuentes, et al., 2014). Given the widespread modern Western practice of placing infants in a room by themselves while they sleep, close proximity was operationally defined as (3) reduced frequency of planned separations from adults during naps.

Intention to Room-Share at Night. This item assessed the frequency with which expectant mothers planned for their baby to sleep in the same room as an adult before and after attending the *Parenting From the Start* workshop: '*How often at night will my baby/pēpi sleep in the same room as me (or another adult)'*. Responses were anchored by a 5-point likert scale: (0) Never, (1) Occasionally, (2)Sometimes, (3) Often, (4) Always. It was predicted that the intended frequency of room-sharing would increase after the workshop, where the benefits in terms of improved safety and responsiveness were discussed.

Intention to Bed-Share at Night. Next I examined the frequency with which expectant mothers planned for their baby to sleep in the same bed as an adult before and after attending the *Parenting From the Start* workshop via the questionnaire item: '*How often at night will my baby/pēpi sleep in the same bed as me (or another adult)'*. Responses were again anchored by a 5-point likert scale: (0) Never, (1) Occasionally, (2) Sometimes, (3) Often, (4) Always. I did not register a specific hypothesis regarding bed-sharing prior to the study beginning.

Planned Frequency of Separation During Daytime and Night-Time Sleeps. The intention to keep babies close (proximity) was measured by asking expectant mothers how frequently they planned for their baby to sleep alone during naps during the day ('*How often during the day will by baby/pēpi sleep in a room by themselves?'*) and at night ('*How often at night will by baby/pēpi sleep in a room by themselves?'*). Responses were anchored by 5-point likert scales ranging from (0) Never, (1) Occasionally, (2)Sometimes, (3) Often, to (4) Always. It was predicted that the frequency of planned separations would be lower after the workshop than before.

Intentions Regarding Alloparenting

Hypothesis 1 included the prediction that intervention group participants would be more likely to plan for some degree of alloparenting (shared care involving multiple adults and/or older children) after attending the workshop compared with before. It was expected that thinking about how high levels of social support facilitate responsive care would support plans to involve other adults and older children in infant care, as was the norm in ancestral societies.

Several open-ended items from the INFANT CARE section of the PIQ asked expectant mothers to describe caregiving arrangements during the early months post birth (*'The person/people who will spend the most time looking after my baby/pēpi during their first 4 to 6 months will be: [please write their name/s below and explain their relationship to your baby/pēpi]'*) and

the second half of the first year (*'The person/people who will spend the most time looking after my baby/pēpi from 6 to 12 months will be: [please write their name/s below and explain their relationship to your baby/pēpi]')*. These people were designated 'main caregivers'. 'Support caregivers' were also recorded in a table of: *'Other people who will care for my baby/pēpi regularly during the first 12 months'*, with columns for adding first names, relationship to baby/pēpi, and details of care (e.g., hrs per week).

Parenting From The Start

PARENTING STRATEGIES QUESTIONAIRE (PSQ 4-6mths)

Parenting practices differ. This questionnaire asks you about the parenting strategies you used during your pēpi/baby's first 4 to 6 months. *Please choose the answers that fit your situation best*. There are no right or wrong answers. Your answers will be combined with other people's data. Your name and date of birth will be kept private. *Please answer every question, even if you're not sure of the best answer*.

Personal Details (Parent)					
Full name:					
Date of birth:			Age:		
Gender:			Today's date:		
Ethnicity:					
Marital status:	Married/ civil union	Defacto partner	Divorced/ separated	Widowed	Single
Highest education:	Some high school	Finished high school	Certificate/ diploma/ apprenticeship	Undergraduate degree	Postgraduate degree
Family income: (per year, before tax)	Less than $20,000	$21,000 – $40,000	$41,000 – $60,000	$61,000 - $80,000	$81,000 or more

Contact Details			
Landline number:		Cell phone:	
Postal address:			
Physical address:			

Personal Details (Baby/Pēpi)	
Full name:	

Date of birth:		Baby's age now:	
Gender:		Ethnicity:	
Birth weight:		Gestation at birth:	

(Some questions taken from Narvaez, Wang, et al., 2013)

Section 1: Pregnancy, Labour and Birth

For each question, please circle the <u>one</u> answer that fits your situation best.

1. Prior to my pēpi/baby's birth day, I <u>planned</u> to spend my early labour:

At home	In a birth centre	In hospital	I planned a caesarean section without labour

2. In the event, I <u>actually</u> laboured:

At home	In a birth centre	In hospital	I didn't labour

3. Prior to labour beginning, I <u>planned</u> for my baby/pēpi to be born:

At home	In a birth centre	In hospital	Other _____

4. My baby/pēpi was <u>actually</u> born:

At home	In a birth centre	In hospital	Other _____

5. Prior to labour, I <u>planned</u> for my baby/pēpi to be born:

Vaginally	With forceps/suction	By caesarean section

6. My baby/pēpi was <u>actually</u> born:

Vaginally	With forceps/suction	By caesarean section

7. My labour was <u>induced</u> (that is, an attempt was made to start labour medically) using:

a) Prostin gel	Yes	No
b) Artificial rupture of membranes ('breaking the waters')	Yes	No
c) Oxytocin drip (e.g., 'syntocinon')	Yes	No
d) Cooks catheter	Yes	No

If yes, please specify when & why _____

8. I used/was given the following prescribed drugs or medications during labour and/or birth:

a) Entonox gas ('gas')	Yes	No
b) Fentanyl (IV opioid/opioid given through a drip)	Yes	No
c) Epidural (tube into epidural space near spine)	Yes	No
d) Spinal (one-off injection into intrathecal space near spine)	Yes	No
d) General anesthetic ('put to sleep')	Yes	No
d) Other (e.g., Remifentanyl PCA – patient controlled analgesia).	Yes	No

9. I experienced perineal damage (any 2nd to 4th degree perineal, labial, or vaginal tear, or episiotomy/cut) during the birth:

Yes	No

If yes, please indicate what kind: _____

10. I received medication after the birth (e.g., during suturing/while I was 'stitched up'):

a) Local anaesthetic (injected)	Yes	No
b) Spinal (if you had to go to theatre)	Yes	No
c) Entonox gas ('gas)	Yes	No
d) Panadol and/or voltaren ('diclofenac')	Yes	No

11. I had one or more non-medical support people (e.g., partner, family member, friend, doula) with me during labour and birth:

Yes	No

12. I had continuous support during labour and birth (i.e., someone with me whenever I wanted):

Yes	No

13. I enjoyed giving birth or found it empowering:

Yes	Some of the time	No

14. I found giving birth traumatic or distressing:

Yes	Some of the time	No

15. **Please describe the main positive factors that you believe affected your pēpi/baby's birth:**
(e.g., preparations during pregnancy, classes you attended, place of birth, support people/attendants, decisions you made before or during labour, use of a birth pool or other tools, etc)

16. My baby/pēpi was premature (born at less than 37 weeks gestation):

Yes	No

17. My baby/pēpi was admitted to the neonatal unit (NNU): *[please circle only one answer]*

Yes, within the first 6 hours	Yes, 6-24 hours after birth	Yes, between day 2 and day 7 (i.e., in the first week)	Yes, during the second week or later	My baby was not admitted to the NNU

If yes, please briefly explain why and for how long they remained in the neonatal unit:

18. During their first 24 hours, my baby/pēpi was held, cuddled, touched, or in physical contact with a parent or caregiver: *[please circle one, include any time spent breastfeeding in your total]*

Only briefly or not at all	For less than 3 hours total	for 3 to 6 hours total	for 6 to 9 hours total	for 9 to 12 hours total	for 12 to 15 hours total	for 15 to 18 hours total	for more than 18 hours

19. During an average day in the first month, my baby/pēpi was held, cuddled, touched, or in physical contact with a parent or caregiver: *[please circle one]*

Only briefly or not at all	For less than 3 hours total	for 3 to 6 hours total	for 6 to 9 hours total	for 9 to 12 hours total	for 12 to 15 hours total	for 15 to 18 hours total	for more than 18 hours

Section 2: Infant Feeding

20. My baby/pēpi received the substances below from and to the following ages: *[please insert age in weeks or months, or indicate if 'from birth' or 'to present' as applicable, e.g., from birth to 6 months]*

a) My breastmilk and/or colostrum	*From:*		*To:*		Never
b) Human donor milk and/or colostrum	*From:*		*To:*		Never
c) Infant formula	*From:*		*To:*		Never
d) Other foods ('solids')	*From:*		*To:*		Never

21. My baby/pēpi was exclusively breastfed (received no water, formula, solid food, or liquid, except human breastmilk and prescribed medications) for the first:

_____ days/weeks/months *[circle one]*	Still exclusively breastfed	Never exclusively breastfed

22. My baby/pēpi was partially breastfed (received a mixture of human breastmilk and alternatives such as artificial milk/formula or solid food) for the first: *[include any time using donor milk]*

_____ days/weeks/months *[circle one]*	Still partially breastfed	Never received breastmilk

23. During the first 5 to 6 months, my baby/pēpi was fed: *[please circle only one answer]*

'on demand' (whenever they wanted), sometimes multiple times an hour	**'on demand'** (whenever they wanted), rarely more than once an hour	**on a loose schedule**, (reasonably flexible, depending on their hunger/desire)	**on a strict schedule** (e.g., every 3-4 hours or at set times)

24. My baby/pēpi was fed during the night (i.e., between 10pm and 7am) until:

_____ days/weeks/months old *[please circle one]*	My baby/pēpi still feeds during the night

25. I wanted to breastfeed my baby/pēpi (partially or exclusively) for a total duration of:

Not at all	Less than 6 months	6 to 12 months	12 to 18 months	18 to 24 months	More than 2 years

26. **Please indicate whether you reached/are likely to reach your breastfeeding target and why or why not:**

_____

27. I was breastfed as a baby/pēpi: *[please select only one answer]*

Yes	Don't know	No

If yes, for how long? _____

28. Most of my closest friends and/or family members: *[circle more than one answer if your close friends and family/whānau are evenly split into two or more of these groups, otherwise circle just one]*

Breastfeed	Formula-feed	Feed breast milk & formula

Difficulties with breastfeeding

29. I experienced difficulty breastfeeding due to *[circle 'yes' for all the answers that apply]*:

a) Painful, squashed, or cracked/bleeding nipples	Yes	No
b) Insufficient breastmilk supply (not enough milk)	Yes	No
c) Latching problems (difficulty getting the baby 'on' properly)	Yes	No
d) Mastitis (breast infection)	Yes	No
e) Engorgement (hard, uncomfortable, 'overfull' breasts)	Yes	No
f) Other (e.g., lip/tongue tie, thrush infection) *Please specify*:	Yes	No

30. I had access to free or affordable consultations with a lactation consultant if needed:

Yes	No	Don't know

Indicate whether you needed this support and why: _____

_____

31. I had access to human donor milk (breastmilk from another person) if needed:

Yes	No	Don't know

32. I would have used human donor milk (breastmilk from another person) if it was readily available:

Yes	No	Don't know

Section 3: Infant Sleep

33. During the first 5 to 6 months, my baby/pēpi slept: *[please circle the best answer]*

a) In the same room as me (or another adult)	Never	Occasionally	Sometimes	Often	Always
b) In the same bed as me (or another adult)	Never	Occasionally	Sometimes	Often	Always
c) In a room by themselves	Never	Occasionally	Sometimes	Often	Always

34. My baby/pēpi moved into their own room when they were:

_____ days/weeks/months old *[please circle one]*	Still in with me or another adult	Shares with another child

35. Keeping my baby/pēpi close during the night (in the same **room**) was important to me:

Agree	Not sure	Disagree

36. Keeping my baby/pēpi close during the night (in the same **bed**) was important to me:

Agree	Not sure	Disagree

37. During the first 5 to 6 months, my baby/pēpi slept in/on:

a) A wahakura (flax basket) or moses basket	Never	Occasionally	Sometimes	Often	Always
b) A Pēpi Pod (lined box)	Never	Occasionally	Sometimes	Often	Always
c) A cot or basinet	Never	Occasionally	Sometimes	Often	Always
d) A couch, chair or beanbag	Never	Occasionally	Sometimes	Often	Always
e) A baby hammock	Never	Occasionally	Sometimes	Often	Always
f) An adult bed (raised off the floor)	Never	Occasionally	Sometimes	Often	Always
g) A futon or low bed (on or close to the floor)	Never	Occasionally	Sometimes	Often	Always
h) A sling, wrap, or baby carrier	Never	Occasionally	Sometimes	Often	Always
i) A caregiver's arms	Never	Occasionally	Sometimes	Often	Always

j) Other *(please specify)*	Never	Occasionally	Sometimes	Often	Always

38. During the first 5 to 6 months I put my baby/pēpi down to sleep:

a) On his/her *front*	Never	Occasionally	Sometimes	Often	Always
b) On his/her *back*	Never	Occasionally	Sometimes	Often	Always
c) On his/her *side*	Never	Occasionally	Sometimes	Often	Always

39. During the first 5 to 6 months my baby/pēpi had a sleep problem requiring expert input:

Yes	Not sure	No

If yes or not sure, please describe:

_____

40. During the first 5 to 6 months, I/we used 'cry it out' or 'sleep training' techniques (leaving my child/tamaiti to cry themselves to sleep):

Never	Once	A few times	Often	Very often

If you have tried 'cry it out' or 'sleep training' techniques please answer Questions 41 to 43.

41. Has sleep training been satisfactory for you and your child/tamaiti?

Yes	No	I'm not sure yet

42. How old was your baby/pēpi when you first tried sleep training? _____ month/s old.

43. Who recommended sleep training to you: *[please circle any that apply]*

A friend or family/whānau member	A *Well Child* nurse	A doctor or medical professional	A midwife	A book or magazine	Somebody on the internet	Other

Section 4: Infant Toileting

The following questions relate to your pēpi/baby's first 5 to 6 months of life

44. During the day, my baby/pēpi urinated ('did wees') and defecated ('did poos'):

a) In a single-use ('disposable') nappy	Never	Occasionally	Sometimes	Often	Always
b) In a re-usable ('cloth') nappy	Never	Occasionally	Sometimes	Often	Always
c) In a toilet, basin, potty, or container	Never	Occasionally	Sometimes	Often	Always
d) On a cloth or pad	Never	Occasionally	Sometimes	Often	Always
e) Other *(please specify):*	Never	Occasionally	Sometimes	Often	Always

45. During the night, my baby/pēpi urinated ('did wees') and defecated ('did poos'):

a) In a single-use ('disposable') nappy	Never	Occasionally	Sometimes	Often	Always
b) In a re-usable ('cloth') nappy	Never	Occasionally	Sometimes	Often	Always
c) In a toilet, basin, potty, or container	Never	Occasionally	Sometimes	Often	Always
d) On a cloth or pad	Never	Occasionally	Sometimes	Often	Always
e) Other *(please specify):*	Never	Occasionally	Sometimes	Often	Always

If your baby/pēpi wore nappies during their first 5 to 6 months, please answer Questions 46-47:

46. During the day (7am to 10pm), my baby/pēpi usually had their nappy changed:

Not at all	Once or twice a day	3 or 4x per day	5 or 6x per day	7 or 8x per day	9 or 10x per day	11 or more times per day

47. During the night (10pm to 7am), my baby/pēpi usually had their nappy changed:

Not at all	Once or twice a night	3 or 4x per night	5 or 6x per night	7 or 8x per night	9 or 10x per night	11 or more times per night

If you practiced infant toileting (also called 'elimination communication' or 'natural infant hygiene') during your pēpi/baby's first 5 to 6 months, please answer Questions 48 and 49:

48. During the day (7am to 10pm), my baby/pēpi was usually taken to the potty/toilet ('held out'):

Not at all	Once or twice a day	3 or 4x per day	5 or 6x per day	7 or 8x per day	9 or 10x per day	11 or more times per day

49. During the night (10pm to 7am), My baby/pēpi was usually taken to the potty/toilet ('held out'):

Not at all	Once or twice a night	3 or 4x per night	5 or 6x per night	7 or 8x per night	9 or 10x per night	11 or more times per night

Section 5: Caregiving context

50. I returned to work/study for _____ hours a week when my child/tamaiti was:

_____ days/weeks/months old *[please circle one]*	I have not returned to work/study

51. Please write how many hours your baby/pēpi spent in each of the following caregiving situations when they were 6 months old: *[Note: The total for each day should add up to at least 24 hours – more if multiple people cared for your baby simultaneously, such as when two caregivers were present]*

No. of hours cared for by:	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
a) Me (baby's mother)							
b) Baby's other parent							
c) Grandparent/s							
d) Other relative/s							
e) Friend or neighbour/s							
f) Paid 'nanny'							
g) 'In home' carer							
h) Kōhanga Reo							
i) Childcare centre							

The number of adults living in our house who helped care for the baby/pēpi was: _____

52. I felt I had excellent social/emotional support over the first 5-6 months of parenting:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

53. I felt I needed more support (e.g., practical, emotional, financial) in caring for my baby:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

Please describe _____

54. The person who spent the most time looking after my baby/pēpi during their first 5 to 6 months (that is, the primary caregiver) was: *[Please complete]*

Caregiver/s: *(e.g., me)*	
Relationship to baby/pēpi:	

If you had regular help in caring for your baby/pēpi, please answer Question 55.

55. The people who helped care for my baby/pēpi were a stable part of our lives during the first 5-6 months (that is, we saw them regularly and they were usually available when we needed them):

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

Section 6: Parenting Tools

56. I/we used the following parenting tools during the first 5 to 6 months:

a) Buggy or pram (with baby/pēpi facing me)	Never	Occasionally	Sometimes	Often
b) Buggy or pram (with baby/pēpi facing away)	Never	Occasionally	Sometimes	Often
c) Sling or wrap (e.g., Moby wrap, ring-sling)	Never	Occasionally	Sometimes	Often
d) Baby carrier (e.g., mei tai, Ergo, front pack)	Never	Occasionally	Sometimes	Often
e) Baby bottle & teats	Never	Occasionally	Sometimes	Often
f) Breast pump	Never	Occasionally	Sometimes	Often
g) Nipple shields (used during breastfeeding)	Never	Occasionally	Sometimes	Often
h) Cloth nappies	Never	Occasionally	Sometimes	Often
i) Pacifier ('dummy')	Never	Occasionally	Sometimes	Often

57. On an average day during the first 5-6 months, my pēpi/baby was carried (in arms or in a sling/wrap/carrier): *[do not include time spent holding your pēpi/baby while sitting still]*

More than 120 minutes (2 hrs) total	For 90 to 120 minutes (1.5 to 2hrs) total	For 60 to 90 minutes (1 to 1.5 hrs) total	For 30 to 60 minutes (0.5 to 1 hr) total	For less than 30 minutes total	Not at all

If you have used a sling, wrap, or baby carrier, please answer Questions 58 to 61:

58. I have used the following kinds of slings, wraps, or carriers over an extended period:

Name or description of sling/wrap/carrier: *e.g., Ergo, Moby wrap, ring sling, woven wrap…*	Type: *[please tick one]*		
	Sling	Wrap	Carrier

59. I had access to a sling, wrap, or carrier that was comfortable for me:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

60. I had access to a sling, wrap, or carrier that was comfortable for my baby/pēpi:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

61. I would recommend a sling, wrap, or carrier to other parents and caregivers:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

Please give a reason _____

Section 7: Feelings About Parenting

62. I am confident in my ability to parent well:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

63. I feel I have the knowledge I need to parent well:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

64. I believe that parenting well is important:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

65. I feel my baby/pēpi and I have a good relationship:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

66. I enjoy parenting:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

67. I am happy with the quality of care my baby/pēpi receives from others:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

68. I have attended the following courses to do with pregnancy and parenting:

Organisation (e.g., Barnardos, Brainwave)	**Name or class type** (e.g., antenatal class, workshop)	**When?** (e.g., during pregnancy)	**Was it useful?** (yes, no, somewhat)

69. I would like more parenting information:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

Please describe the kind/s of information that would be most useful to you at this point _____

_____

Section 8: Health of Baby/Pēpi

70. During the first 5-6 months, <u>my baby/pēpi experienced</u>:

a) 'Nappy rash' (painful sores on bottom)	Never	Occasionally	Sometimes	Often
b) Infant 'colic' (prolonged unexplained crying)	Never	Occasionally	Sometimes	Often
d) Eczema or dermatitis (red, itchy skin)	Never	Occasionally	Sometimes	Often
e) Asthma or allergies	Never	Occasionally	Sometimes	Often
f) Accidents or injuries requiring a doctor	Never	Occasionally	Sometimes	Often
g) Other health problems	Never	Occasionally	Sometimes	Often

Please describe _____

Section 9: Parenting Beliefs

For each question, please circle the one answer that best fits your views.

71. Over the first 12 months after birth:

a) It is best to respond to a baby/pēpi as quickly as possible	Agree	Disagree
b) Babies/ngā pēpi should not be held or carried too much	Agree	Disagree
c) Babies/ngā pēpi are better cared for if parents attend to their needs	Agree	Disagree
d) It is best to ignore the first few minutes of crying	Agree	Disagree
e) Babies/ngā pēpi can be spoiled by too much attention	Agree	Disagree
f) It is best to feed 'on demand' (i.e., whenever the baby/pēpi wants)	Agree	Disagree
g) The more responsive parents are, the less babies/ngā pēpi cry	Agree	Disagree
h) Babies/ngā pēpi should spend time in their own room	Agree	Disagree
i) Parents and other caregivers should be reliably responsive	Agree	Disagree
j) It is best to feed babies/ngā pēpi on a schedule	Agree	Disagree
k) All my pēpi/baby's needs should be met promptly	Agree	Disagree
l) Babies/ngā pēpi must learn independence as early as possible	Agree	Disagree
m) A baby/pēpi should be held and carried as much as they want	Agree	Disagree
n) Babies/ngā pēpi develop independence in their own time	Agree	Disagree
o) Babies/ngā pēpi need care at night as well as during the day	Agree	Disagree
p) Babies/ngā pēpi need to learn to wait for what they want	Agree	Disagree
q) Babies/ngā pēpi must be trained to sleep through the night	Agree	Disagree
r) Responding to crying makes babies/ngā pēpi cry more	Agree	Disagree
s) Babies/ngā pēpi should be kept comfortable at all times	Agree	Disagree
t) Babies/ngā pēpi cannot be spoiled by too much attention	Agree	Disagree

Thank you for taking part! Your answers are greatly appreciated :)

APPENDIX I: Final Questionnaire Including EDN Scale Items

Parenting From The Start

FINAL QUESTIONAIRE (12-18mths)

This questionnaire asks about your parenting experiences during your pēpi/baby's first 12 months. *Please choose the answers that fit your situation best*. There are no right or wrong answers. Your answers will be combined with other people's data and your name and date of birth will remain private. ***Please answer every question,*** *even if you're not sure of the best answer. Feel free to add notes to clarify your answer.*

Personal Details (Parent)					
Full name:					
Date of birth:			Age now:		
Gender:			Ethnicity:		
Marital status:	Married/ civil union	Defacto partner	Divorced/separated	Widowed	Single
Number of adults living in household:	1	2	3	4	5+
Highest education:	Some high school	Finished high school	Certificate/diploma /apprenticeship	Undergraduate degree	Postgraduate degree
Family income: (per year, before tax)	Less than $20,000	$21,000 – $40,000	$41,000 – $60,000	$61,000 - $80,000	$81,000 or more

Contact Details			
Landline number:		Cell phone:	
Postal address:			
Physical address:			

Personal Details (Baby/Pēpi)	
Full name:	
Date of birth:	

Gender:		Ethnicity:	
Birth weight:		Gestation at birth:	

PREGNANCY/HAPŪTANGA (NOTE: Highlighted items are part of the EDN Scale)

1. During your pregnancy with this child/tamaiti:		
a) Did you **often** feel stressed?	Yes	No
b) Did you **usually** feel safe?	Yes	No
c) Did you **usually** eat healthy food?	Yes	No
d) Did you **usually** do at least 30 minutes of exercise, 3 times a week?	Yes	No
e) Did you **sometimes** drink alcohol?	Yes	No
f) Did you **sometimes** use non-prescription drugs?	Yes	No
g) Did you **sometimes** smoke tobacco or cannabis?	Yes	No
h) Did you **prepare physically** for labour and birth? (e.g., yoga, stretching, Pink Kit exercises)	Yes	No
i) Did you **prepare emotionally** for labour and birth? (e.g., relaxation, hypnobirthing, visualisation, breathing, meditation)	Yes	No

LABOUR & BIRTH/TE WĀ WHAKAWHĀNAU

2. During your labour and birth:		
a) Did your labour begin **naturally** (without the use of drugs/gel)?	Yes	No
b) Did you **remain upright and/or move around** during labour?	Yes	No
c) Did you give birth at **home**?	Yes	No
d) Did you give birth in **hospital**?	Yes	No
e) Did you give birth in the **place of your choice**?	Yes	No
f) Were you free to labour or birth in **water** if you felt like it?	Yes	No
g) Did you **dislike** any of the health professionals who were involved?	Yes	No
h) Did you **distrust** any of the health professionals who were involved?	Yes	No
i) Was **anyone** present who made you feel uncomfortable?	Yes	No
j) Did you have a **caesarean section**?	Yes	No

k) Did you give birth **vaginally**?	Yes	No
l) Did you use **drugs or medications** during labour?	Yes	No
m) Was your baby/pēpi delivered with the help of **forceps or suction**?	Yes	No
n) Did you have one or more non-medical **support people** with you?	Yes	No
o) Were you supported **continuously** during labour and birth?	Yes	No
p) Did you feel **satisfied** with your labour and birth?	Yes	No

AFTER BIRTH/Ā MURI I TE WHĀNAU MAI O TE PĒPI

3. After birth (during the first week)		
a) Did your baby/pēpi breastfeed **within the first two hours** after birth?	Yes	No
b) Was your baby/pēpi skin-to-skin **for most of the first two hours**?	Yes	No
c) Did your partner or support person stay with you **overnight**?	Yes	No
d) Was your baby/pēpi offered **formula** during their first 7 days?	Yes	No
e) Was your baby/pēpi fed with a **bottle** during their first 7 days?	Yes	No
f) Did your baby/pēpi spend **most** of their awake time with you?	Yes	No
g) Were you **ever** separated from your baby/pēpi when s/he wanted you?	Yes	No
h) Was your baby **sometimes** out of earshot (while they were awake)?	Yes	No

INFANT SLEEP/NGĀ WĀ MOE O TE PĒPI

4. Did your baby/pēpi sleep in the **same room** as you...				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

5. Did your baby/pēpi usually sleep in the **same bed** as you...				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always

c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

6. Did you respond to your baby/pēpi **during the night** (e.g., feeding/toileting them?)				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

INFANT FEEDING/HE WHANGAI Ū

7. For how many months (0 to 12) during their first year did your baby/pēpi receive **human breastmilk** every day?												
0	1	2	3	4	5	6	7	8	9	10	11	12

8. For how many months (0 to 12) during their first year did your baby/pēpi receive **infant formula** every day?												
0	1	2	3	4	5	6	7	8	9	10	11	12

9. For how many months (0 to 12) during their first year was your baby/pēpi fed **on demand** (i.e., whenever they wanted, as often as they wanted) every day?												
0	1	2	3	4	5	6	7	8	9	10	11	12

10. For how many months (0 to 12) during their first year was your baby/pēpi fed **at the breast** (i.e., skin-to-skin with a caregiver, cradled in their arms) every day?												
0	1	2	3	4	5	6	7	8	9	10	11	12

11. For how many months (0 to 12) during their first year was your baby/pēpi fed **on demand** (i.e., whenever they wanted, as often as they wanted) every day?												
0	1	2	3	4	5	6	7	8	9	10	11	12

INFANT TOILETING/HE MIMI ME TIKO

12. For how many months (0 to 12) during their first year did your baby/pēpi urinate ('wee') or defecate ('poo') **in a toilet, potty, or similar** at least some of the time?											
0	1	2	3	4	5	6	7	8	9	10	11	12

13. Could you tell when your baby/pēpi **needed to urinate** ('wee')…				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

14. Could you tell when your baby/pēpi **needed to defecate** ('poo')…				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

15. Was your pēpi/baby's soiled nappy/clothing usually **changed within 5 minutes**…				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

INFANT CARE/MANAAKITANGA

NOTE: This section includes two EDN subscales: Positive Care (green) & Negative Care (pink)

16. Was your pēpi/baby handled **gently**…				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

17. How much were you able to **play with & talk to** your pēpi/baby…				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

18. Was your pēpi/baby **left to cry** (e.g., for more than 5 minutes without you)…				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

*This item was reverse-scored so that 0=always, 1=often, 2=sometimes, 3=never

19. Was your pēpi/baby **held or carried** (e.g., in arms or a sling/baby carrier)…				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

20. Was your pēpi/baby responded to **promptly** (within 5 minutes)…				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

21. Did you or a whānau/family member stay home with your pēpi/baby…				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

22. Did your pēpi/baby have **constant access** to a caregiver they loved…				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

23. How many **non-family caregivers** did your child/tamaiti have in total…						
a) from birth to 3 months?	1	2	3	4	5	6+
b) from 3 to 6 months?	1	2	3	4	5	6+
c) from 6 to 9 months?	1	2	3	4	5	6+
d) from 9 to 12 months?	1	2	3	4	5	6+

Note: Please include people who care for your child regularly, such as your child's teacher/carer at a centre or Kōhanga Reo, or a paid nanny/au pair/in-home carer.

24. Was your pēpi/baby **picked up when they cried**?				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

25. Was your pēpi/baby **yelled at**?				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

*This item was reverse-scored so that 0=always, 1=often, 2=sometimes, 3=never

26. Was your pēpi/baby **hit, thrown, or shaken**?				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

*This item was reverse-scored so that 0=always, 1=often, 2=sometimes, 3=never

SOCIAL SUPPORT/MANAAKITANGA

27. Did you have enough **practical support (**e.g., help with housework & cooking)…				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

28. Did you have enough **emotional support (**e.g., someone kind to talk to)…				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

29. Did you have enough **time for self-care (**e.g., showering, exercise, 'time out')…				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

30. Did you have **other adults** who shared the day-to-day parenting with you…				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

31. Could you afford **things you needed** for your baby/pēpi (e.g., food, clothes)…				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

INFANT HEALTH/HAUORA

32. Did your baby/pēpi have any **serious health problems** during their first year?	
Yes. *Please describe briefly:*	No

33. Did your baby/pēpi experience **nappy rash** (red skin/sores around genitals)…				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

34. Did your baby/pēpi have colic or **long bouts of unexplained crying**…				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

35. Did your baby/pēpi have **eczema or dermatitis** (red, itchy skin)…				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

36. Did your baby/pēpi have **asthma or allergies**…				
a) from birth to 3 months?	Never	Sometimes	Often	Always
b) from 3 to 6 months?	Never	Sometimes	Often	Always
c) from 6 to 9 months?	Never	Sometimes	Often	Always
d) from 9 to 12 months?	Never	Sometimes	Often	Always

APPENDIX J: Alternate Versions of the EDN Scale

EDN Subscales at Times 2 and 3

EDN Healthy Pregnancy. Maternal wellbeing prior to birth which was thought to relate to the evolved developmental niche was measured by 7 items at Time 3. Binary (yes or no) questions were presented to participants as part of the PREGNANCY/HAPŪTANGA section of the Final Questionnaire: 'During your pregnancy with this child/tamaiti: (a) Did you often feel stressed? (b) Did you usually feel safe? (c) Did you usually eat healthy food? (d) Did you usually do at least 30 minutes of exercise, 3 times a week? (e) Did you sometimes drink alcohol? (f) Did you sometimes use non-prescription drugs? (g) Did you sometimes smoke tobacco or cannabis? Each 'yes' answer was worth 1 point, while 'no' responses were given a score of zero. Items a, e, f, and g were reverse scored. Item scores were summed to give the EDN Healthy Pregnancy subscale score, which could range from a low of zero (worst fit with the evolved developmental niche) to four (best fit with the evolved developmental niche). We expected participants who had attended the Parenting From the Start antenatal workshop to score higher on this subscale given the attention to relationships between self-care during pregnancy and positive birth outcomes. These items do not appear on the Parenting Strategies Questionnaire (PSQ) completed at the home visit. Health during pregnancy is not assessed at Time 2.

EDN Natural Birth. Fit with an ideal prototype of 'natural' (physiologically-normal) ancestral birth was measured at Time 3 by a 9-item subscale of the EDN Scale which formed part of the Final Questionnaire section entitled: LABOUR & BIRTH/TE WĀ WHAKAWHĀNAU. Participants were given a binary choice of answer (yes or no) to the following questions: *'During your labour and birth: (a) Did your labour begin naturally (without the use of drugs/gel)? (b) Did you remain upright and/or move around during labour? (c) Did you give birth at home? (d) Did you give birth in hospital? (e) Did you give birth in the place of your choice? (f) Did you have a caesarean section? (g) Did you give birth vaginally? (h) Did you use drugs or medications during labour? (i) Was your baby/pēpi delivered with the help of forceps or suction?* Each 'yes' answer was worth 1 point, while 'no' responses were given a score of zero. Items d, f, h, and i were reverse scored. Item scores were summed to give the EDN Natural Birth subscale score, which could range from a low of zero (worst fit with the evolved developmental niche) to 9 (best fit with the evolved developmental niche). We hypothesised that participants who attended the *Parenting From the Start* antenatal workshop would score higher on this subscale, given their increased awareness of labour/birth from an evolutionary perspective.

The PSQ provides similar content to 8 out of 9 items of the *EDN Natural Birth* subscale. At Time 2, labour and birth was scored as beginning naturally (Q2a: 0=no, 1=yes) as long as participants did not report their birth was induced or delivery by caesarean section. No questions asked whether participants had remained upright and moved around during labour so this item (2b) was not able to be scored based on home visit data. With regards to the remaining items, participants were scored 1 point per answer on the *EDN Natural Birth* subscale if they gave birth at home (2c: 0=no, 1=yes), gave birth in the place of their choice (2e: 0=no, 1=yes), and/or gave birth vaginally (2k0=no, 1=yes). Reverse-scored items included

gave birth in hospital (2d: 0=yes, 1=no), had a caesarean section (2j: 0=yes, 1=no), used drugs or medications during labour (2l: 0=yes, 1=no), and instrumental birth (2m: 0=yes, 1=no).

EDN Early Proximity. Close physical proximity is a prerequisite for parental attunement and responsiveness. The extent to which mothers and babies were together or apart during the first week after birth was assessed at Time 3 by a 4-item subscale from the final questionnaire section entitled: AFTER BIRTH/Ā MURI I TE WHĀNAU MAI O TE PĒPI. Mothers who completed the assessment were asked: *'After birth (during the first week): (a) Was your baby/pēpi skin-to-skin for most of the first two hours? (b) Did your baby/pēpi spend most of their awake time with you? (c) Were you ever separated from your baby/pēpi when s/he wanted you? (d) Was your baby sometimes out of earshot (while they were awake)?*' Each 'yes' answer was worth 1 point, while 'no' responses were given a score of zero. Items c and d were reverse scored. Item scores were summed to give the EDN Proximity subscale score, which could range from a low of zero (worst fit with the evolved developmental niche) to 4 (best fit with the evolved developmental niche). We hypothesised that participants who attended the *Parenting From the Start* antenatal workshop would score higher on this subscale, given their exposure to previous research relating mother-baby closeness to positive outcomes and separations to increased infant stress.

Questions on the PSQ at Time 2 are not the same, but two items relate to early proximity: PSQ18. '*During their first 24 hours, my baby/pēpi was held, cuddled, touched, or in physical contact with a parent or caregiver… [please circle one, include any time spent breastfeeding in your total]'* and PSQ19. '*During an average day in the first month, my baby/pēpi was held, cuddled, touched, or in physical contact with a parent or caregiver… [please circle one]'.* Ordinal level responses were recorded on a 5-point scale with the following values: (0) Only briefly or not at all, (1) For less than 3 hours total, (2) For 3 to 6 hours total, (3) For 6 to 9 hours total, (4) For 9 to 12 hours total, (5) For 12 to 15 hours total, (6) 15 to 18 hours total, and (7) For more than 18 hours. Summing these two scores (possible range 0 to 14) provided a Time 2 proxy for the *EDN Early Proximity* subscale.

EDN Proximity & Responsiveness During Infant Sleep. Maternal proximity and responsiveness during infant sleep was assessed at Time 3 by the 12-item *EDN Sleep* subscale from the Final Questionnaire section entitled INFANT SLEEP/NGĀ WĀ MOE O TE PĒPI. This subscale consisted of three questions with four items each, covering room-sharing, bed-sharing, and night time responsiveness during each quartile of the first year:

1. *Did your baby/pēpi sleep in the **same room** as you (a) from birth to 3 months? (b) between 3 and 6 months? (c) between 6 and 9 months? (d) between 9 and 12 months?*
2. *Did your baby/pēpi sleep in the **same bed** as you (a) from birth to 3 months? (b) between 3 and 6 months? (c) between 6 and 9 months? (d) between 9 and 12 months?*
3. *Did you respond to your baby/pēpi **during the night** (e.g., feeding/toileting them?) (a) from birth to 3 months? (b) between 3 and 6 months? (c) between 6 and 9 months? (d) between 9 and 12 months?*

Answers were scored on 4-point likert scales anchored by descriptors: (0) Never, (1) Sometimes, (2) Often, and (3) Always. The EDN Sleep subscale score was obtained by summing all item scores, giving a possible range between zero and 36. High scores on the *EDN*

Sleep subscale were considered a closer fit with the human evolved developmental niche because they indicated closer physical proximity between mother and child and greater attention to meeting infant needs during the night.

The PSQ completed at Time 2 (home visit) included three questions about room-sharing, bed-sharing, and nighttime separations. PSQ33. *'During the first 5 to 6 months, my baby/pēpi slept… (a) in the same room as me (or another adult), (b) in the same bed as me (or another adult), and (c) in a room by themselves'*. Participants were asked to *'please circle the best answer'* from a 5-point likert scale anchored by descriptors, where 0=never, 1=occasionally, 2=sometimes, 3=often, 4=always. Item 33c was reverse-scored so that 0=always, 1=often, 2=sometimes, 3=occasionally, 4=never. The content and scoring was similar but not identical, so the sum of these 3 items is classed as an alternate form of the *EDN Sleep* subscale.

EDN: Responsive Infant Feeding. The fit between infant feeding approach and the evolved developmental niche was assessed at Time 3 via 3 items from the INFANT FEEDING/HE WHANGAI Ū section of the Final Questionnaire. The *EDN Feeding* subscale was computed by summing the 3 item scores. Possible responses to each item ranged from 1 month to 12 months (with half numbers permitted): 1*. For how many months (0 to 12) during their first year did your baby/pēpi receive human breastmilk every day? 2. For how many months (0 to 12) during their first year was your baby/pēpi fed 'on demand' (i.e., whenever they wanted, as often as they wanted) every day? 3. For how many months (0 to 12) during their first year was your baby/pēpi fed at the breast (i.e., skin-to-skin with a caregiver, cradled in their arms) every day?* Potential subscale scores ranged from zero to 36, with higher scores indicating a closer fit to the evolved developmental niche.

EDN-consistent infant feeding at Time 2 (home visit) was assessed using different questions, although some of the content was similar. Breastfeeding duration during the first 6 to 12 months was assessed by taking the longer of two responses: PSQ 21. '*My baby/pēpi was exclusively breastfed (received no water, formula, solid food, or liquid, except human breastmilk and prescribed medications) for the first ___ days/weeks/months [circle one]'* and PSQ22. *'My baby/pēpi was partially breastfed (received a mixture of human breastmilk and alternatives such as artificial milk/formula or solid food) for the first ___ days/weeks/months [circle one; include any time using donor milk].'* Other possible answers including '*Still exclusively/partially breastfed'* and *'Never exclusively breastfed/Never received breastmilk'.* The longer of these two answers produced a single breastfeeding item score (range 0 to 12, rounded down to completed half months where necessary). Duration of night feeding (PSQ24. *'My baby/pēpi was fed during the night, i.e., between 10pm and 7am) until ___ days/weeks/months [please circle one])* is also measured in completed half months, limited to a maximum of 12. Because the home visit was sometimes completed before babies turned one these items scores were sometimes truncated by lower infant age. The last item in this set was intended to capture the responsiveness of feed timing: PSQ23. *'During the first 5 to 6 months, my baby/pēpi was fed… [please circle only one answer]'.* The four multiple choice answers fell on an ordinal scale with assigned values of (3) *'on demand'* (*whenever they wanted), sometimes multiple times an hour*, (2) '*on demand' (whenever they wanted), rarely more than once an hour*, (1) *on a loose schedule (reasonably flexible, depending on their*

hunger/desire, and (0) *on a strict schedule (e.g., every 3-4 hours or at set times).*[156] The *EDN Feeding* subscale score for Time 2 is based on the sum of these three item scores (possible range 0 to 27, but truncated for infants aged less than 12 months at the home visit).

EDN Responsive Infant Toileting. At Time 3, maternal responsiveness to infant toileting was measured by the 13-item INFANT TOILETING/HE MIMI ME TIKO section of the Final Questionnaire, 12 to 20 months post birth. The first item asked: '*For how many months (0 to 12) during their first year did your baby/pēpi urinate ('wee') or defecate ('poo') in a toilet, potty, or similar at least some of the time?*' Participants responded by circling a whole number from zero to 12 to indicate the duration of parent support for elimination needs. The remaining 12 questions were in three sets, asking mothers to indicate how consistently they could identify toileting needs in each quartile of the first year for urination and defecation separately, and how promptly soiled nappies were changed. The first set asked: *'Could you tell when your baby/pēpi needed to urinate ('wee')... (a) from birth to 3 months? (b) between 3 and 6 month? (c) between 6 and 9 months? and (d) between 9 and 12 months?*'. The second set asked: '*Could you tell when your baby/pēpi needed to defecate ('poo')... (a) from birth to 3 months? (b) between 3 and 6 month? (c) between 6 and 9 months? and (d) between 9 and 12 months?*' And the third set asked: *'Was your pēpi/baby's soiled nappy/clothing usually changed within 5 minutes... wee')... (a) from birth to 3 months? (b) between 3 and 6 month? (c) between 6 and 9 months? and (d) between 9 and 12 months?*' Responses within each item/age range were scored on a 4-point likert scale from (0) Never, to (1) Sometimes, (2) Often, or (3) Always. The 13 items were then summed, giving an EDN Toileting subscale score between zero and 48.

At Time 2, maternal responsiveness to infant toileting during the first 5-6 months post birth was measured by 11 items from the PSQ. These differed from the items used at Time 3. The first set of questions asked about the frequency with which babies/pēpi urinated ('did wees') and defecated ('did poos') in the following locations 44. <u>During the day</u> and 45. <u>During the night</u>:

a) *In a single-use ('disposable') nappy*
b) *In a re-usable ('cloth') nappy*
c) *In a toilet, basin, potty or container*
d) On a cloth or pad
e) Other *(please specify):*

Responses were scored on 5-point likert scales anchored by descriptors: (0) Never, (1) Occasionally, (2) Sometimes, (3) Often, (4) Always. Items relating to nappy use (44a, 44b, 45a, & 45b) do not relate to infant toileting and are not included in the the *EDN Infant Toileting* subscale. The second set of questions asked how often babies/pēpi *'<u>usually</u> had their nappy changed'* 46. <u>During the day</u> (7am to 10pm), and 47. <u>During the night</u> (10pm to 7am). Participants were asked to answer questions 46-47 if their baby/pēpi wore nappies during their first 5 to 6 months. The third set of questions asked how often babies/pēpi *'was <u>usually</u>*

[156] Whereas hunter-gatherer groups invariably breastfeed infants 'on demand' and multiple times an hour, (male) behaviourists of the mid 20th century promoted scheduled feeding. Subsequent research on human lactation associates scheduling with milk supply issues as suckling is a 'demand and supply' system.

taken to the potty/toilet ('held out') 48. During the day (7am to 10pm), and 49. During the night (10pm to 7am). Participants were asked to answer questions 48-49 if they practiced infant toileting (also called 'elimination communication' or 'natural infant hygiene') during the first 5 to 6 months. Responses to questions 46 to 49 were scored on 7-point scales anchored by descriptors: (0) Not at all, (1) Once or twice a day/night, (3). 3 or 4x per day/night, (5) 5 or 6x per day/night, (7) 7 or 8x per day/night, (9) 9 or 10x per day/night, (11) 11 or more times per day/night. The home visit version of the *EDN Toileting* subscale was obtained by summing the scores from items 44c, 44d, 44e, 45c, 45d, 45e, 46, 47, 48 and 49 (possible range = 0 to 68).

EDN Positive Care. At Time 3 the quality of interaction was measured via INFANT CARE items from the final questionnaire 12 to 20 months post birth. Two EDN subscales captured elements of the human evolved developmental niche. The *EDN Positive Care* subscale covers aspects of caregiving considered to be of benefit to babies, while the *EDN Absence of Negative Care* subscale focuses on the extent to which babies experienced suboptimal caregiving during their first year of life.

The *EDN Positive Care* subscale is made up of six questions with four items each:

1. *Was your pēpi/baby handled **gently** (a) from birth to 3 months? (b) between 3 and 6 months? (c) between 6 and 9 months? (d) between 9 and 12 months?*

2. *How much were you able to **play with & talk to** your pēpi/baby (a) from birth to 3 months? (b) between 3 and 6 months? (c) between 6 and 9 months?* and *(d) between 9 and 12 months?*

3. *Was your pēpi/baby **held or carried** (e.g., in arms or a sling/baby carrier) (a) from birth to 3 months? (b) between 3 and 6 months? (c) between 6 and 9 months?* and *(d) between 9 and 12 months?*

4. *Was your baby/pēpi responded to **promptly** (within 5 minutes) (a) from birth to 3 months? (b) between 3 and 6 months? (c) between 6 and 9 months?* and *(d) between 9 and 12 months?*

5. *Did you or a family/whānau member stay home with your baby/pēpi (a) from birth to 3 months? (b) between 3 and 6 months? (c) between 6 and 9 months?* and *(d) between 9 and 12 months?*

6. *Did your baby/pēpi have **constant access** to a caregiver they loved (a) from birth to 3 months? (b) between 3 and 6 months? (c) between 6 and 9 months?* and *(d) between 9 and 12 months?*

Participants responded to each item using a separate four-point likert scale. Possible answers for each quartile of the infant's first year were: 0=never, 1=sometimes, 2=often, or 3=always. Subscale scores ranged from zero to 72, with higher scores indicating greater reported positive care. It was hypothesised that indices of positive caregiving would be greater in intervention group families than those assigned to the waiting list control group.

Subscale 7: *EDN Positive Care* was not assessed at the home visit.

EDN Absence of Negative Care. The EDN Absence of Negative Care subscale followed a similar structure, with four questions consisting of four items each, and each item relating to a quartile of the babies' first year:

1. *Was your baby/pēpi **left to cry** (e.g., for more than 5 minutes without you)... (a) from birth to 3 months? (b) between 3 and 6 months? (c) between 6 and 9 months?* and *(d) between 9 and 12 months?*

2. *Was your baby **picked up when they cried**? (a) from birth to 3 months? (b) between 3 and 6 months? (c) between 6 and 9 months?* and *(d) between 9 and 12 months?*

3. *Was your baby/pēpi **yelled at**... (a) from birth to 3 months? (b) between 3 and 6 months? (c) between 6 and 9 months?* and *(d) between 9 and 12 months?*

4. *Was your baby/pēpi **hit, thrown, or shaken**... (a) from birth to 3 months? (b) between 3 and 6 months? (c) between 6 and 9 months?* and *(d) between 9 and 12 months?*

Scoring for items 2 and 4 was identical to the *EDN Positive Care* subscale, from 4-point likert scales anchored by descriptors (0=never, 1=sometimes, 2=often, 3=always). Items 1 and 3 were reverse-scored (0=always, 1=often, 2=sometimes, 3=never) so that higher scores on the *EDN Absence of Negative Care* indicated healthier infant experiences and a better fit with the human evolved developmental niche. Thus, it was hypothesised that intervention group mothers would report higher scores on this scale as well. Possible scores ranged from zero to 48.

This domain was not assessed at Time 2, so there is no equivalent subscale for the home visit.

EDN Alloparenting and Social Support. Hypothesis 2 predicted the antenatal parenting intervention would alter parenting strategies across the infant's first year, increasing evolved parenting practices such as alloparenting. The extent to which mothers felt supported and assisted during their first year of caregiving was measured at two time points: on the *Parenting Strategies Questionnaire* (PSQ) at the home visit, and again in the SOCIAL SUPPORT/MANAAKITANGA section of the final questionnaire. The four questions (16 items) on the final questionnaire make up one subscale of the *EDN Scale.* This is reported first to complete the review of EDN subscales.

The *EDN Social Support* subscale consists of four questions asking about practical support, emotional support, time for self-care, and shared caregiving respectively. Each question contained four items covering the quartiles of babies' first year:

1. *Did you have enough **practical support** (e.g., help with housework & cooking)… (a) from birth to 3 months? (b) between 3 and 6 months? (c) between 6 and 9 months? (d) between 9 and 12 months?*

2. *Did you have enough **emotional support** (e.g., someone kind to talk to)... (a) from birth to 3 months? (b) between 3 and 6 months? (c) between 6 and 9 months? (d) between 9 and 12 months?*

3. *Did you have enough **time for self-care** (e.g., showering, exercise, 'time out')... (a) from birth to 3 months? (b) between 3 and 6 months? (c) between 6 and 9 months? (d) between 9 and 12 months?*

4. *Did you have **other adults** who shared the day-to-day parenting with you... (a) from birth to 3 months? (b) between 3 and 6 months? (c) between 6 and 9 months? (d) between 9 and 12 months?*

Responses within each age range (item) were scored on a 4-point likert scale anchored by the descriptors (0) Never, (1) Sometimes, (2) Often, and (3) Always. The 4 items were then summed, giving possible subscale scores between zero and 48. Intervention group mothers were expected to score higher than control group mothers on this subscale due to the attention paid to improved child outcomes associated with increased social support in the *Parenting From the Start* workshop.

Perceived social support was measured at Time 2 (home visit) by two questions on the PSQ: '*I felt I had excellent social/emotional support over the first 5-6 months of parenting'* (0=strongly disagree, 1=disagree, 2=not sure, 3=agree, 4=strongly agree) and '*I felt I needed more support (e.g., practical, emotional, financial) in caring for my baby*' (reverse-scored so that 4=strongly disagree, 3=disagree, 2=not sure, 1=agree, 0=strongly agree). The second question included additional space for participants to describe the kinds of additional support that would have been useful. These two items were summed to provide a Time 2 proxy for the *EDN Social Support* subscale.

Regular care by people other than a child's parents and assistance during parenting were measured in several other ways at the home visit and final assessment, providing additional information about alloparenting and social support in this sample.

Section 5 (Caregiving Context) of the *Parenting Strategies Questionnaire* (PSQ) included a range of questions relating to infant care. The extent to which caregiving was shared with other adults and older children was assessed by inviting mothers to: '*Please write how many hours your baby/pēpi spent in each of the following caregiving situations when they were 6 months old: [Note: The total for each day should add up to at least 24 hours – more if multiple people cared for your baby simultaneously, such as when two caregivers were present]'*. Participants entered the number of hours each day their baby was cared for by: *(a) Me (baby's mother), (b) Baby's other parent, (c) Grandparent/s, (d) Other relative/s, (e) Friend or neighbour/s,* a *(f) Paid 'nanny', (g) 'In home' carer, (h) Kōhanga Reo,* or *(i) Childcare centre*. Participants also reported the '*number of adults living in their house who helped care for the baby/pēpi'* in an open-ended item. While acknowledging the potential for alloparenting, the assumption was made that babies still had one or more primary caregivers. The PSQ asked mothers to indicate: '*The person who spent the most time looking after my baby/pēpi during their first 5 to 6 months (that is, the primary caregiver)'* by filling in a box asking for the '*Caregiver/s (e.g., me)'* and '*Relationship to baby/pēpi*'. The unclear wording referenced both

a single 'person' and the potential for multiple 'caregiver/s'. Mothers were asked to answer an additional question if they had *'regular help in caring for* [their] *baby/pēpi'*, using a 5-point likert scale to indicate their level of agreement with the statement '*The people who helped care for my baby/pēpi were a stable part of our lives during the first 5-6 months (that is, we saw them regularly and they were usually available when we needed them)'.* Possible answers were scored as 0=strongly disagree, 1=disagree, 2=not sure, 3=agree, 4=strongly agree.

Additional data from the final assessment (Time 3) provides information about care across the whole of the first year. The final questionnaire asked mothers to record the number of **non-family** caregivers each child/tamaiti had in total during each quartile of the first year: '*How many **non-family caregivers** did your child/tamaiti have in total (a) from birth to 3 months? (b) between 3 and 6 months? (c) between 6 and 9 months? (d) between 9 and 12 months?'*. Respondents were asked to '*Please include people who care for your child regularly, such as your child's teacher/carer at a centre or Kōhanga Reo, or a paid nanny/au pair/in-home carer.'* Possible answers ranged from zero (only family caregivers) to '6+'.

APPENDIX K: Secondary Health Outcomes

Place of Birth

Retrospective self-reports on planned and actual place of birth. Both variables were entered as ordinal level data ranging from the least to most medical setting: (1) home, (2) birth centre, or (3) hospital.

Birth Outcomes

This section covers the kinds of birth mothers reported (vaginal, instrumental, or surgical) on the *Parenting Strategies Questionnaire* (PSQ) when babies were 6 to 16 months old as well as medications and other medical interventions associated with labour or birth. Hypothesis 3 predicted that women who attended the *Parenting From the Start* workshop would experience higher rates of vaginal birth and fewer birth interventions than mothers randomly assigned to the control group during pregnancy. The percentage of mothers reporting vaginal delivery and various interventions (e.g., inductions, epidurals, caesarean sections) were classed as secondary outcome measures. Analyses comparing the intervention and control groups were pre-planned, with significance testing (e.g., t-tests) where possible.

Rates of Intervention

It was predicted that intervention group participants would experience fewer interventions than control group participants. This was assessed with a one-sided Independent Samples t-test looking at the sum of 16 interventions, that is, how many of the interventions were experienced, on average, within each study condition. The *Parenting Strategies Questionnaire* asked whether labour was induced (that is, an attempt was made to start labour medically) using: (1) Prostin gel, (2) artificial rupture of membranes (ARM), (3) oxytocin drip (e.g., 'syntocinon'), or (4) Cooks catheter. After specifying when and why if appropriate, mothers were asked whether they used or were given the following prescribed drugs or medications during labour and/or birth: (5) Entonox gas, (6) Fentanyl (IV opioid/opioid given through a drip), (7) Epidural (tube into epidural space near spine), (8) Spinal (one-off injection into intrathecal space near spine), (9) general anaesthetic ('put to sleep'), (10) or another intervention during labour or birth (e.g., Remifentanyl PCA - patient controlled analgesia). Augmentation was not specifically assessed, but was coded in the 'other' category. Mothers were asked to indicate whether their baby was born by (11) caesarean section or (12) with the help of forceps/suction as well as which of the following interventions were used after birth: (13) Local anaesthetic (injected), (14) Spinal (had to go to theatre), (15) Entonox gas, (16) Panadol &/or voltaren ('diclofenac').

Potential differences between study conditions were examined in greater detail by considering three categories of medical intervention separately: interventions to start labour, interventions during labour and birth, and interventions occurring after birth.

Interventions to Start Labour. The first of the more detailed analyses examined births that were induced medically rather than starting in their own time: planned caesareans and inductions. The *Parenting Strategies Questionnaire* asked mothers to record their pre-birth intentions via a multi-choice question: '*Prior to labour, I planned for my baby/pēpi to be born:* (1) *Vaginally*, (2) *With forceps/suction*, or (3) *By caesarean section*. Induction of labour was examined via responses to the statement '*My labour was induced (that is, an attempt was made to start labour medically) using…*' with four binary (yes/no) options, indicating whether *Prostin gel*, *artificial rupture of membranes ('breaking the waters')*, *Oxytocin drip (e.g., 'syntocinon')*, or *Cooks catheter* were employed to encourage labour to begin. Births were coded as starting medically if they were induced or planned caesareans. I expected the percentage of births starting medically to be lower in the intervention group than the control group.

Interventions During Labour. The second of the more detailed analyses examined medical interventions that occurred after labour began, including instrumental and surgical births (both planned and emergency). Rates of caesarean section were assessed via another multiple choice item on the PSQ: *'My baby/pēpi was actually born:'* (1) *Vaginally*, (2) *With forceps/suction*, or (3) *By caesarean section*. Non-surgical interventions during labour were examined via responses to the statement '*I used/was given the following prescribed drugs or medications during labour and/or birth…'.* There were six binary (yes/no) options, indicating whether the following interventions were experienced: (1) *Entonox gas*, (2) *Fentanyl (IV opioid/opioid given through a drip)*, (3) *Epidural (tube into epidural space near spine)*, (4) *Spinal (one-off injection into intrathecal space near spine)*, (5) *General anaesthetic (GA: 'put to sleep'), or (6) another intervention during labour or birth (e.g., Remifentanyl PCA - patient controlled analgesia)*. Augmentation of labour via a synthetic oxytocin drip (e.g., 'to speed up a slow labour') was not specifically assessed, but was coded in the 'other' category when mentioned in participants' written comments.

Interventions After Birth. The third of the more detailed analyses examined medical interventions that occurred after birth, as recorded at the home visit on the *Parenting Strategies Questionnaire*: (11) Local anaesthetic (injected), (12) Spinal (had to go to theatre), (13) Entonox gas, and (14) Panadol &/or voltaren ('diclofenac').

Health Outcomes: Admissions to the Neonatal Unit (NNU)

Hypothesis 3 included the prediction that those who attended the antenatal parenting workshop would report fewer admissions to the neonatal unit (NNU). The percentage of infants admitted to the newborn intensive care unit was a secondary outcome measure based on maternal report. Mothers were asked whether their baby was born prematurely (prior to 37 weeks gestation) and whether their baby was admitted to NNU (neonatal unit) on the *Parenting Strategies Questionnaire* (PSQ). Brief details were invited alongside the multiple choice answers: (0) no, (1) After the first week, (2) Between days 2 and 7, (3) 6 to 24hrs after birth, and (4) Within the first 6 hours.

Health Outcomes: Infant Colic

Hypothesis 3 predicted that babies in the intervention group would experience less colic than those in the waiting list control condition. Colic was assessed by maternal report at two time points: at the home visit 11 to 24 months old (PSQ), and at the final assessment 11 to 22 months post birth (EDN scale). Given the exploratory nature of the research, it was unclear which measurement would be most appropriate – one closer to the early months when colic symptoms are considered to be more common, or later when mothers may be getting more sleep and have a wider perspective.

Time 2: Home Visit. In the Health of Baby/Pēpi section of the *Parenting Strategies Questionnaire* mothers were asked to select the most appropriate answer from a four-point likert scale: *'During the first 5-6 months, my baby/pēpi experienced infant 'colic' (prolonged unexplained crying)…* (0) *never,* (1) *occasionally,* (2) *sometimes,* or (3) *often.* These ratings were coded as a quasi-continuous scores ranging from zero to 3. Data was available for all 46 mothers who completed the home visit.

Time 3: Final Assessment. The Infant Health/Hauora section of the *Evolved Developmental Niche* scale asked mothers to complete four relevant questions: *'Did your baby/pēpi have colic or long bouts of unexplained crying... (a) from birth to 3 months? (b) between 3 and 6 months? (c) between 6 and 9 months? (d) between 9 and 12 months?'* Possible answers on the four-point likert scales were: (0) *never,* (1) *sometimes,* (2) *often,* or (3) *always.* These ratings were coded as quasi-continuous item scores each ranging from zero to 3 and then summed. The resulting 'colic (first year)' variable had a possible range of zero to 12, and was intended to provide an estimate of the extent to which mothers remembered long bouts of unexplained crying across the quartiles of the first year.

Health Outcomes: Infant Feeding

This section looks at descriptive statistics relating to infant feeding including breastfeeding goals and whether they were met, various problems that interfered with breastfeeding experiences, and planned analyses comparing breastfeeding exclusivity and duration in the intervention and control groups. Artificial formula use was also examined across study conditions.

Breastfeeding Duration. Hypothesis 3 included the prediction that babies in the intervention group would receive greater exclusivity and duration of breastfeeding than those in the control group. This secondary outcome measure involved comparing the percentage of infants who were partially/fully/exclusively breastfed at various ages according to mother's report on the *Parenting Strategies Questionnaire* (PSQ) and *Evolved Developmental Niche Scale* (EDN Scale). Assessments took place at the home visit 11-24 months post birth (PSQ), and during the clinic assessment 11-22 months post birth (EDN Scale). Planned analyses involved significance testing (e.g., t-test) to compare intervention and control groups

Breastfeeding duration was measured by an item on the EDN Scale: *'For how many months (0 to 12) during their first year did your baby/pēpi receive human breastmilk every day?'*, with multiple choice answers ranging from 1 month to 12 months (whole numbers).

Duration of Formula Use. Use of artificial breastmilk substitutes was measured on the INFANT FEEDING section of the final questionnaire: '*For how many months (0 to 12) during their first year did your baby/pēpi receive infant formula every day?'*. Possible answers ranged from zero to 12 months, rounded to completed half months. Formula use that occurred only during the first fortnight after birth was scored 0.1 for every 3 day period including formula.

Exclusive Breastfeeding. Exclusive breastfeeding was measured on the INFANT FEEDING section of the PSQ. The question: '*My baby/pēpi was exclusively breastfed (received no water, formula, solid food, or liquid, except human breastmilk and prescribed medications) for the first…'* was followed by three multiple choice options: (a) __ *days/weeks/months [circle one]*, (b) *Still exclusively breastfed*, and (c) *Never exclusively breastfed*. Surrounding questions asked about initiation/duration of infant formula and other foods as well as partial breastfeeding. Possible answers varied depending on babies' ages at the time of the home visit, and were rounded down to completed half months. Breastmilk use that occurred only during the first fortnight after birth was scored 0.1 for every 3-day period including breastmilk.

Health Outcomes: Postnatal Depression

A secondary outcome measure registered with the ANZCTR was the percentage of mothers with scores over 10 on the *Edinburgh Postnatal Depression Scale (EPDS).* This screening test was an optional part of the home visit 11-24 months post birth, so was not completed by all participants. Scores of 10 or more (out of 30) may suggest postnatal depression and warrant further investigation. Hypothesis 3 included the prediction that mothers in the intervention group would be less likely to suffer from postnatal depression than those randomly assigned to the control group. Planned analysis consisted of significance testing (e.g., t-tests) to compare intervention and control groups. Actual EPDS scores were also compared as the interval level data enabled increased statistical power.

APPENDIX L: OMOSAR Clinical Manual

Instructions for Raters

The Observational Measure of Sensitivity and Responsiveness (OMOSAR) requires both observational and interviewing skills. The person conducting visits is referred to as a 'rater' to emphasise their role in collating information from their observations *and* caregivers' answers to support ratings for each category of interest. Raters must also be skilled at setting family members at ease without endorsing or challenging any opinions expressed by the caregivers. If participants ask what is involved in this assessment, say you would like to see them interacting with their baby as they usually do and doing whatever their baby needs. If you are treated like a visitor, use your judgement as to what is culturally and socially appropriate in order to help the family relax into their usual routine. Ask what kinds of things they might normally do at the time of day you are visiting, and encourage them to go ahead and do those. If your presence is obviously constraining the behaviour of caregivers, ask if it would be possible to observe the dyad playing or feeding. That is, prompt them to engage in one of the behaviours you wish to observe, without influencing *how* they engage in it. Be careful not to make assumptions about how the infant will be fed or treated.

The OMOSAR scoring guide shows each of the six caregiving domains. For each domain, select the number that most closely describes the infant-caregiver dyad you are observing. You must select one answer for every category. Although you are looking at relational behaviour, the focus of scoring is on the caregiver rather than the infant. Try not to evaluate: just observe and describe what you see by picking the closest description. Each category is scored once for daytime behaviour, and then again for night time behaviour. You may give half points (e.g., 3.5) to indicate that a particular dyad falls above one score but below another.

Make your assessment based on observed behaviour wherever possible. If relevant interactions are not observed, ask questions and base your score on your overall impression, giving due weight to what you have observed and the credibility of information provided through self-report. Example questions are provided for the semi-structured interview.

Scoring

Caregivers are given separate scores for *sensitivity* and *responsiveness* within each of the six domains, using 5-point likert scales 'anchored' to behavioural descriptions. Thus, there are twelve categories covering daytime caregiving, and another twelve scores relating to night time parenting. Within each category, a score of '5' indicates high *sensitivity* or *responsiveness* in that domain, and lower scores suggest lower sensitivity or responsiveness. All scores are provided by an expert rater immediately after the home visit, reducing the effects of self-report such as social desirability bias.

It is crucial that raters are familiar with the variability when it comes to infant feeding (breast, lactation aid, cup, spoon, syringe, bottle), toileting (taking baby to the toilet, holding baby over a potty or bucket, holding baby over a basin or outside, using single-use nappies or cloth nappies, changing immediately, leaving the baby in a soiled nappy, ignoring or anticipating

need to eliminate, responding to infant cues), and sleep (use of a wahakura, moses basket, Pēpi pod, bassinet, or cot, use of infant sleeping bags or blankets, carrying in a sling or carrier, co-sleeping or putting the baby to bed in their own room, bed-sharing or utilising a 'side-car' cot). All interactions with participants must be warm, non-judgemental, and respectful in order to facilitate rapport. It is not the rater's place to comment on any aspect of parenting.

Example Questions for Semi-Structured Interview

Initial explanation for participants
The purpose of this home visit is to learn more about your parenting: what you have been doing and how it is working out for you. We are also interested in knowing who shares in the caregiving, and any differences between how you parent at night and how you parent during the day. *To start with we have a few general questions, and then some questions about specific topics such as feeding and toileting. We know that there is no one 'right' way to care for a child, and we're grateful you're helping us learn more about parenting in NZ.*
General questions
Has your baby been well? Any colds/sickness/recent immunisations? *Who is involved in the regular day-to-day care of your child?* *Who cares for your child at night?*
1. Physical Comfort
<u>*Sensitivity*</u> (understanding of baby's needs/wants) *How do you know if your child:* • *is too hot or too cold or uncomfortable in some way?* • *wants to get out of their car seat/pram/high chair/etc?* *Does your child mind getting dressed or undressed, or having their nappy changed? Are they wriggly? How do you manage that?* <u>*Responsiveness*</u> (observed and reported behaviour) *What do you usually say and do if your child seems uncomfortable? Can you give an example?* *Would you notice if your child was uncomfortable during the night (e.g., blankets too tight)? How would you respond?*

2. Physical & Emotional Affection

<u>*Sensitivity*</u> (understanding of baby's needs/wants)
What do you appreciate/enjoy about your child?
Do they like to be close to you a lot? How do you know?
How can you tell when they want to be picked up, held, or cuddled?
Are you somebody who likes physical contact/are you an affectionate person?
Do you worry about spoiling your baby?

<u>*Responsiveness*</u> (observed and reported behaviour)
What do you do when your baby wants physical or emotional affection?
How do you show love?
If your baby wants to be with you during the night (e.g., held, carried, touched, stroked), how do you usually respond?
Do/did you ever breastfeed to sleep?

3. Play & Interaction

<u>*Sensitivity*</u> (understanding of baby's needs/wants)
How do you know when your baby wants to play or interact?
What kinds of games does s/he like?
How can you tell when your baby needs a break from interacting?
Do you use baby sign language/does your baby indicate what they want with gestures? (Can you give some examples…)

<u>*Responsiveness*</u> (observed and reported behaviour)
Do you have time to play with your baby each day? (What gets in the way?)
What kinds of games have you played in the last few days?
If your baby wants to interact with you during the night (e.g., smiled at, talked to), how do you usually respond?

4. Feeding

<u>*Sensitivity*</u> (understanding of child's needs/wants)
How do you know when your child wants to eat/feed?
How do you know when s/he has had enough?

<u>*Responsiveness*</u> (observed and reported behaviour)
How often do you feed your child? Does it vary?
What do they eat? What happens if they don't like it? What do you do?
Who decides when it's time for a feed (you or them)?
If your child wants food or drink during the night, how do you usually respond?

5. Toileting

Sensitivity (understanding of baby's needs/wants)
Can you tell when your baby needs to wee/poo?
Have you noticed any consistent signals? Have these changed over time?
How often does s/he eliminate? Has this changed over time?
How can you tell if his/her nappy/clothes are wet/soiled?

Responsiveness (observed and reported behaviour)
What do you do when your baby needs to poo/wee (e.g., take them to the toilet or not)*?*
Do they wear nappies? How often do you change their nappy?
If your baby needs to eliminate (wee or poo) during the night, how do you usually respond?
Have you always done that?
Are they wet in the morning?
When do you plan to begin 'toilet training' or offering the potty? Why then? What method will you use and why?

6. Sleep

Sensitivity (understanding of baby's needs/wants)
How do you know when your baby is getting tired?
Where do they sleep during the day/at night?
How far from you are they during daytime naps? Are they within earshot?
Could you hear them if they cried during the night? What would you do then?
How did you decide where your baby would sleep?

Responsiveness (observed and reported behaviour)
What do you do when your baby is tired?
How do you decide how often they should sleep? Do you have a schedule or do you follow your baby's schedule?
If your baby needs help to fall asleep during the night, how do you usually respond?

OMOSAR Scoring Guide

1. PHYSICAL COMFORT	
Sensitivity	**Responsiveness**
1. Insensitive Caregiver appears oblivious to infant's physical comfort. Does not indicate through body language, actions, or words that the baby's need for comfortable clothing, position, movement & environment has been recognised; or seems to lack compassion or the ability/inclination to consider the child's perspective and needs.	1. Unresponsive Caregiver fails to respond to infant's need for physical comfort; or appears unkind or neglectful in this regard. Vocalisations, body language, or other signs suggesting discomfort may be ignored. Infant may show signs of being too hot or too cold, or be left restrained (e.g., in a car seat or high chair) despite protestations.
2. Slightly sensitive Some of the infant's physical preferences are recognised, but many are not, or are ignored/disregarded. Caregiver may sometimes appear to misunderstand infant and this is not resolved quickly. Caregiver may not recognise infant's need to move their body to develop strength and coordination.	2. Slightly responsive Some of the infant's physical preferences are responded to, but some are not; or the response appears somewhat unkind/thoughtless. Caregiver may ignore needs or repeatedly offer the wrong thing; or respond grudgingly. Child may be physically constrained for lengthy periods. Distress may or may not be evident.
3. Somewhat sensitive Infant's physical needs and preferences are mostly recognised, although subtle expressions of physical discomfort may be missed.	3. Somewhat responsive Infant's physical comfort is often acknowledged and attended to, but care may be less warm, consistent, prompt, &/or skilful than a 4.
4. Quite sensitive Caregiver appears attuned and actively tries to determine what their baby wants. Any misunderstandings are brief and resolved quickly (within a few minutes). Caregiver appears compassionate & mostly able to 'read' how child feels &/or predict what is needed.	4. Quite responsive Caregiver ensures the infant is physically comfortable most of the time. The infant is provided with opportunities to move their body freely & look around while awake (e.g., through appropriate 'floor freedom').
5. Very sensitive Caregiver appears consistently aware of infant's physical comfort (e.g., whether their temperature, clothing and physical environment is comfortable). Able to 'put themself in their baby's shoes'. Attuned to baby's moment-by-moment desires, such as contentment with physical freedom or need to be held securely (e.g., 'swaddled').	5. Very responsive Caregiver is emotionally warm and consistently maintains the infant's physical comfort. May anticipate needs and/or respond appropriately to infant feedback. Caregiver responds to infant's needs promptly, reliably & willingly. Caregiver behaviour comes across as genuinely kind & compassionate. Baby has plenty of opportunities to move their body when they're in the mood.

2. PHYSICAL & EMOTIONAL AFFECTION	
Sensitivity	**Responsiveness**
1. Insensitive Caregiver appears oblivious to infant's emotional needs; or disregards/devalues infant's preferences for some reason. Does not indicate through body language, actions, or words that the baby's desire for emotional connection or physical contact has been noted or recognised as reasonable. May appear to be a lack of compassion for, or interest in, child.	1. Unresponsive Caregiver fails to respond to infant's needs for emotional connection, affection, hugs, smiles, or other contact; or appears to thoroughly dislike such contact or to feel it must be ignored. Vocalisations/body language suggesting a 'bid for contact' are routinely ignored/rejected. Or, if baby is passive, a marked lack of physical/emotional affection despite opportunities.
2. Slightly sensitive Some of the infant's needs/requests (smiles, invitations to hug, kiss, be close) are *recognised*, but some are not. Caregiver may appear to consistently misunderstand infant; or devalues infant communication or preferences, e.g., smiles or gurgles are often ignored.	2. Slightly responsive Some of the infant's smiles/requests are *responded to*, but some are not, or are overtly rejected. Caregiver may sometimes persist in offering the wrong thing (or give no response). There may or may not be obvious distress on the part of the infant. Few displays of affection.
3. Somewhat sensitive The infant's needs/requests (smiles, invitations to hug, kiss, be close) are generally *recognised,* although more subtle requests may sometimes be missed, especially when attention is divided.	3. Somewhat responsive The infant's emotional needs are often met, but responses may be slower, less consistent, or less warm/skilful than a 4, especially when the caregiver's attention is divided.
4. Quite sensitive Most of the infant's needs are understood & acknowledged. Caregiver appears attuned and actively tries to determine what their baby wants. Any misunderstandings are brief and resolved quickly. Appears fairly compassionate and aware of infant even when managing competing demands, but less so than 5.	4. Quite responsive Most of the infant's needs are met, even when attention is divided. Caregiver is emotionally warm/ kind. Any misunderstandings are brief and resolved quickly. Infant clearly feels comfortable seeking physical &/or emotional comfort as necessary, although they may not require much. Less skilful or prompt than 5.
5. Very sensitive Caregiver appears highly attuned and aware of infant's need for affection, emotional connection and physical contact. Virtually every infant request is acknowledged (e.g., by actions, words, or body language). Caregiver is highly motivated to figure out what baby wants, skilful at seeing infant's perspective and sensitive to their preferences. Appears to know child well & willing to follow child's lead wherever possible.	5. Very responsive Caregiver consistently offers physical contact or other affection as the infant requires, and may anticipate needs – e.g., offering hugs or other physical affection before it is 'asked' for. Responsive to infant feedback, so contact is effective and interactions are mutually rewarding. Highly motivated to be affectionate on baby's terms. Relationship appears warm, comfortable, and 'in sync'.

3. PLAY & INTERACTION	
Sensitivity	**Responsiveness**
1. Insensitive Caregiver appears oblivious to infant's desire to play/engage; or devalues interaction. There may be no indication (e.g., through body language, actions, or words) that opportunities for play or communication are recognised by the caregiver. Caregiver may lack compassion or seems to resent infant's demands for attention.	1. Unresponsive Caregiver fails to anticipate/respond to infant's needs for play and one-on-one interaction; or there are no signs of play/interaction. Vocalisations or body language suggesting a desire to interact are routinely ignored/responded to negatively; or, infant exhibits a notable and pervasive lack of interest in caregiver, despite opportunity to play.
2. Slightly sensitive Some of the infant's smiles, requests, invitations to play or interact are *recognised*, but some are not. Caregiver may appear to misunderstand infant or be oblivious to/reject opportunities for interaction. E.g., smiles are often ignored. Possible resentment or lack of compassion.	2. Slightly responsive Some of the infant's smiles/requests/invitations to play or interact are *responded to*, but some are not; or the emotional climate of the play is negative. Caregiver may persist in offering the wrong thing despite feedback; or, markedly low levels of interaction/play in this dyad.
3. Somewhat sensitive The infant's requests for play or interaction are generally *recognised,* although more subtle signals may sometimes be missed, especially when attention is divided.	3. Somewhat responsive Communication is effective at least some of the time and there are some instances of play and/or interaction that are enjoyable/satisfying for the baby. Less smooth and/or skilful than a 4.
4. Quite sensitive Most of the infant's desires are understood and acknowledged. Caregiver appears attuned and actively tries to determine what their baby wants. Any misunderstandings are brief and resolved within a few minutes. Caregiver displays a willingness to interact &/or play	4. Quite responsive Most of the infant's invitations are met with warmth & kindness. Caregiver may anticipate needs and initiate or offer play/interactions before they are 'asked' for. Many positive interactions are observable. This dyad communicates effectively most of the time.
5. Very sensitive Caregiver appears highly attuned to infant and aware of the need for play and interaction. Communication is mutually understood and almost always effective (e.g., baby sign is used). Virtually every infant request is acknowledged, either by the caregiver's actions or her/his words, vocalisations, or body language. Caregiver appears highly motivated to figure out when & how infant wants to play/engage/interact. Caregiver is skilful at seeing infant's perspective and sensitive to their preferences.	5. Very responsive Caregiver responds to virtually all smiles or other 'invitations' promptly and/or anticipates the baby's need for play and interaction. 'Serve and return' interactions are characteristic. Caregiver may initiate games, but once begun they follow the infant's cues, with warmth, flexibility, smoothness and appropriate pacing. Responsive to feedback, so misunderstandings are brief. Highly motivated to play or engage with infant. Mutually-rewarding interactions are a noteworthy feature of this relationship.

4. FEEDING	
Sensitivity	**Responsiveness**
1. Insensitive Caregiver appears oblivious to infant's need/desire to eat/drink/feed/nurse. Signals may not be recognised, and/or the baby's need/desire is treated as aversive, unpleasant, annoying, or unreasonable.	1. Unresponsive Caregiver fails to anticipate and/or respond to the infant's need/desire to eat, feed or nurse. Signals suggesting hunger or a need for comfort at the breast may be ignored; or responses may be inappropriate or very delayed.
2. Slightly sensitive Some of the infant's hunger signs are *recognised*, but many are not. Caregiver may misunderstand infant; or respond negatively (e.g., as if feeding is aversive/unpleasant/annoying/unreasonable), but less so than 1.	2. Slightly responsive Some of the infant's hunger signs *responded to*, but many are not. Caregiver may stick to an inappropriate schedule; or persist in offering the wrong thing; or the interactions appear awkward/slow/erratic/ uncomfortable/rigid.
3. Somewhat sensitive Caregiver is aware of need to feed/nurse, although may be distracted or out of sync with baby at times. Less attuned/positive than a 4.	3. Somewhat responsive The infant is offered snacks, breast or alternative (e.g., bottle) reasonably regularly, but this may be more rigid/less 'on demand'; or less prompt/skilful/warm than a 4.
4. Quite sensitive Caregiver appears relatively attuned and mostly recognises when the baby needs/wants to eat or feed. The infant's desire is interpreted as reasonable and positive, and is acknowledged compassionately (e.g., "You're hungry aren't you, I'll feed you in just a moment"). Less sensitive than 5.	4. Quite responsive The infant is offered snacks, breast or alternative (e.g., bottle) regularly and at least to some extent 'on demand'. Caregiver may anticipate needs, and mostly responds to any 'requests' by the infant fairly promptly (e.g., within 5 minutes). Less warm/smooth/skilful/prompt/reliable than a 5.
5. Very sensitive Caregiver appears highly attuned to infant and aware of need to eat/nurse for hunger and/or comfort. Notices subtle signals (e.g., recognises body language such as turning head to breast or sucking on a finger as indicating a need to feed). Does not wait for baby to cry. Caregiver is skilful at seeing infant's perspective and sensitive to their preferences. Babies over 6 months may not be given everything they want, but this is handled tactfully, and caregiver aims to meet their needs promptly and reliably. Obvious compassion for child. Alert to infant feedback, so misunderstandings are brief.	5. Very responsive Caregiver routinely responds to infant's needs/requests by offering a snack, the breast, or an alternative within a few minutes, or (for an older child) an appropriate explanation of why they must wait or accept something else. Caregiver may anticipate a desire to eat or nurse. Highly motivated to feed 'on demand' even if this involves nursing for long periods, at inconvenient time(s), or multiple times an hour. Skillfully negotiates resistance/preferences. Feeding interactions characterised by smoothness, good pacing, and mutual enjoyment. Responses are prompt/warm/kind.

5. TOILETING	
Sensitivity	**Responsiveness**
1. Insensitive Caregiver appears oblivious to infant's elimination signals and slow to notice wet/soiled nappies. Or, if recognised, the infant's elimination is treated as aversive, unpleasant, annoying, or unreasonable.	1. Unresponsive Caregiver does not respond to infant's need/desire to eliminate and is slow to change nappies. Baby may or may not appear distressed, and may or may not signal (baby's may give up signalling if it hasn't 'worked' in the past).
2. Slightly sensitive Caregiver does not recognise toileting signs, but notices fairly quickly (e.g., within ten minutes) that baby has eliminated or nappy is wet/soiled. Increase by 0.5 if caregiver sometimes notices *during* infant's elimination.	2. Slightly responsive No toileting opportunities are offered but nappy is changed more frequently than 1 (e.g., checked every 1-2 hours during the day or changed at least once overnight). Or less warm/kind version of 3.
3. Somewhat sensitive Caregiver is aware of infant's need to be clean, and appears willing to facilitate this. Routinely notices *during* elimination; or soon afterwards (e.g., within a few minutes).	3. Somewhat responsive Toilet opportunities sometimes offered; or nappy is changed immediately/quickly (e.g., within a few minutes) if wet/soiled. Caregiver is warm/matter-of-fact about infant's elimination.
4. Quite sensitive Caregiver appears reasonably attuned and mostly recognises when the baby wants to eliminate (e.g., signals such as wriggling during a feed, crying repeatedly, screwing up face, going red, touching ear). The infant's desire is interpreted as reasonable and positive, and is acknowledged compassionately (e.g., "You need to wee don't you, I'll just get your potty?"). May be distracted at times or less aware than 5.	4. Quite responsive The infant is offered a hygienic opportunity to eliminate reasonably regularly (e.g., at least 6 times per day, or 1+ times during the night if baby needs to go). Caregiver may anticipate needs, and/or respond to signals. Nappy is changed promptly if necessary. Responses may be less compassionate/prompt/ smooth/skilful/reliable than a 5.
5. Very sensitive Caregiver appears 'in tune' with infant and displays an awareness of elimination patterns and the infant's perspective. Virtually every infant need/request is acknowledged (e.g., by the caregiver's actions, words, or body language). Caregiver notices subtle signals (such as wriggling, rubbing eyes, going red, or twisting away from the breast) rather than waiting for baby to cry. Distress is treated as communication. Caregiver is highly motivated to provide a hygienic place to eliminate.	5. Very responsive Caregiver suggests/offers appropriate toileting opportunities. Caregiver may anticipate baby's need to eliminate (e.g., offering within a few minutes of waking up after a sleep), and/or respond to infant vocalisations, body language, or other signals. Successfully offers a hygienic place to eliminate most days when baby is well (i.e., baby actually wees/poos when the opportunity is provided), and sometimes much more often. Skilfully negotiates resistance/preferences. Toileting interactions are characterised by smoothness &/or tact.

6. SLEEP	
Sensitivity	**Responsiveness**
1. Insensitive Caregiver appears oblivious to infant's need/desire to sleep or rest; or unaware of developmentally-appropriate amounts/patterns of sleep at a particular age/stage. Or, if recognised, the infant's needs are treated as aversive, unpleasant, annoying, or unreasonable.	1. Unresponsive Caregiver does not respond to infant's need/desire to sleep or rest at a frequency/duration appropriate to current age/stage. Signals suggesting tiredness may be ignored, and/or inappropriate strategies are used.
2. Slightly sensitive The caregiver displays some recognition that infant needs to sleep/rest, and plans for it, but this may be based on a schedule rather than awareness of the baby. Caregiver may not recognise baby's tiredness signals in the moment, or take account of contextual factors such as sickness. Sleep expectations may be unrealistic given baby's age/stage/etc.	2. Slightly responsive Caregiver makes some effort to respond to infant's need to sleep/rest, but their efforts are unsuccessful, inconsistent, poorly coordinated, or lacking in compassion (e.g., failing to nurse, carry or offer a place to sleep). S/he/they may sometimes respond inappropriately (e.g., trying to play, keep the baby awake), without good reason.
3. Somewhat sensitive Caregiver is somewhat attuned to infant's need to sleep and has some awareness of factors such as tiredness signals, appropriate sleep patterns, and how the context may affect infant, but less attuned or positive than a 4.	3. Somewhat responsive Caregiver demonstrates some plan when it comes to infant sleep, but may more rigid/less baby-led or less prompt/skilful/warm than a 4. May have limited number of sleep strategies (e.g., no backup plan if the usual strategy fails).
4. Quite sensitive Caregiver appears relatively attuned to sleep needs and/or baby's tiredness signals. The infant's needs and preferences are interpreted as reasonable and positive, and are acknowledged compassionately (e.g., "You're tired aren't you, snuggle here"). Less warm/skilful than a 5 in recognising and anticipating infant's needs.	4. Quite responsive The infant is offered appropriate opportunities to sleep given their current age/stage/state of wellness/etc. Caregiver may have multiple strategies, such as nursing the baby to sleep, placing them in a sling, going for a walk/drive, or putting them down calm and comfortable (in a cot). Less warm/prompt/skilful than 5.
5. Very sensitive Caregiver appears 'in tune' with infant. Highly motivated to meet infant's needs. Anticipates need to sleep/rest and recognises subtle body language (such as looking away, eyes closing or getting 'heavy'). Consistently compassionate and skilful at seeing infant's perspective.	5. Very responsive Caregiver consistently and kindly provides appropriate opportunities to sleep/rest. May anticipate needs and/or respond appropriately, promptly, and consistently to signals/feedback. Baby is not left to cry. Resistance/preferences are handled tactfully.

APPENDIX M: Final Assessment Protocol

Parenting From The Start

FINAL ASSESSMENT PROTOCOL (12-18mths)

The final assessments for the *Parenting From the Start* study have two main components: an observational assessment of the attachment relationship between mother and child, and questionnaires. Approximately half of each 60-minute laboratory assessment will involve running the mother and baby through Ainsworth's *Strange Situation* Procedure (SSP), which will be videod and scored later to assess attachment. The remainder of each session will consist of the mother filling out her final study questionnaires (the *EDN Scale* and *ACE Scale)*, thanking her for her participation, debriefing, and answering any questions. The equipment and research team members needed for the final assessments are summarised in Table M1. The elements of the final assessment are shown in Table M2.

Table M1.

Summary of Strange Situation Procedure

Episode	People	Description	Purpose
1	Host leaves mum & baby	Introduce mother and baby to the room (1 minute)	Observe amount and quality of child play/exploration & interaction with mum
2	Mum & baby	Mother and baby settle in (3 minutes)	Observe amount and quality of child play/exploration & interaction with mum
3	Mum, baby & Stranger	Introduction of a Stranger (3 minutes)	Observe changes in play, amount and type of attention child pays to Stranger in comparison to mum, & how child accepts the Stranger's attempts to interact
4	Mum leaves baby & Stranger	First separation (up to 3 minutes – cut short if baby is very upset)	Observe child's response to mother leaving, child's play/exploration in comparison to earlier, & how child responds to Stranger (e.g., comfort, being held, attempts to interact)
5	Baby & mum, Stranger leaves	First reunion (3 minutes)	Observe child's response to mother's return & their subsequent interaction
6	Mum leaves baby alone	Second separation (up to 3 minutes – cut short if baby is very upset)	Observe child's reaction to mother leaving (e.g., distress, search behavior) & quality of play/exploration while alone
7	Baby & Stranger	Stranger returns (up to 3 minutes – cut short if baby is very upset)	Observe how child responds to Stranger upon reunion & amount/quality of play (to compare with mother's reunions)

8	Baby & mum, Stranger leaves	Second reunion (3 minutes)	To observe child's response to mother's return, their subsequent interactions, & whether/how baby returns to play.

A number of people are involved in these assessments: the lead researcher (Leith), the assessor (Morri), and at least two research assistants (RAs). This document outlines their various roles and responsibilities as well as describing the processes to be used. Tables 2, 3 & 4 form a fidelity checklist which is completed for each assessment to allow us to measure consistency across procedures when multiple research assistants are taking turns at roles such as the 'Stranger' and 'host'. The following sections summarise the *Strange Situation Procedure*, final questionnaires, and debrief/ending of the session.

Strange Situation Procedure

Room Set-Up. Two adjacent office-sized rooms are used, connected by a one-way mirror window. The assessor is located in the darkened room from which s/he can view the procedure without interfering with the behaviour of parent and infant. Two chairs are placed opposite the door to the testing room - one for the child's primary caregiver and another for a "Stranger" - separated so one can tell who the baby is looking at. About 1 step away from both chairs towards the middle of the room, there is a set of toys. Two or three video cameras with microphones record the full 21-minute procedure from different angles to ensure the baby is visible throughout. The participant's name and study ID are displayed so that the research team can enter data correctly.

Overview. The *Strange Situation Procedure* consists of eight episodes presented in standard order, and videoed to allow for later scoring and classification by a trained assessor. The episodes are designed to progressively activate the infants' attachment system. The procedure is conducted when the baby is between 9 and 20 months old, to see what kinds of relational expectations the baby has developed over their first year or so. This procedure is the 'gold-standard' measure of infant attachment internationally, but has rarely been used in New Zealand. Using the *Strange Situation Procedure* will help us learn more about the kind of support and resources local Manawatū families benefit from, because it predicts a range of later outcomes.

After being introduced to the testing room, the baby is observed with his/her mother in an unfamiliar but unthreatening environment. The mother is asked to settle her baby into play with a standard set of attractive toys, and then return to her chair to read a magazine. While the mother is still present, a Stranger[157] enters and makes a gradual approach – first sitting quietly in the other chair, then talking to the mother, then attempting to play on the floor with the infant. After this, the mother leaves the room, returning up to 3 minutes later. This brief separation is cut short (e.g., to 30 seconds) if the baby is very upset or the mother wishes

[157] To provide consistency with previous research, all the 'Strangers' used in this study present as women. Exploring the effects of the Stranger's gender on the procedure is beyond the scope of this project.

to return early. The Stranger quietly slips out, and a few minutes later the mother leaves a second time. This time the Stranger returns first, to distinguish between the baby's response to being left alone and the baby's desire for his/her mother specifically. Once the Stranger has returned to her chair, the mother returns for a second reunion episode, and then encourages her child to return to play for the final minutes.

This protocol is based on the original procedure used by Mary Ainsworth, as described in the classic edition of the book *Patterns of Attachment* (Ainsworth et al., 2015). Instructions are based on those used in the *Minnesota Longitudinal Study* (Sroufe et al., 2005b), which in turn was based on the *National Institute of Child Health and Human Development Study of Early Child Care*, a ten site national study conducted by leaders in the field of infant/child development.

Questionnaires

Once the *Strange Situation Procedure* has been completed, each study mother completes two final questionnaires. The first, labelled 'final questionnaire', is really the EDNS (*Evolved Developmental Niche Scale*), which has been purpose-designed to capture each participant's experiences of parenting over their baby's first year of life, and the extent to which these conform with or deviate from the ancestral practices babies have evolved to expect. The second, the ACE (*Adverse Childhood Experience)* Scale, asks retrospectively about the mother's own experiences as a child.

Debriefing

Mothers who attend these final assessments may have questions about the activities. Unless these are about the procedure (i.e., what is going to happen), research assistants should refer these to the lead researcher rather than attempt to discuss the purpose of the assessments, etc, during the session. It's fine to acknowledge that it feels very artificial to follow the scripted procedure, and that most people find it slightly uncomfortable to be videoed. The reason it's so proscribed is so that we see each baby in a similar context. You may also like to mention that the videos will not be assessed until a later date, and that Leith will inform all participants of the key findings when the research is complete.

Because this is a randomised controlled trial with two groups, only about half of the participants will have attended the *Parenting From the Start* workshop and received their free resources at the point they complete these final assessments. It is important that Morri does not know which people are in which group, so that the information cannot bias his scoring. For this reason, please don't mention the workshops to participants. All participants in the *Parenting From the Start* study are eligible for a free one-on-one consultation with Leith if they would like to discuss their baby's video and/or parenting in general. End the session by thanking each participant for their time! We are so grateful for their involvement.

Final Assessment Summary

Mum's name:		Study ID:	
Baby's name:		Baby's age:	
Location:	*Psychology Clinic*	Date & time:	

Table 2.
Checklist Showing Roles & Equipment Needed for Final Assessments

Role	**Description**	**Person**
Researcher	Runs study; schedules participants (study mums); not present for SSP	*Leith*
Assessor	Oversees filming; manages timing & ticks off completed tasks on checklist; makes decisions re cutting episodes short; scores videos	*Morri*
Host	Greets study mums & interacts/gives scripted instructions	
Stranger	Out of sight initially; interacts with mum & baby according to SSP script	
Filmer	Films SSP from observation room, ensuring clear shot of baby's face	
Equipment	**Purpose**	**Check**
Video cameras (x3)	To record SSP from within testing room (x2) and through one-way mirror window from observation room (x1)	
SD cards (x3)	To install in video cameras. 3 in cameras plus spares	
Stop watches (x2)	Used by assessor (& observer as back-up) to schedule espisodes & time knocks on wall (e.g., to signal mum to leave)	
Standard set of toys	To promote exploration by infant. Includes large soft doll, ball, ring stacker, shape sorter, Duplo train & blocks, & Lamaze baby toy	
Mat	To go under toys and protect baby from carpet/carpet from spills	
Scripts (x4)	Details the procedure and tells research team what to say & do at each stage	
Magazines (x2)	For mother and Stranger to pretend to read during procedure	
Instructions for mother (Beginning)	Prompt sheet left on chair at start of procedure to remind mother what she should be doing and let her know what will happen next.	
Instructions for mother (Middle)	Prompt sheet given to mother during procedure to remind her what she should be doing and let her know what will happen next.	

Table 3.
Checklist of Final Assessment Tasks in Chronological Order

Person	Advance tasks to book participants and prepare equipment	Check
Leith	Email participant to let them know their final assessment is approaching. Describe procedure (particularly SSP), parking, etc	
Leith	Make date & time for 60 minute appointment at *Massey Psychology Clinic*	
Leith	Book research assistants (at least 2 plus Morri, but 3 is better)	
Leith	Ensure all research assistants have signed *Confidentiality Forms*	
Morri	Charge video camera batteries	
Morri	Download videos to Macbook & check recordings work (sound & video)	
Morri	Check stop-watches are working (install fresh batteries if necessary)	

Person	Preparation on the day	Check
	Set up rooms for *Strange Situaton Procedure*:	
Morri	- Clear out any unnecessary furniture from testing room (TR)	
Morri	- Remove curtain rail & store neatly in observation room (OR)	
Morri	- Tie back curtain in observation room	
Morri	- Place two chairs in position in testing room	
Morri	- Label chairs as 'mother'& 'Stranger' (Stranger goes nearest door)	
Morri	- Position toys equidistant from the two chairs, on mat, about 80cm away	
Morri	- Place doll, shape sorter, ball, & ring stacker next to Duplo box	
	Set up video cameras, speakers, and microphones in testing room:	
Morri	- Turn on room speakers (in observation room)	
Morri	- Check participants can be heard in filming room (& NOT vice versa)	
Morri	- Check SD cards are installed, with sufficient memory for no. of procedures	
Morri	- Check video cameras show correct date and time	
Morri	- Check video camera on correct recording settings (Auto, 1080/60i)	
Morri	- Plug in microphones and check battery light flashes when switching on	
Morri	- Do test recording to check both sound & video are working	

Morri	- Position video cameras in testing room	
Morri	- Plug in testing room video cameras using multiplug	
Morri	- Turn on power to cameras in testing room (at wall)	
Morri	- Put up plywood box wall to protect cameras & block off radiator	
Morri	- Check cameras show chairs, toys, & door (height 60cm approx.)	
Morri	- Set up observation room camera (with SD card) & plug in	

Person	**Tasks immediately before assessment**	**Check**
Morri	Write date & names/ID number/B's age on whiteboard (bottom half only)	
Morri	Check date, names, ID, etc are clearly visible on camera screens	
Morri	Place magazine & first prompt sheet on mother's chair	
Morri	Give host her script & the second instruction sheet for the mum (middle)	
Morri	Give Stranger her instruction sheet & a watch/clock so she can track time	
Morri	Fill out the *Assessment Summary* sheet for the next participant	
Morri	Ensure there are copies of the two questionnaires ready to go	
Morri	Ensure the Stranger is out of sight prior to the procedure	

Note: It is critical that the mother and baby do not see the Stranger prior to the procedure, and that no other family members or close friends are in the building. If the baby knows that friends or relations are nearby it can destroy the validity of the procedure (e.g., if the baby trys to get out the door to find them).

Table 4.

Strange Situation Procedure Script

Person	Tasks/Episode	Check
Host	*Greet mother on arrival. Make small talk. Escort her to observation room.* "Hi. It's good to see you, Mum and Toddler. Did you find us okay?" *Chat with mother while helping her into the building.* "I am supposed to be neutral around Toddler, so I won't be talking to him/her very much. It's hard to do and it may seem strange, so I wanted you to know what I'm doing and why."	
Host	"Ok, let's put all of your things in this room, and I'll tell you what we are going to do today. Most of the session will be in the room next door, but please can you leave your bag and coats in here. If you've brought toys from home, we'd like you to leave them here because we want all children to use the same toys. If you have a dummy (pacifier), please leave that here too, because we want a clear camera shot of Baby's face." Before we get started, does Baby need to be fed or changed? Would you like to use the bathroom?" *Give mum time to get herself & baby comfortable.*	
Morri	***Start recording on back-up video camera (in observation room)***	
Morri	***Start recording on main video cameras (in testing room).*** *Check that both cameras and the microphones are going!*	
Morri	*Check that date, names, ID, clock, chairs, toys, and door are all shown clearly on video camera screens.*	
Morri	*Turn testing room screens away so they don't distract the infant during the SSP.*	
Host	"We are going to start with an activity where we want to see how Baby responds to a new place and a Stranger both when you are with him/her and when he/she is alone. This part will take about 20 minutes and will involve you getting Baby settled in the room, Baby playing with you in the room, and a Stranger coming in. The Stranger is a member of our *Parenting From the Start* research team." "The Stranger will sit quietly sometimes, talk to you sometimes, and play with Baby sometimes. You will leave Baby in the room with the Stranger for a few minutes. Then you will come back in the room for a few minutes. For a short time, both you and the Stranger will leave the room and both of you will eventually return to be with Baby. When you leave the room, you'll come back in here and can see Baby through the one-way mirror window." "Children have different reactions to this procedure. Some get upset, some think it's fun and play the whole time, and others don't seem to care either way. If Baby is very upset for 30 seconds, we'll speed up and move to the next part. We'd really like to get through the whole task, but of course, you can ask us to end a part early or to end the whole procedure if you want."	
Host	"I know this is a lot of information; we'll give you reminders of what to do right before each part, but for now do you have any questions about the general plan?"	

	*Answer any questions and then **point out the first prompt sheet (on mum's chair)** & placement of cameras while Morri finishes turning them on.* *CHECK THE CAMERAS ARE ALL RECORDING BEFORE PROCEEDING!*	
Episode 1: Introduce mother and baby to the room (1 minute).		
Host	**"**OK. Let's head over now. I'd like you to carry Baby into the main (testing) room. That's the room you'll mostly be in, and whenever you leave you can return to this (observation) room to watch." "We'd like you to put Baby down near the toys and get him/her settled and interested in some of them. Then, sit in this chair and read a magazine. If your baby starts to talk or interact with you, **respond as you normally would, then return to reading your magazine.** There are instructions on the seat to remind you what is going on for this part. The Stranger will join you in a few minutes and tell you what's next". *Point out toys & parent's chair, saying* "please get your child settled playing with the toys and then sit here [*indicate mother's chair*].	
Episode 2: Mother and baby settle in (3 minutes).		
Dyad	*Infant explores. Mum assists only if necessary.*	
Episode 3: Introduction of a Stranger (3 minutes):		
Stranger	*Stranger enters and sits quietly in her seat looking at a magazine for 1 minute before continuing (check the clock to keep track of time & avoid a reminder knock)*	
Stranger	*After 1 minute has passed, the Stranger says:* "Hello, my name is [x] and I'm playing the role of the Stranger", *and then talks briefly about innocuous topics (how cute the baby is, whether baby has been well lately).* *Then says:* "We use knocks on the window to know when to start each part. In a minute we'll hear a knock that means it's time for me to play with Baby for a minute. The next knock will mean it's time for you to leave the room. Try to leave quickly, and if you have a purse, please take it with you. Head back to the observation room next door, and [host] will tell you what to do next. So, basically wait for the second knock and then leave. Do you have any questions?"	
Morri & Stranger	*FIRST KNOCK: Stranger gets down on the floor and attempts to interact with infant, commenting on toys s/he has previously shown interest in. (1 min)*	
Episode 4: First separation (up to 3 minutes – cut short if there is 30 seconds of hard crying that does not ease or mother wishes to return early):		
Morri, Host, Stranger	*SECOND KNOCK: Mum gets up & walks quickly to door, leaving infant with Stranger. (If she doesn't, Stranger quietly remind her: "Ok, you can go the observation room now. Please shut the door carefully").* *Host collects mum from door & closes door immediately so that baby can't escape(!). Ensure the door 'clicks' closed.*	
Stranger	*Stranger comforts baby if necessary, gets baby settled playing with toys, and then returns to her seat and pretends to read magazine.*	

	IDEAS FOR BRIEFLY TRYING TO GET BABY RE-ENGAGED WITH TOYS: say baby's name from a distance, smile, ask 'may I have a turn', offer them a toy, drop shapes in sorter box. Continue to play with child until child is settled into playing/exploring. Don't keep playing too long though – you should be back in your seat well before mum returns. *If child approaches/initiates interaction while you're sitting reading, respond briefly as mum was instructed to, then return to your magazine. Comfort child if distressed by mother leaving (you may pick up, soothe, etc). Try to arrange play/comfort so child is facing door when mother returns. (If baby is distressed, experimenter may terminate this part before 3 minutes are over).*	
Host	*Meanwhile, in video room: Host tells mum:* "Hi there. We hope to get to the end of each part. This will last 3 minutes unless Baby gets upset in which case I'll send you back in early. You can also tell me if you want to go back in early." "When I tell you to go, knock on the door firmly, say Baby's name, then go back into the room. Pause briefly inside the door to see what Baby does, then pick her/him up if they want. Then do what seems natural, eventually trying to get Baby to play again so you can return to your chair and act like you did before." (*If mum was very involved with toys before say:* "Once you've re-introduced your child to the toys, avoid initiating play yourself. Just respond briefly to Baby if he/she interacts with you, then return to reading your magazine)." "When you hear the knock on the wall, leave the room and come here just like you did last time." ***Hand over mother's instruction sheet for middle of procedure*** *and say:* "This sheet is a reminder of what to do next." *(If Baby cries, get mum's opinion:* "Do you think we should give the Stranger a few more seconds to try to comfort Baby, or should we have you go back in now?")	
Episode 5: First reunion (3 minutes):		
Host	*Host escourts mum back to door of testing room and says:* "Ok, go in now."	
Mother	*Mother knocks on door, calls baby's name, and enters. Pauses at door for 10 seconds to see what baby will do. Interacts as they usually would with infant, then returns to seat and reads magazine.*	
Stranger	*Stranger waits unobtrusively while mum and baby are reunited, to avoid interfering with reunion. Either retreat to your chair or stay quietly where you are out of the way. Wait until the reunion is complete and mum has returned to her chair, then leave quietly. Or if Mum and Baby continue to play on floor or walk around room for a while, leave quietly after 30-40 seconds. Be absolutely certain that you do not interfere with our ability to observe the greeting, initial proximity seeking/ avoidance behavior, and whether or not child settles.* *Stranger returns to observation room. Morri will tell you when it is time to go back in. Mother and child remain together in the testing room for 3 minutes.*	

Episode 6: Second separation (up to 3 minutes – cut short if there is 30 seconds of hard crying that does not ease or mother prefers it is shortened):		
Morri	*KNOCK: Parent gets up and leaves infant alone in room.* *Child is alone for 3 minutes (unless cut short by Morri, who is timing with stop watch.)*	
Host	*Host collects mum from testing room and shuts door carefully… takes mum back to observation room and says:* "When this part is over, the Stranger will go back in for a few minutes"	
Morri	*Morri tells others in observation room when one and two minutes have passed.* *Says to Stranger:* "In 30 seconds it will be time for you to go back in". *Then: "*Go back in now" *(either when 3 minutes is almost over or if Baby is highly distressed for 30 seconds.)*	
Episode 7: Stranger returns (up to 3 minutes – cut short if there is 30 seconds of hard crying that does not ease or mother wishes to return early):		
Stranger	*Stranger enters room. Pause at door to see what child will do.* *If child is distressed: comfort them, then try to get child to play/explore.* *If child is not distressed: initiate play then move gradually to chair and begin reading. If Baby initiates contact, interact as necessary (respond briefly and appropriately), then return to reading.* *Try to arrange play/comfort so child is facing door when mother returns. This period will last 3 minutes unless Baby is distressed and Morri ends it early.*	
Host	*Host says to Mum:* "Just like before, this will last 3 minutes unless Baby gets upset in which case I'll send you back in early. You can also tell me if you want to go back in early."	
Host	*If Baby cries, get mum's opinion:* "do you think we should give the Stranger a few more seconds to try to comfort Baby, or should we have you go back in now?"	
Episode 8: Second reunion (3 minutes, sometimes extended):		
Morri	*Tell others in observation room when 1 and 2 minutes have elapsed.* *Let the host know when it's time to take mum back to the testing room (usually at about 2.5 minutes).*	
Host	*Take mum to wait outside testing room door and say:* "When I tell you to go, knock on the door firmly, say Baby's name, then go back into the room. Pause briefly inside the door to see what Baby does, then do what seems natural. Try to get Baby to play again, and return to your chair and act like you did before. I'll come in and tell you when we are done." *At 3 minutes:* "Ok, go in now." *Mother knocks on door, calls baby's name, and enters. Pauses at door for 10 seconds to see what baby will do. Interacts as they usually would, then returns to seat and reads magazine.*	
Stranger	*Stranger: Remain unobtrusive while Mum and Baby are reunited. Either retreat to your chair or stay quietly where you are out of the way. Wait until the reunion*	

	is complete and mum has returned to her chair, then leave quietly. Or if Mum and Baby continue to play on floor or walk around room for a while, leave quietly after 30-40 seconds. Be absolutely certain that you do not interfere with our ability to observe the greeting and initial proximity seeking/ avoidance behavior. *Return to observation room.*	
Morri	*Keep time with stopwatch: Mother and child should remain in the room together for 3 minutes. You may want to extend this time to see what happens if child needs longer to settle.*	
Host	*Host returns to testing room and says:* "Thank you for that – the *Strange Situation Procedure* is all done now. How was that for you?" *Acknowledge how artificial it feels to do such a scripted procedure.*	
Host	*Say to mother:* "I'm just going to press 'stop' on the video cameras now, and Morri will do the same for the camera in the other room". *Stop recording for the two cameras in the testing room, but leave them on.*	
Morri	*Press 'stop' on back-up video camera in observation room, and turn off power on intercom.*	
Host	*Say to mother:* "The last bit of the session involves completing these two final questionnaires. There is a longer one and a shorter one, and we'd like you to do the longer one first." *Hand over the one titled 'final questionnaire' (this starts with mum and baby's details and includes the EDN Scale).* *Then:* "Please answer every question, even if you're not sure of the best answer."	
Host	*Give ACE Scale*. *Check every page of the other questionnaire to ensure no questions have been missed. Prompt mum to complete if necessary. Let her know it's fine for her to write on the questionnaire if she wants to explain her answer, but make sure she gives one answer for each question. Check with Morri regarding any queries.*	
Host	*Let mother know that the session is over, thank her for her time, and let her know she can contact Leith with any questions.* *e.g.,* "That's the end of our session. Thank you so much for coming in today. If you have any questions about the assessment, please feel free to contact Leith. As you know, you're also welcome to meet with Leith one-on-one to discuss any other aspects of parenting that you would like, and she will be reporting back the key findings to all participants once the study is finished."	

Notes

1) If the baby is quite distressed, crying without stopping, epidodes 4, 6, and/or 7 are cut short. Intermittent crying and fussing is OK, but if there is hard crying for 30 seconds at any time, or the parent wants to return to their child, Morri will signal the host to terminate the separation by sending the Stranger or parent back in early. The procedure then continues as normal.

2) Change to procedure from 1 September 2018 onwards (after first two SSPs): If baby is clearly signalling a need to be fed and/or toileted during the procedure, and gets upset when the mother rebuffs them 2 or more times, the Host will pop their head into the testing room and say "we just wanted to let you know that it's fine to feed (or toilet) your baby if that's what you'd normally do". The mother should remain in the testing room if posible, but the cameras may be turned off during the feed/toilet if she prefers.

3) Ensure room temperature remains comfortable (e.g., by turning heaters down and leaving the door open between sessions if it's hot). Blinds and curtains must be tightly shut to ensure good video and sound recordings.

APPENDIX N: Sample Confidentiality Form for Research Assistants

Parenting From The Start

RESEARCH ASSISTANT CONFIDENTIALITY AGREEMENT

I ..... (Full Name - printed) agree to keep confidential all information concerning this parenting research project and the participants and volunteers who are involved in it.

I will not retain, copy, or disclose any information involving this study except with the permission of the lead researcher, Leith Anna Morrimire, or her research supervisors.

I understand that all information relating to participants in this research is to be kept confidential. I will not discuss their participation or any other personal details I am privy to with anyone outside the research team at any time, now or in the future.

Signature:		**Date:**	
Full Name - printed			

Strange Situation Procedure Coding Sheet

Mum's ID:		Date of SSP:			
Baby's name:		Age at SSP:			
Parent's name:		Coder's name:			
Notes:		Confidence:	1	2	3
		Disorganised:	Yes (1)		No (0)
Classification:		Security:	secure		insecure

Episode		Crying			Notes & coding	
1	Mother & baby introduced to room					
2	Mother sits & baby plays					
3	Stranger enters (sits quietly, talks, plays)					
4	First separation (stranger stays with baby)					
5	(mother returns) First reunion				*Proximity & contact seeking*	
					Contact maintenance	
					Resistance	
					Avoidance	
First reunion notes						

6	Second separation (baby's left alone)					
7	(stranger returns) separation continues					
8	(mother returns) Second reunion				*Proximity & contact seeking*	
					Contact maintenance	
					Resistance	
					Avoidance	

Second reunion notes

Possible categories based on tables:

Category:	First reunion:		Second reunion:	
Contact seeking				
Contact maintenance				
Resistance				
Avoidance				

ABC Classification

Disorganised behaviour:

Score each possible D behaviour you see – you could give multiple scores in one episode. If a behaviour lasts through two episodes you give a separate score for each because the mother is sometimes present and sometimes not, but when doing SS you may want to acknowledge it was one long behaviour, not really two.

Episode	Time	Description of Behaviour	Coding	Score

Summary score (SS)

Take the highest score you have and then think about the other behaviours you have seen. There is always a risk of over-coding: lots of behaviours are really common and don't end up deserving a D classification.

SS =

Overall classification (ABCD)

APPENDIX P: Adverse Childhood Experiences Scale

Finding Your ACE Score While you were growing up, during your first 18 years of life:

1. Did a parent or other adult in the household often or very often... Swear at you, insult you, put you down, or humiliate you? or Act in a way that made you afraid that you might be physically hurt?

Yes/No. If yes enter 1 _____

2. Did a parent or other adult in the household often or very often... Push, grab, slap, or throw something at you? Or Ever hit you so hard that you had marks or were injured?

Yes/No. If yes enter 1 _____

3. Did an adult or person at least 5 years older than you ever... Touch or fondle you or have you touch their body in a sexual way? or Attempt or actually have oral, anal, or vaginal intercourse with you?

Yes/No. If yes enter 1 _____

4. Did you often or very often feel that ... No one in your family loved you or thought you were important or special? or Your family didn't look out for each other, feel close to each other, or support each other?

Yes/No. If yes enter 1 _____

5. Did you often or very often feel that ... You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you? or Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?

Yes/No. If yes enter 1 _____

6. Were your parents ever separated or divorced?

Yes/No. If yes enter 1 _____

7. Was your mother or stepmother: Often or very often pushed, grabbed, slapped, or had something thrown at her? Or Sometimes, often, or very often kicked, bitten, hit with a fist, or hit with something hard? Or Ever repeatedly hit at least a few minutes or threatened with a gun or knife?

Yes/No. If yes enter 1 _____

8. Did you live with anyone who was a problem drinker or alcoholic or who used street drugs?

Yes/No. If yes enter 1 _____

9. Was a household member depressed or mentally ill, or did a household member attempt suicide?

Yes/No. If yes enter 1 _____

10. Did a household member go to prison?

Yes/No. If yes enter 1 _____

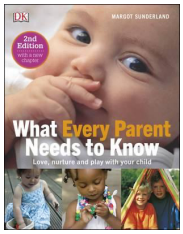
Now add up your "Yes" answers: _____ This is your ACE Score.

APPENDIX Q: Description of Preschool Workshop

Parenting From the Start *Preschool Workshop*

Preschool workshops were fully catered and open to partners and support people as well as control group participants. Venues were chosen to be child-friendly, and several dates were offered to improve accessibility. Couches were provided for nursing parents and toys for those who brought small children. As for the pregnancy workshops, attendees who were not participants in the study or whānau (family) members signed Confidentiality Forms in which they agreed to keep private any personal information, including who else was present - respecting other people's right to decide when/whether/how to share their involvement.

The preschool workshop was shorter than the pregnancy version, lasting less than 6 hours in total. Topics covered in the first half were similar to the pregnancy workshop (adverse childhood experiences, early brain development, attachment, alloparenting, and the evolved developmental niche). Cross-cultural comparisons with hunter-gatherer and Indigenous societies were retained, as was the focus on traditional Māori caregiving. The second half was largely new, with information about pregnancy, birth and early parenting choices giving way to sections on later childhood across cultures, parenting goals, and the science of parenting. Background information and activities relating to resilience, emotion regulation, problem solving, 'growth mindset', reinforcement, punishment, praise, self-determination, and positive discipline gave attendees the chance to consider the pros and cons of various parenting approaches. Discussions on obstacles/challenges and the support we need in order to parent well were included to acknowledge that real-world parenting in modern New Zealand takes place within contexts that may or may not be helpful.



Each control group mother from the study was gifted the book *What Every Parent Needs to Know: Love, Nurture and Play With Your Child* (2016) by Margot Sunderland. In addition to expressing appreciation for their involvement, this book was selected based on the accessibility of the evidence-based content (fully referenced), and consistency with the key themes of the *Parenting From the Start* workshops. Originally published under the title *The Science of Parenting: How today's brain research can help you raise happy, emotionally balanced children*, the first edition won First Prize in the *British Medical Association Medical Book Awards* 2007 Popular Medicine section.

APPENDIX R: Qualitative Feedback from *Parenting From the Start* Antenatal Workshops

Qualitative Feedback

Comments about the workshop were elicited by several open-ended questions on the feedback form, asking about the things attendees *liked most*, *liked least,* and *found most interesting &/or useful*, as well as *how they would describe Parts 1 and 2 of the workshop to other parents.* Responses to these four qualitative questions were copied verbatim alongside the quantitative data and are shown in the Tables below. Feedback from Part 1 and 2 of the workshop was unable to be linked due to the limited identifying information collected. Respondents were asked for their ethnicity and whether they were a study participant, partner, or community member. No IDs or names were used. Comments have been sorted by ethnicity to help assess how the workshop was received by those identifying as New Zealand European or Pākehā, compared with Māori and/or Pasifika, and other backgrounds. Only data from expectant mothers is reported here, as other attendees were not participants in the research project.

Workshop feedback came in one workshop at a time over 8 months. The written feedback described here was supplemented at the time by face-to-face debriefs at the end of every workshop. An iterative feedback model was employed whereby small modifications were made between sessions to improve the experience for future attendees. These changes included attention to the physical space in our venues (temperature settings, etc), the Keynote slides (e.g., increasing the size of the font and changing the colour to make it easier to read on smaller presentation screens), the activities (e.g., reducing the number of cards in the Timeline exercise), and the ways in which concepts were explained (e.g., removing jargon, clarifying points where there was evidence of confusion). It is difficult to track how this iterative model impacted perceptions of the content and presentation, particularly as the feedback above is not in chronological order, but our bicultural values-based approach necessitated responding to feedback wherever possible rather than just collecting it. A full-workshop script and detailed topic checklist ensured high consistency across workshops to maintain the integrity of the intervention despite minor alterations.

Some of the changes suggested by attendees could not be actioned because they conflicted with the design of the workshop (e.g., offering the workshop over more sessions, adding in additional topics irrelevant to the human evolved developmental niche), or practicalities (e.g., avoiding weekends, when those were the only days study participants indicated they were available). In some cases the feedback received was conflicting, as when infant toileting was included multiple times in the list of things attendees liked most, but also referenced as something other attendees liked least about Part 2 of the workshop. For example, one attendee used the space in their 'least liked' part of the questionnaire to specifically request *more* time discussing EC (elimination communication, another term for infant toileting), while another stated it was not their 'thing'. The use of statistics was another feature that appeared both in the 'most liked' and 'least liked' category for different attendees. Similarly, the workshop "felt long" to one attendee, while another commented "It would have been nice if it could have been longer". There is no 'one size fits all' workshop!

Tables R1 to R6 include all written feedback received, split by ethnicity. Coloured (green) font has been used to indicate comments in the 'things I liked least' column that were in fact positive. Every Pākehā/NZ European who attended the *Parenting From the Start* workshop (100%) commented on what they liked most, although some responses were global rather than specific, for example "Informative and interesting". 60% (21 of the 35) of the 'least liked' boxes on the feedback forms were either left blank or included a positive comment such as "Found it all relevant", "Nothing", or "N/A". Spelling and grammar have not been corrected, and emojis have been reproduced as accurately as possible.

Table R1.

Feedback on What Pākehā/NZ European Attendees Liked Most and Least About the Workshop

***Parenting From the Start:* Part 1**	
Things I liked most:	**Things I liked least:**
The evidence included in workshop	*That it's not already a nationally funded programe available to all parents*
baby wearing & advantages of it	*history, powerpoint – too busy/hard to follow & needs more interaction from crowd*
Talking about our history as a species and how we have approached parenting (collectively) back then until now	-
Confidence building, free wrap!	-
how to meet babies needs – alloparenting, the chat about what "village" support we can have. Practical with the moby sling – hands free yet fully responsive	*Confronting nature about what neglect can do on a brain made me :S*
Research references, supported claims, explanations of WHY not just 'you should...'	*confronting statistics (needed but uncomfortable)*
Great overview & answering of specific questions	*It would be great to have more research/scientific detail but understand difficulty w time & broad group*
Brain development, Alloparenting	*N/A*
Evolutionary history, other cultural parenting practices, moby wrap	*N/A*
Chatting with other parents	*Answering formula question in questionnaire [PIQ-pretest] – hard to give answer as don't plan to use but will if need to (to supplement for ex. While I get my breastfeeding sorted)*
historical/evolutional background of parenting, statistics and datas + personal and friendly presentation	*(small writing on powerpoint pres)*
Relaxed atmosphere. Good food. Complex topics explained well	*Fount it all relevant*
Using the Moby wrap	*?*
Informative & interesting	-
Good general overview of parenting and baby's needs	*NA*
The very first activity laying out the historical info	-
Overall knowledge of topics	-

***Parenting From the Start:* Part 2**	
Things I liked most:	**Things I liked least:**
That different parenting options were shown in a non-bias way – Just showing the facts, so parents can make informed decisions	*That its the end of the workshop*
Videos showing birth & breastfeeding	-
new ideas – toileting from beginning	-
Learning about birth – reassuring & also interesting that babies naturally move to a nipple	-
the options provided & actual facts. Loved the talk about breastfeeding & breast crawl	-
Range of topics, options of depth, discussions	*Not much time to reflect or question as much as group wanted*
Evidence based information that made sense	-
Statistics	-
toileting and sleeping info	*Nothing*
Statistical evidence	*Would have like more acknowledgement that while ideal options are 429istory eg. Birth, breastfeeding; that other options aren't the end of the world*
Practical ideas for when baby is born (finding the breast, infant toileting, etc)	*N/A*
Breastfeeding/birth sections	*Probably less interested in the toileting*
Kangaroo Mother Care, early breastfeeding video, Elimination communication	*The exercise with the reports and stats*
Seeing the research/stats behind birth outcomes in hospital vs homebirth. Useful to have stats rather than opinions	*Enjoyed it all... maybe the exercise/pregnancy nutrition was least helpful as I felt already aware*
learning some things I had no idea about – toileting an infant in a different way and the breast crawl	*?*
Easy to understand + covers new ideas	*I would have preferred to do this part first*
Info on sleep options, infant toileting, initiation of breastfeeding	*NA*
Easy to understand info	-

Every person with Māori/Pasifika ancestry who attended the *Parenting From the Start* workshop (100%) provided a comment about what they liked most, although once again some responses were global rather than specific, for example "The wealth of information". 70% (7 out of 10) of the 'things I liked least' boxes on the feedback forms were either left blank or included a positive comment such as "nil", "NA", or "Nothing, I loved it".

Table R2.

Feedback on What Māori/Pasifika Attendees Liked Most and Least About the Workshop

***Parenting From the Start:* Part 1**	
Things I liked most:	**Things I liked least:**
Fun, interactive, semi-informal feel	*-*
Moby wrap, timeline activity, tangata whenua point of view, lunch ☺	*-*
Learning about the importance of sensitive/responsive parenting on the brain and social development	*nil*
Attachment theory; Alloparenting ; Bicultural nature of workshop. Given the short timeframe, the pace & style of presentation was great! Info is so useful and accessible, thank you!!	*Would have been great to have this info delivered more widely; over a series of days so that we could process & discuss content in between workshops*
The wealth of information!	*Nothing, I loved it*

***Parenting From the Start:* Part 2**	
Things I liked most:	**Things I liked least:**
Learning more info	*Some participants seemed a bit judgemental (not so open minded) about some topics to me. But Leith was great*
The group activities, the videos, talking about needs	*Would have been great if we'd had more time for Q&A, particularly around safe sleeping & toileting topics*
Skin to skin straight away. Breast crawl	*N/A*
I loved the varity of knowledge and the way It was presented	*Nothing, Loved it again!*
Breastfeeding + Sleep	*-*

There was overlap between the positive feedback of Pākehā/NZ European attendees and those identifying as Māori and/or Pasifika. People from both groups mentioned the *Moby Wrap* baby slings, videos, and topics covered (early brain development, alloparenting, breastfeeding, and sleep), as well as the importance of sensitive/responsive parenting, the "relaxed atmosphere" ("fun, interactive, semi-informal feel"), "good food", clear explanations and the opportunity to spend time with other attendees. It is noteworthy that the bicultural approach ("tangata whenua point of view") is mentioned specifically as being among the things Māori/Pasifika attendees liked most.

Anyone who described their ethnicity as something other than Māori, Pasifika, or Pākehā/New Zealand European was placed together in the final ethnicity category. Small numbers meant this diverse group could not be classified more accurately because of the risk of identifying individuals. People placed in this category included New Zealanders without European, Māori, or Pasifika heritage (e.g., NZ Chinese) as well as Europeans from outside New Zealand, Australians, and those who described themselves as Latin American or English. Once again, everyone in this category (100%) provided a comment about what they liked most. 67% (6 out of 9) of the 'things I liked least' boxes on the feedback forms were either

left blank or included a positive comment such as “Nothing”, “NA”, and “nothing – well presented and good approach”.

Table R3.

Workshop Feedback from Attendees Assigned to the ‘Other’ Ethnicity Category

***Parenting From the Start:* Part 1**	
Things I liked most:	**Things I liked least:**
Meeting people, sharing knowledge, being informed about close proximity awareness. Understanding Attachment theories. Practice carry baby all day, lessons with Moby wrap	*NA*
The back to basics approach – evidenced based research (431istory431t431n431)	*nothing – well presented and good approach*
Learning about attachment	-
Learning about responsive parenting tools	*Enjoyed the practical elements the most, so maybe the theory side would be my least favourite*
Historical timeline – very interesting	-

***Parenting From the Start:* Part 2**	
Things I liked most:	**Things I liked least:**
Breastfeeding, toileting and skin-to-skin information	*N/A*
toileting, breastfeeding information	*The statistics discussions were a bit overwhelming but still informative*
covering topics in more depth than in antenatal classes, backed by research. Also the rationale behind why certain things were/are recommented. Antenatal touched on but gave little rationale	*Nothing*
Sleep workshop	*Infant toileting – EC not my thing*

Additional qualitative feedback was elicited by asking attendees to indicate which topics they found most interesting and/or useful, and how they would describe the workshop to other parents who were considering attending. This data, also split by ethnicity, is reported in the Tables below. Once again, comments relating to Parts 1 and 2 of the *Parenting From the Start* antenatal workshop cannot be linked, but the answers to each question have been kept together. That is, comments within each row come from a single person.

All participants provided comments about which topics they found most interesting and/or useful in Parts 1 and 2 of the *Parenting From the Start* workshop. Most comments were specific, for example “baby brain development & sensitive interaction/responsiveness – within 5 mins” or “Breastfeeding & how long for. Pregnancy – things to do that are beneficial. Toileting”.

Table R4.

Additional Feedback from Pākehā/NZ European Attendees at the Parenting From the Start *Workshops*

Part 1	
Topics I found most interesting &/or useful:	**How I would describe the workshop to others:**
evidence around self secure children and general statistics and evidence	*gain evidence based knowledge that will increase your parenting knowledge and confidence*
baby brain development & sensitive interaction/responsiveness – within 5 mins	*helps make informed choices of early parenting & reduces adverse psychological effects in later stages of life*
Stress levels in babies and how to minimize it. The long term effects of this	*Very worthwhile*
Links to history of species & other cultures – shows reason behind this type of parenting being evolutionary	*Really informative. Very glad to have had the chance to attend*
What an allo Parent style looks like. Trying on the wrap & how this can be responsive & Practical.	*If you want to know how to meet your babies needs then this class will show you how important it is to start young*
How to create your own village – Plunket/antenatal group etc	
Brain development + Evolutionary niche. Alloparenting as historical/evolutionary	*Placing parenting choices in historical/scientific context*
attachment, childcare/alloparenting	*overview of child attachment & bonding*
Village parenting style. Mammal evolution	*Informative, welcoming*
Alloparenting. Anthropological studies/history	*An overview of infant development and the roles of those interacting with a child*
Background of parenting – Maori, African etc.	*Useful, well-prepared and professional. Interesting and colourful*
Holding/carrying a baby ☺. Grouptalk	
Brain development info. Historical background. Statistics and science behind attachment. Evolved Development Niche	*Relaxed and informative. A good introduction to attachment parenting theory, and practical information*
The history of parenting and the research that shows how we've moved away from traditional basic things that our babies require for brain development – the scientific evidence	*An eye-opener on the importance of responsive parenting. Reassuring to know it's simple – all we have to do is be their for our babies*
Looking back at ancient parenting/lifestyle. The importance of being close and attentive. The brain development/science and importance of positive connections	*Thought-provoking, modern and backed by science*
Forward facing/close proximity and brain development	*A good overview of things you can do as a parent to create a good environment for your baby to thrive in*
Allo parenting. Attachment philosophy	*A really well researched and presented introduction to parenting concepts that will have a huge positive impact on the next generation*
Responsiveness, Alloparenting	*Science/history behind ideas for parenting but easily understood + delivered*

Part 2	
Topics I found most interesting &/or useful:	**How I would describe the workshop to others:**
Sleeping, homebirth, toileting	*Evidence based Information to help parents to make Informed decisions about their parenting*
Toileting. 'Breast crawl'. Skin on skin	*Very informative*

Toileting	*Fresh approach to labour/birthing & early stages of parenting*
Home birth, Toileting, Skin to skin care	*A good foundation of scientific information about child raising*
Breastfeeding & how long for. Pregnancy – things to do that are beneficial. Toileting	*Really interesting and informative*
Breastfeeding & the breast crawl. Elimination communication toileting. Oxyitocin (sp?)how to increase over the days	*in depth knowledge & fact based ☺*
Infant toileting, statistics around babywearing, clarify of information regarding cosleeping/bedsharing	*Practical info for parenting choices*
Toileting	*Interesting, professional, I got new information*
sSleeping info & toileting	*Good introduction to caring for your baby*
Had never considered infant toileting so was interesting to hear about	*A look at the best-outcome, most natural versions of birth & early childcare*
Calm birth, baby finding the breast, Studies on hospital vs homebirth statistics	*informative, practical, welcoming*
Information about birth process/stats	*Good overall study of parenting from pregnancy. Perhaps slightly more favourable to less intervention & discounting need for intervention at times*
The subtle cascade of intervention from vaginal inspections. The part about allowing the umbilical cord 5 mins – 15 mins (if water birth) to finish pumping. Early breastfeeding	*A great way to prepare and equip expecting parents for the birthing and parenting choices that they will make*
Early breastfeeding & toileting were interesting, I hadn't considered toileting/wasn't aware of the way baby could naturally start feeding so early without being forced	*Really valuable information to challenge some of the assumptions we make based on current cultural norms. Certainly worth attending.*
Statistics about positive birth outcomes relating to minimal intervention, toileting strategies, the very peaceful birth video, and the breast crawl, which I was clueless about	*Very empowering and informative – this is my 4th baby & I learnt a lot, wish I'd had all this info with my previous 3 babies*
Breastfeedings aides + support availability. Infant toileting – this is new to me! Home birthing options and benefits	*This informative and covers a wide range of topics and ideas. It's great to know the options available to you and risks/benefits. Information is power!*
Infant toileting. Initiation of breastfeeding	*Information from birth and the early months looking after your baby to enable good attachment and development*
Breastfeeding, Sleeping, Toileting	*Gained knowledge which will allow me to make better decisions or ask informed questions*

Popular elements of the workshop included the evidence-based approach, including examples of real scientific studies relating to parenting as well as broader overviews/synthesis. People appreciated the cross-cultural approach, and information about traditional Māori parenting. The evolutionary history of humans as hunter-gatherers and social mammals was also mentioned. Topics such as early brain development, attachment, alloparenting, babywearing, sensitive responsiveness, and social support (all in Part 1), as well as options relating to labour/birth, infant feeding, toileting, and safe sleep, and research relating to planned place of birth, skin-to-skin time, and common medical interventions (Part 2) were described as interesting and/or useful by those who attended. Hands-on activities such as learning how to tie a *Moby Wrap* sling were mentioned by many participants, as were the videos and group discussions. The workshop was described as useful for first-time and

experienced parents. The antenatal workshops were seen as “informative”, “practical”, “welcoming”, ”friendly”, “professional”, “easy to understand”, and “empowering”. Similar themes can be identified in the feedback from Māori/Pasifika attendees and those with other cultural backgrounds[158].

Table R5.

Additional Feedback from Māori/Pasifika Attendees at the Parenting From the Start *Workshops*

Part 1	
Topics I found most interesting &/or useful:	**How I would describe the workshop:**
Learning more about alloparenting + it's importance. How childhoods can affect development of brain	*Definitely worth coming to. Lots of information and discussions*
How baby's brain works + develops. How your reaction can affect/build your baby	*very resourceful, based on studies not 'old wives tales', gives you a great background + timeline of events + the maori perspective + teaching was great*
importance/benefits of carrying your baby (with the wraps)	*Basic needs for a baby and how important they are*
Alloparenting. Attachment. Brain development	*Evidence-based parenting workshops, really worthwhile with practical advice & knowledge. Friendly atmosphere!*
Alloparenting, the wraps, and the break down of how hands on parenting affects the brain development	*Incredible! Definitely attend!*

Part 2	
Topics I found most interesting &/or useful:	**How I would describe the workshop:**
Breast crawling	*Packed with information that you may not hear anywhere else*
Safe-sleeping, in particular bed-sharing. Infant toileting	*Practical tips that are immediately applicable, questions that helped our family work out what we need. Thank you!*
Skin to skin, Breast crawl + infant toileting	*Very informative, offers different ideas or perspectives*
Definitely the co-sleeping, breastfeeding and tolieting	*This whole workshop has blown my mind. Do it, it's your best way of giving your kid a best start*
All topics especially the toilet training from birth	*Informative covers all aspects, great for first time parents*

[158] One participant from the ‘Other ethnicity’ category was unable to be accurately identified in Part 2 of the workshop as they provided an ambiguous qualitative description (either ‘European’, or more probably ‘White’) which could not be distinguished from the ‘Pākehā/New Zealand European’ category with confidence. Their comments are included as part of this latter category.

Table R6.

Additional Workshop Feedback From Attendees Assigned to the 'Other' Ethnicity Category

Part 1	
Topics I found most interesting &/or useful:	**How I would describe the workshop:**
Nature vs Nurture, attachment theory, understanding why being sensitive and responsive is crucial for first year	*Help to understand the basic needs & knowledge of parenting. Make informed decisions for your own parenting style*
The history and patterns of parenting. The effects of different approaches to development	*If you can take just one point out of the morning and improve your childs development – then it has been a worthwhile exercise*
Attachment. Need support system to raise a child – village. Learn how to use a Moby wrap	*Interesting learning that children need to feel secure – need physical contact*
Babywearing and impact on babies and parents connectivity, along with other tools used around the world traditionally	*Really thought provoking – has got me thinking about different approaches I might take*
Baby wearing. Brain development	-

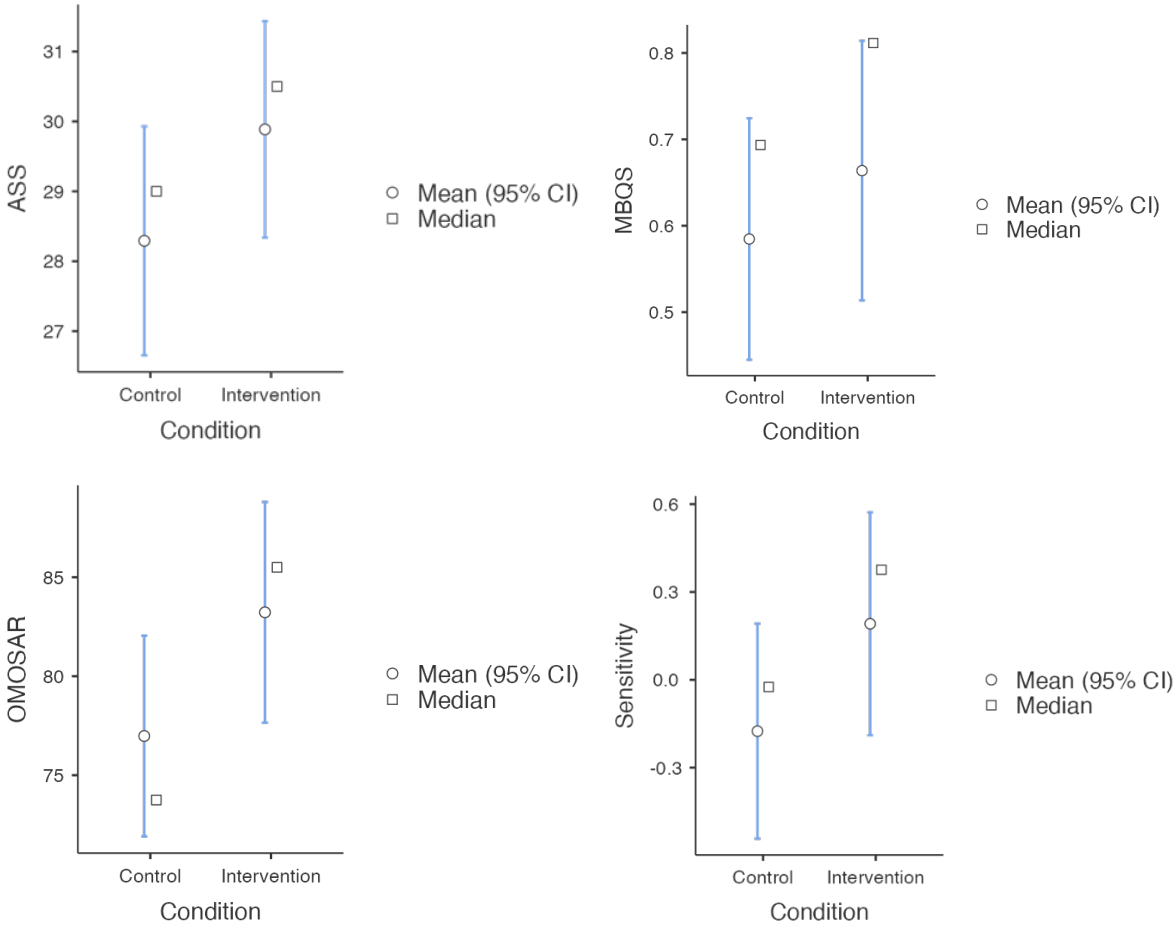
Part 2	
Topics I found most interesting &/or useful:	**How I would describe the workshop:**
Different options to take care of baby	*Interesting information of how to be a good parent and options – everyone has different ideas about parenting. Good to learn from evidence-base studies*
Labour, pregnancy, breastfeeding, toileting	*Attend before antenatal classes. Information cross-referencing is helpful in an indepth way.*
Toileting – new technique which I had not heard of previously. Breast crawling video.	*A great in-depth overview covering useful topics relevant to new parents*
Infant sleep – co sleeping	*How your baby can sleep and you don't just have to use nappies!*

The *Parenting From the Start* antenatal workshop was well received by attendees (research participants, support people, and community members), including those with Māori/Pasifika whakapapa (ancestry). All major topics were seen as interesting and useful, and the atmosphere at the workshops was considered friendly, welcoming, and professional.

APPENDIX S: Maternal Sensitivity Comparisons Across Study Conditions

Figure S1.

Mean Raw Scores on Three Maternal Sensitivity Measures and a Computed Variable Combining Them



Notes. ASS = sum of *Ainsworth Sensitivity Scale* scores, MBQS = *Mini- Maternal Behavior Q-Sort*, OMOSAR = *Observational Measure of Sensitivity and Responsiveness.* Combined Sensitivity Measure based on the average of the three standardised scores. 95% CI = 95% confidence intervals.

APPENDIX T: Patterns of Attachment in the *Pakiaka Tupuora* Sample

Table T1.

Attachment Classifications in the Pakiaka Tupuora *Sample by Study Condition*

CONTROL GROUP	INTERVENTION GROUP
A. First-time mothers (n = 22) Secure attachment (11) $B1_{1}$, $B1_{50}$ $B2_{13}$, $B2_{16}$, $B2_{22}$, $B2_{33}$, $B2_{45}$ $B4_{9}$, $B4_{17}$, $B4_{24}$, $B4_{49}$ Insecure attachment (5) **$C1_{3}$**, $C1_{5}$, **$C1_{32}$**, **$C1_{36}$** **$C2_{44}$** Cannot classify (0) none Lost to follow up (6) 28, 38, 39, 46, 51, 52	**B. First-time mothers** (n = 18) Secure attachment (13) $B1_{12}$, $B1_{27}$ $B2_{6}$, $B2_{15}$, **$B2_{25}$**, $B2_{34}$, $B2_{35}$ $B3_{14}$, $B3_{37}$, $B3_{43}$ $B4_{2}$, $B4_{4}$, $B4_{48}$ Insecure attachment (1) $A1_{42}$ Cannot classify (0) none Lost to follow up (4) 29, 40, 41, 47
C. Experienced mothers (n = 9) Secure attachment (3) **$B2_{106}$**, $B2_{109}$, $B2_{114}$ Insecure attachment (2) $C1_{107}$ $C2_{121}$ Cannot classify (1) 112 Lost to follow up (3) 108, 120, 123	**D. Experienced mothers** (n = 8) Secure attachment (5) $B1_{116}$, $B1_{119}$ $B2_{105}$, **$B2_{122}$** $B3_{117}$ Insecure attachment (0) none Cannot classify (1) 104 Lost to follow up (2) 101, 113
Overall 22 mother-baby dyads completed SSP **64%** of dyads who completed the final clinic assessment (14/22) were securely attached **32%** showed insecure attachment patterns	Overall 20 mother-baby dyads completed SSP **90%** of dyads who completed the final clinic assessment (18/20) were securely attached **5%** showed insecure attachment patterns

Notes: Each number indicates one mother-child dyad. (1) A1-2 refer to insecure avoidant attachment patterns, B1-B4 refer to secure attachment patterns, C1-2 refer to insecure resistant attachment patterns; (2) **red bolding**

indicates possible signs of disorganization in the child's behaviour. If confirmed, the three relationships currently classified as secure would be reclassified as insecure.

Table T2.

Observed and Expected Counts for Study Condition and Two-Way Attachment Security (N = 42)

Attachment relationship		Condition		Total
		Control	Intervention	
Insecure	Observed	7	1	8
	Expected	4.19	3.810	8.00
	% within column	31.8 %	5.0 %	19.0 %
Secure	Observed	14	18	32
	Expected	16.76	15.238	32.00
	% within column	63.6 %	90.0 %	76.2 %
Cannot classify	Observed	1	1	2
	Expected	1.05	0.952	2.00
	% within column	4.5 %	5.0 %	4.8 %
Total	Observed	22	20	42
	Expected	22.00	20.000	42.00
	% within column	100.0 %	100.0 %	100.0 %

Table T3.

Observed and Expected Counts for Study Condition and Three-Way Attachment Security (N = 42)

3-way attachment classifications		Condition		Total
		Control	Intervention	
B	Observed	14	18	32
	Expected	16.762	15.238	32.00
C	Observed	7	0	7
	Expected	3.667	3.333	7.00
A	Observed	0	1	1
	Expected	0.524	0.476	1.00
CC	Observed	1	1	2
	Expected	1.048	0.952	2.00
Total	Observed	22	20	42
	Expected	22.000	20.000	42.00

Table T4.

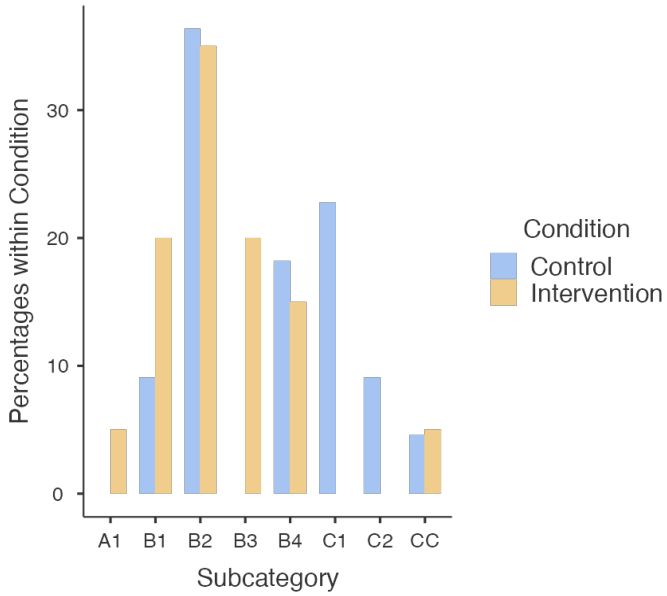
Observed and Expected Counts for Study Condition and Attachment Subcategory on the SSP *(N=42)*

Category		Condition		
		Control	Intervention	Total
A1	Observed	0	1	1
	Expected	0.524	0.476	1.00
B1	Observed	2	4	6
	Expected	3.143	2.857	6.00
B2	Observed	8	7	15
	Expected	7.857	7.143	15.00
B3	Observed	0	4	4
	Expected	2.095	1.905	4.00
B4	Observed	4	3	7
	Expected	3.667	3.333	7.00
C1	Observed	5	0	5
	Expected	2.619	2.381	5.00
C2	Observed	2	0	2
	Expected	1.048	0.952	2.00
CC	Observed	1	1	2
	Expected	1.048	0.952	2.00
Total	Observed	22	20	42
	Expected	22.000	20.000	42.00

Note: SSP = Strange Situation Procedure. A1 and A2 indicate insecure avoidant attachment, B subcategories 1-4 indicate secure attachment, and C1 and C2 indicate insecure resistant attachment relationships. CC stands for 'cannot classify'.

Figure T1.

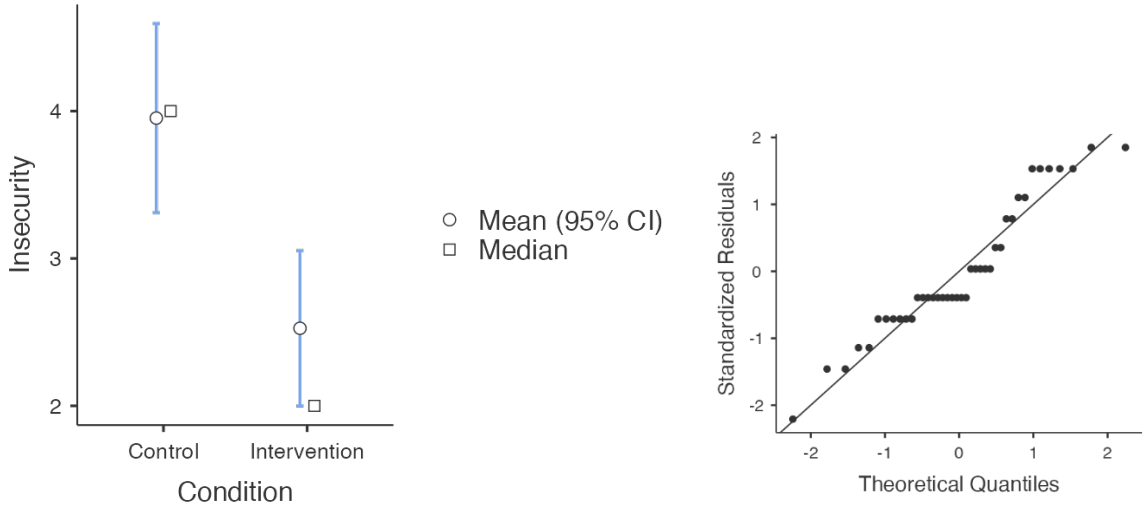
Percentage of Infants in Each Study Condition Classified in Each Attachment Subcategory (N = 42)



Notes. Relationships were classified using Ainsworth's *Strange Situation Procedure* when infants were 11-20 months old. A=insecure avoidant, B=secure, C=insecure resistant, CC=cannot classify.

Figure T2.

Mean Insecurity Scores in Episode 8 of the SSP by Study Condition and Q-Q Plot of Residuals



APPENDIX U: Attachment Regression Analyses

Mediation and moderation analyses were conducted using the medmod module for Jamovi (The jamovi project, 2021) to assess the possibility that maternal sensitivity mediates or moderates the relationship between study condition and infant attachment. The independent variable was study condition (intervention group vs control group). The dependent variable was insecurity – a computed variable equal to the highest of the avoidance and resistance scores of interactive behaviour for Episode 8 of the *Strange Situation Procedure*. The mediator or moderator being investigated was the computed sensitivity variable combining the three measures of maternal sensitivity used in the study. This was calculated by adding the three standardised maternal sensitivity scores (zASS, zMBQS, and zOMOSAR). All analyses were bootstrapped using 1000 samples.

Mediation Analysis

The mediation analysis showed that the direct effect of study condition on attachment insecurity explained virtually all (99.5%) of the relationship between these two variables, with no evidence sensitivity mediated this relationship. The direct effect (c) of study condition to attachment insecurity was statistically significant (p = .001), and the indirect effect through maternal sensitivity was not. The path from study condition to maternal sensitivity was significant (p = .049), but the path from maternal sensitivity to attachment insecurity was non-significant. Mediation estimates and path estimates are shown in Table U1.

Table U1.

Mediation Estimates: Study Condition to Attachment Insecurity via Maternal Sensitivity

				95% Confidence Interval				
Effect	**Label**	**Estimate**	**SE**	**Lower**	**Upper**	**Z**	**p**	**% Mediation**
Indirect	a × b	-0.00731	0.162	-0.346	0.374	-0.0452	0.964	0.513
Direct	c	-1.41876	0.489	-2.383	-0.444	-2.9014	0.004	99.487
Total	c + a × b	-1.42607	0.434	-2.250	-0.550	-3.2860	0.001	100.000

Path Estimates

						95% Confidence Interval			
			Label	**Estimate**	**SE**	**Lower**	**Upper**	**Z**	**p**
Condition	→	Sensitivity	a	1.67437	0.8501	-0.0511	3.263	1.9696	0.049
Sensitivity	→	Insecurity	b	-0.00437	0.0848	-0.1685	0.171	-0.0515	0.959
Condition	→	Insecurity	c	-1.41876	0.4890	-2.3834	-0.444	-2.9014	0.004

Notes. Shows the effect of the predictor (study condition) on the dependent variable (infant attachment insecurity in episode 8 of the Strange Situation Procedure) at different levels of the moderator (maternal sensitivity). Maternal sensitivity was calculated by adding the three standardised maternal sensitivity scores based on the *Ainsworth Sensitivity Scales* (zASS) *Mini-Maternal Behavior Q-Sort* (zMBQS), and *Observational*

Measure of Sensitivity and Responsiveness (zOMOSAR). Number of mother-baby dyads = 42, number of samples for bootstrapping = 1000.

Moderation Analysis

The moderation analysis again found that only the experimental condition of being assigned to the intervention versus the control group was significantly related to infant attachment insecurity a year post birth ($p < .001$) when accounting for maternal sensitivity. There was no evidence that sensitivity moderated the relationship between study condition and infant attachment security during the *Strange Situation Procedure* one year post birth.

Table U2.

Moderation Estimates: Impact of Maternal Sensitivity on the Relationship between Study Condition and Attachment Insecurity

			95% Confidence Interval			
	Estimate	**SE**	**Lower**	**Upper**	**Z**	**p**
Condition	-1.4541	0.4557	-2.384	-0.599	-3.191	0.001
Sensitivity	0.0102	0.0826	-0.137	0.187	0.124	0.902
Condition ✻ Sensitivity	0.1955	0.1579	-0.124	0.469	1.238	0.216

Slope Analysis Estimates

			95% Confidence Interval			
	Estimate	**SE**	**Lower**	**Upper**	**Z**	**p**
Average	-1.451	0.455	-2.32	-0.561	-3.19	0.001
Low (-1SD)	-1.985	0.483	-2.84	-1.021	-4.11	< .001
High (+1SD)	-0.918	0.732	-2.33	0.453	-1.25	0.210

Notes. Shows the effect of the predictor (study condition) on the dependent variable (infant attachment insecurity in episode 8 of the Strange Situation Procedure) at different levels of the moderator (maternal sensitivity). Maternal sensitivity was calculated by adding the three standardised maternal sensitivity scores based on the *Ainsworth Sensitivity Scales* (zASS) *Mini-Maternal Behavior Q-Sort* (zMBQS), and *Observational Measure of Sensitivity and Responsiveness* (zOMOSAR). Number of mother-baby dyads = 42, number of samples for bootstrapping = 1000.

Separate Analysis for Each Maternal Sensitivity Measure

Moderation and mediation analyses were then repeated for each of the sensitivity measures separately, as pre-registered. Results were consistent with the combined sensitivity variable analysis. Direct and total effects were statistically significant, with the predictor (study condition) accounting for more than 98% of the mediation relationship for all maternal sensitivity measures. Paths from study condition to the ASS and OMOSAR were also significant, but the path from study condition to the MBQS was not. No paths from sensitivity

to attachment were statistically significant. Mediation analyses results are shown in Tables U3, U4, and U5. Moderation analyses results are shown in Tables U6, U7, and U8.

Table U3.

Simple Mediation Estimates for the ASS on the Relationship between Study Condition and Insecurity

				95% Confidence Interval				
Effect	**Label**	**Estimate**	**SE**	**Lower**	**Upper**	**Z**	**p**	**% Mediation**
Indirect	a × b	-0.0108	0.168	-0.310	0.388	-0.0642	0.949	0.759
Direct	c	-1.4152	0.484	-2.353	-0.475	-2.9239	0.003	99.241
Total	c + a × b	-1.4261	0.429	-2.279	-0.576	-3.3267	< .001	100.000

Path Estimates

						95% Confidence Interval			
			Label	**Estimate**	**SE**	**Lower**	**Upper**	**Z**	**p**
Condition	→	ASS sum	a	2.62907	1.1038	0.446	4.729	2.3819	0.017
ASS sum	→	Insecurity	b	-0.00412	0.0608	-0.119	0.117	-0.0677	0.946
Condition	→	Insecurity	c	-1.41524	0.4840	-2.353	-0.475	-2.9239	0.003

Notes. ASS = sum of *Ainsworth Sensitivity Scale* scores. Independent variable = study condition (intervention group vs control group). Dependent variable = infant attachment insecurity (highest of avoidance and resistance scores) in Episode 8 of the *Strange Situation Procedure* one year post birth. Number of mother-baby dyads = 42, number of samples for bootstrapping = 1000.

Table U4.

Simple Mediation Estimates for the MBQS on the Relationship Between Study Condition and Insecurity

				95% Confidence Interval				
Effect	**Label**	**Estimate**	**SE**	**Lower**	**Upper**	**Z**	**p**	**% Mediation**
Indirect	a × b	0.00384	0.100	-0.296	0.149	0.0384	0.969	0.268
Direct	c	-1.42990	0.440	-2.251	-0.504	-3.2518	0.001	99.732
Total	c + a × b	-1.42607	0.407	-2.233	-0.618	-3.5007	< .001	100.000

Path Estimates

						95% Confidence Interval			
			Label	**Estimate**	**SE**	**Lower**	**Upper**	**Z**	**p**
Condition	→	MBQS	a	0.1190	0.117	-0.0994	0.343	1.0150	0.310
MBQS	→	Insecurity	b	0.0323	0.524	-1.1063	1.020	0.0615	0.951
Condition	→	Insecurity	c	-1.4299	0.440	-2.2512	-0.504	-3.2518	0.001

Notes. MBQS = *Mini-Maternal Behavior Q-Sort*. Independent variable = study condition (intervention group vs control group). Dependent variable = infant attachment insecurity (highest of avoidance and resistance scores) in Episode 8 of the *Strange Situation Procedure* one year post birth. Number of mother-baby dyads = 42, number of samples for bootstrapping = 1000.

Table U5.

Simple Mediation Estimates for the OMOSAR on the Relationship Between Study Condition and Insecurity

				95% Confidence Interval				
Effect	**Label**	**Estimate**	**SE**	**Lower**	**Upper**	**Z**	**p**	**% Mediation**
Indirect	a × b	-0.0220	0.215	-0.362	0.521	-0.102	0.919	1.54
Direct	c	-1.4041	0.488	-2.417	-0.504	-2.880	0.004	98.46
Total	c + a × b	-1.4261	0.431	-2.264	-0.581	-3.312	< .001	100.00

Path Estimates

						95% Confidence Interval			
			Label	**Estimate**	**SE**	**Lower**	**Upper**	**Z**	**p**
Condition	→	OMOSAR	a	8.88221	3.9458	1.0044	16.6286	2.251	0.024
OMOSAR	→	Insecurity	b	-0.00247	0.0218	-0.0419	0.0417	-0.114	0.910
Condition	→	Insecurity	c	-1.40411	0.4875	-2.4168	-0.5038	-2.880	0.004

Notes. OMOSAR = *Observational Measure of Sensitivity and Responsiveness*. Independent variable = study condition (intervention group vs control group). Dependent variable = infant attachment insecurity (highest of avoidance and resistance scores) in Episode 8 of the *Strange Situation Procedure* one year post birth. Number of mother-baby dyads = 42, number of samples for bootstrapping = 1000.

Table U6.

Simple Moderation Estimates for the ASS on the Relationship Between Study Condition and Insecurity

			95% Confidence Interval			
	Estimate	**SE**	**Lower**	**Upper**	**Z**	**p**
Condition	-1.4908	0.464	-2.422	-0.576	-3.210	0.001
ASS mean	0.0604	0.233	-0.419	0.520	0.260	0.795
Condition ✻ ASS mean	0.4239	0.469	-0.595	1.247	0.905	0.366

Simple Slope Estimates

			95% Confidence Interval			
	Estimate	**SE**	**Lower**	**Upper**	**Z**	**p**
Average	-1.47	0.471	-2.41	-0.563	-3.13	0.002
Low (-1SD)	-1.87	0.523	-2.79	-0.523	-3.58	< .001
High (+1SD)	-1.07	0.742	-2.67	0.261	-1.44	0.149

Notes. Shows the effect of the predictor (condition) on the dependent variable (insecurity) at different levels of the moderator (ASS mean). ASS = sum of *Ainsworth Sensitivity Scale* scores. Condition = intervention group vs control group. Insecurity = highest of avoidance and resistance scores in Episode 8 of the *Strange Situation Procedure* one year post birth. N = 42, number of samples for bootstrapping = 1000.

Table U7.

Simple Moderation Estimates for the MBQS on the Relationship Between Study Condition and Insecurity

			95% Confidence Interval			
	Estimate	SE	Lower	Upper	Z	p
Condition	-1.4345	0.500	-2.27	-0.366	-2.8697	0.004
MBQS	0.0498	0.805	-1.62	1.400	0.0619	0.951
Condition ✻ MBQS	0.9788	1.564	-2.05	2.839	0.6260	0.531

Simple Slope Estimates

			95% Confidence Interval			
	Estimate	SE	Lower	Upper	Z	p
Average	-1.43	0.475	-2.27	-0.459	-3.02	0.003
Low (-1SD)	-1.79	0.712	-2.44	-0.488	-2.51	0.012
High (+1SD)	-1.08	0.677	-2.59	0.266	-1.60	0.110

Notes. Shows the effect of the predictor (condition) on the dependent variable (insecurity) at different levels of the moderator (MBQS). MBQS = *Mini-Maternal Behaviour Q-Sort*. Condition = intervention group vs control group. Insecurity = highest of avoidance and resistance scores in Episode 8 of the *Strange Situation Procedure* one year post birth. N = 42, number of samples for bootstrapping = 1000.

Table U8.

Simple Moderation Estimates for the OMOSAR on the Relationship Between Study Condition and Insecurity

			95% Confidence Interval			
	Estimate	SE	Lower	Upper	Z	p
Condition	-1.4118	0.4509	-2.3674	-0.6208	-3.1311	0.002
OMOSAR	-6.68e−4	0.0196	-0.0363	0.0439	-0.0341	0.973
Condition ✻ OMOSAR	0.0571	0.0385	-0.0339	0.1156	1.4816	0.138

Simple Slope Estimates

			95% Confidence Interval			
	Estimate	SE	Lower	Upper	Z	p
Average	-1.433	0.456	-2.37	-0.595	-3.141	0.002
Low (-1SD)	-2.174	0.546	-3.23	-0.996	-3.983	< .001
High (+1SD)	-0.691	0.803	-2.44	0.705	-0.861	0.389

Notes. Shows the effect of the predictor (condition) on the dependent variable (insecurity) at different levels of the moderator (OMOSAR). OMOSAR = *Observational Measure of Sensitivity and Responsiveness*. Condition = intervention group vs control group. Insecurity = highest of avoidance and resistance scores in Episode 8 of the *Strange Situation Procedure* one year post birth. N = 42, number of samples for bootstrapping = 1000.

APPENDIX V: Health Outcomes – Pregnancy, Labour, and Birth

Gestation and Birth Weight

Gestation was measured in completed half weeks. The median gestation for both study conditions was 40 weeks, and the average gestations were similar for the control group (m = 39.7, SD = 1.47) and the intervention group (M = 39.5, SD = 1.62). Box and whisker plots are shown in Figure V1.

Infant birthweights were reported by mothers on the *Parenting Strategies Questionnaire* (PSQ) completed at the home visit 11-24 months post birth, and converted to kilograms (kg). Mean birthweight was higher in the control group (M = 3.71kg, SD = 0.495, n = 23) than the intervention group (M = 3.55kgs, SD = 0.564, n = 21).

Figure V1.
Gestation (Plot A) and Birth Weight (Plot B) Within Each Study Condition

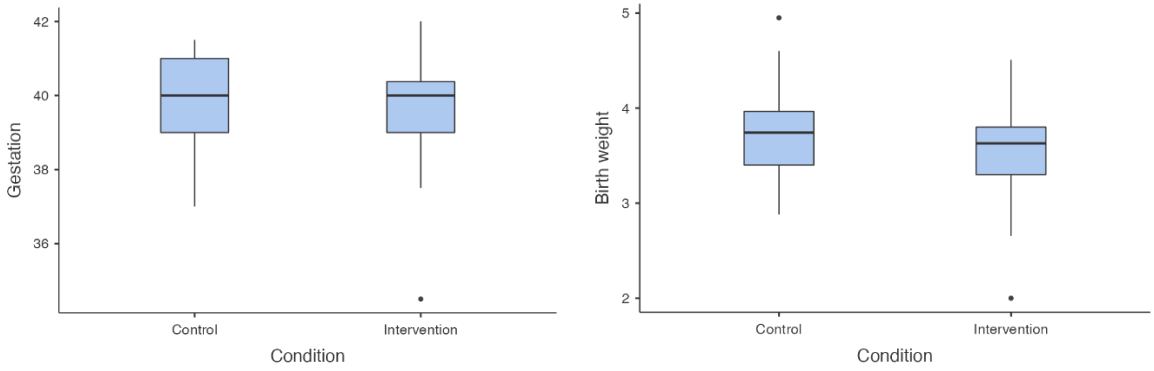


Figure V2.
Type of Birth Experienced by Participating Mothers From Each Study Condition

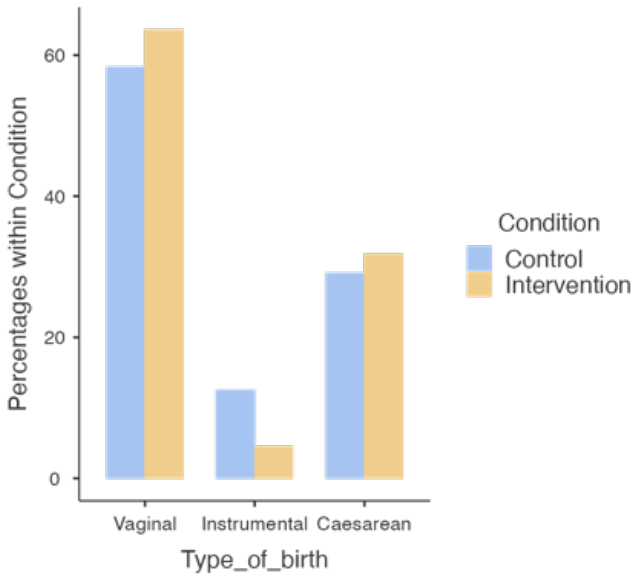


Figure V3.

Rates of Births Starting Medically (Induced or Planned Caesarean) by Study Condition

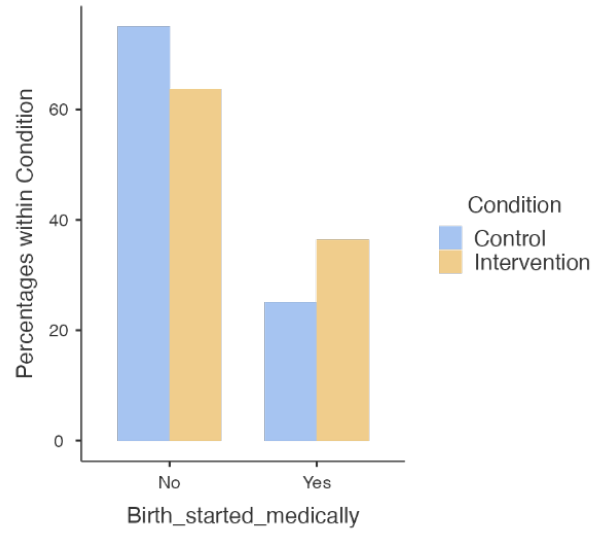
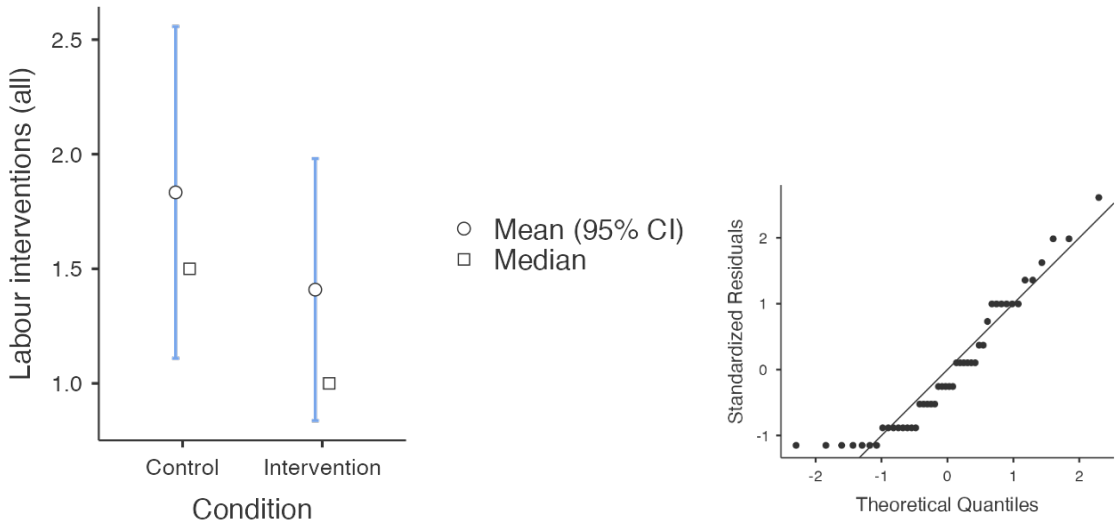


Figure V4.

Mean Number of Labour Interventions (incl. Caesareans and Forceps/Suction) by Study Condition



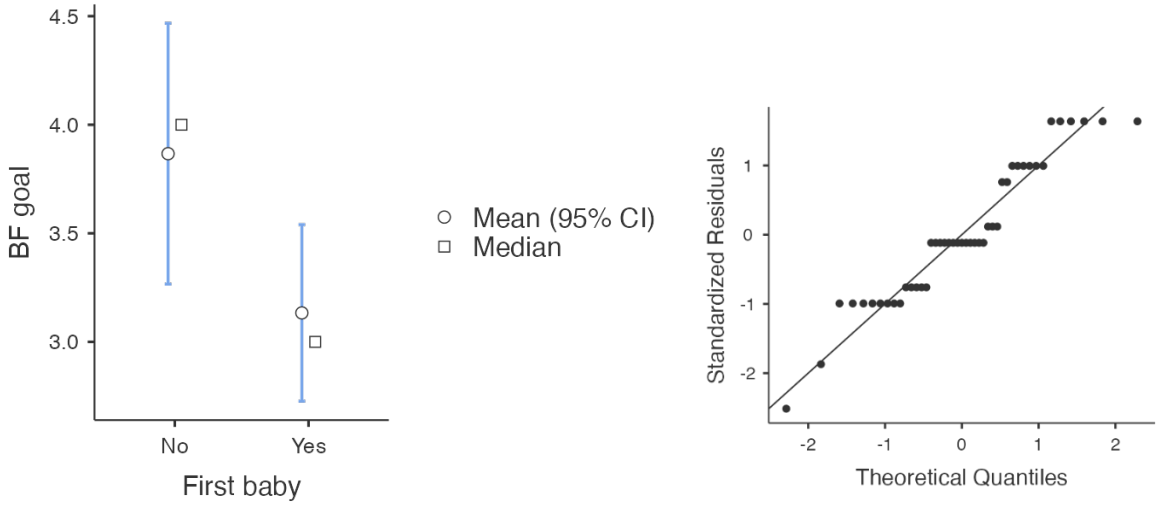
APPENDIX W: Health Outcomes - Infant Feeding

Breastfeeding Goals

All but one participant (n = 45) who completed the first follow-up assessment (the home visit 11 to 24 months post birth) retrospectively reported a breastfeeding goal. This was an ordinal-level measure based on one of five multiple choice endings to the statement: *'I wanted to breastfeed my baby/pēpi (partially or exclusively) for a total duration of:* (0) Not at all, (1) Less than 6 months, (2) 6 to 12 months, (3) 12 to 18 months, (4) 18 to 24 months, (5) More than 2 years. All participants (100% of the sample) indicated an intention to breastfeed, with nobody choosing the first response ('Not at all'). The distribution of goals is shown in the figure below. 40% of mothers (18/45) reported they had planned to breastfeed for 12 to 18 months, and a quarter (26.7%) planned to breastfeed more than 2 years (12/45) as the World Health Organisation recommends. 17.8% intended to breastfeed for 6 to 12 months in total (8/45), and 11.1% planned to breastfeed for 18 to 24 months (5/45). Two mothers (4.4% of the sample) said they had planned to breastfeed for less than 6 months (8/45).

Figure W1.

Retrospectively Reported Breastfeeding Goals for Women Caring for a First or Subsequent child (n = 45)

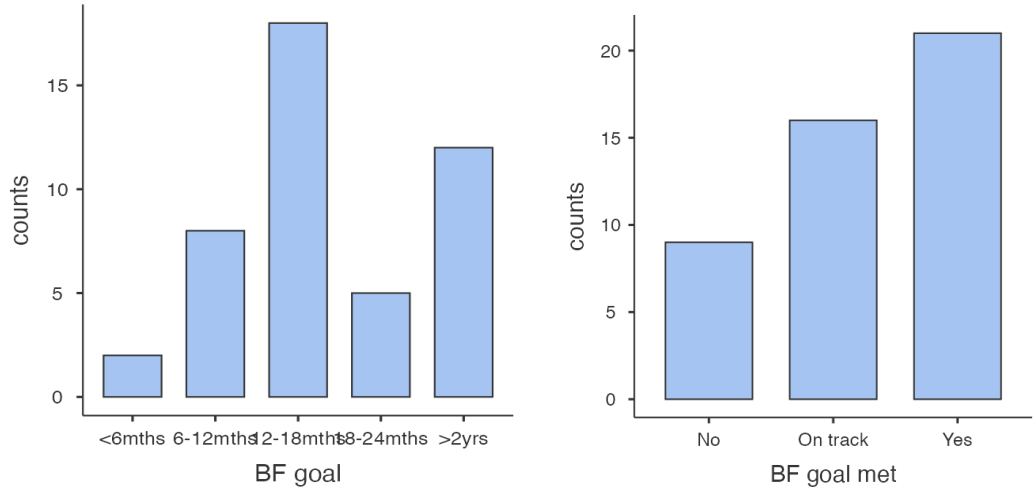


First-time mothers reported significantly shorter average breastfeeding goals than participants who already had one or more other children. This was a post hoc comparison. Two-sided Independent Samples t-tests were used to test the null hypothesis that first-time mothers and experienced mothers had identical breastfeeding goals. The Levene's test indicated adequate homogeneity of variances ($F = 0.195(1,43)$, $p = 0.661$), but a significant Shipiro-Wilk test suggested a violation of the assumption of normality, so non-parametric tests were used in place of Student's t-tests. The mean difference in duration of breastfeeding goal on the quasi- continuous scale was significant, indicating experienced mothers set longer breastfeeding goals (Mann-Whitney U = 141, $p = 0.035$). The rank biserial correlation of 0.373 indicated a small to moderate effect size.

45.7% of women in the sample (21/45) had already met their breastfeeding goal by the first follow-up assessment. Another third (34.8%) were on track to meet their goal but hadn't yet reached the breastfeeding duration they aimed for (16/45), while fewer than one fifth (9/45 = 19.6%) indicated breastfeeding did not continue as long as they had hoped and they had not met their goal with the present baby.

Figure W2.

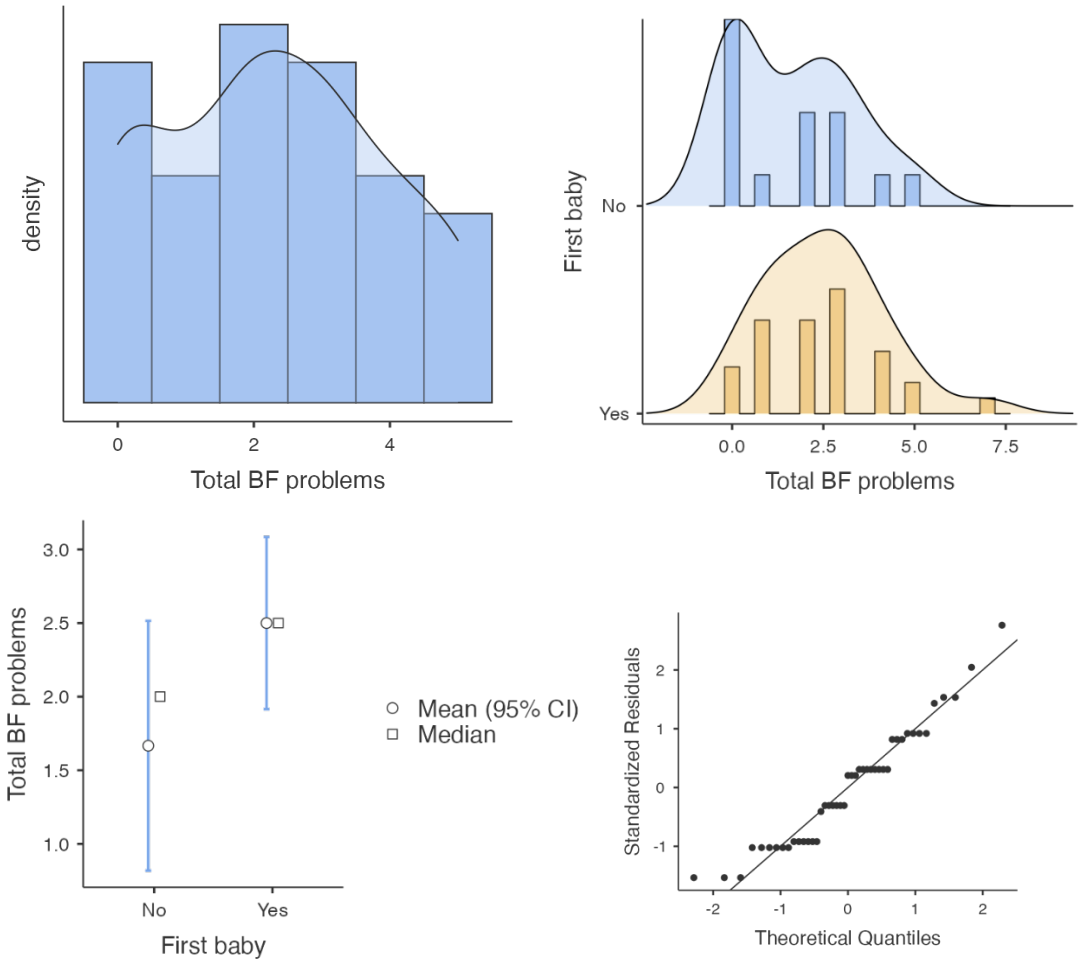
Breastfeeding Goals for Women in the Sample and Whether They Were Met by the 11-24mth Home Visit



Breastfeeding Problems

Breastfeeding problems were common in the sample. More than half the participants in the study reported problems getting their baby latched on comfortably or correctly (27/46 = 58.7%), 51.1% experienced nipple pain (23/45), over a third experienced breast engorgement (18/46 = 39.1%), 28.3% perceived their milk supply to be insufficient (13/46), and 17.4% reported at least one bout of mastitis (8/46). Additional breastfeeding problems were described by more than a third of the sample (16/46 = 34.8%), of which the most common was lip or tongue tie (7/46 = 15.2%). Two mothers out of the 46 who completed the home visit reported suffering from Raynaud's Syndrome (4.3%), one reported thrush (2.2%), one food intolerances (2.2%), and one an undershot jaw (2.2%). Finally, one mother and one baby were described as having an aversion to breastfeeding (4.3% total). The mean number of breastfeeding issues per mother-baby dyad was 2.27, with a standard deviation of 1.63. The maximum number of problems experienced by a single dyad was 5, the minimum was zero, and the median number of problems was 2.

Figure W3.
Number of Breastfeeding Problems Experienced by Women in the Pakiaka Tupuora *Sample* (N = 46)



First-time mothers reported more breastfeeding problems (M = 2.60, SD = 1.57, n = 30) than experienced mothers caring for a second or subsequent baby (M = 1.60, SD = 1.59, n = 15), as shown in Figure W3. The difference was marginally non-significant (Mann-Whitney U = 147, p = 0.058) based on two-sided non-parametric test of the null hypothesis that parenting experience would make no difference to the total number of breastfeeding issues reported. This was a post hoc comparison. The effect size was large (Cohen's d = 0.633). A significant Shapiro-Wilk test of normality suggested the assumptions of parametric testing were not met (W = 0.936, p = .015).

Figure W4.
Breastfeeding Duration from Birth to 6 months, as Reported at the Home Visit

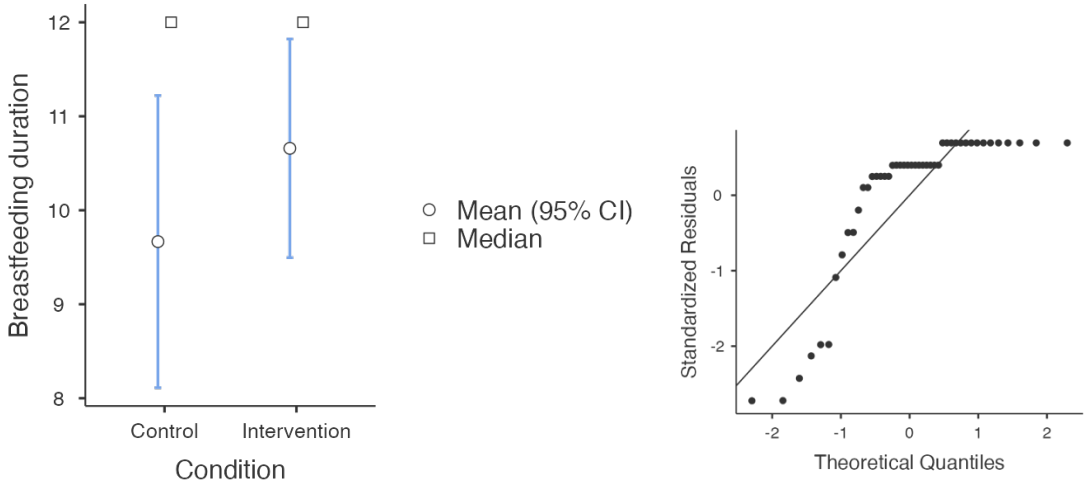
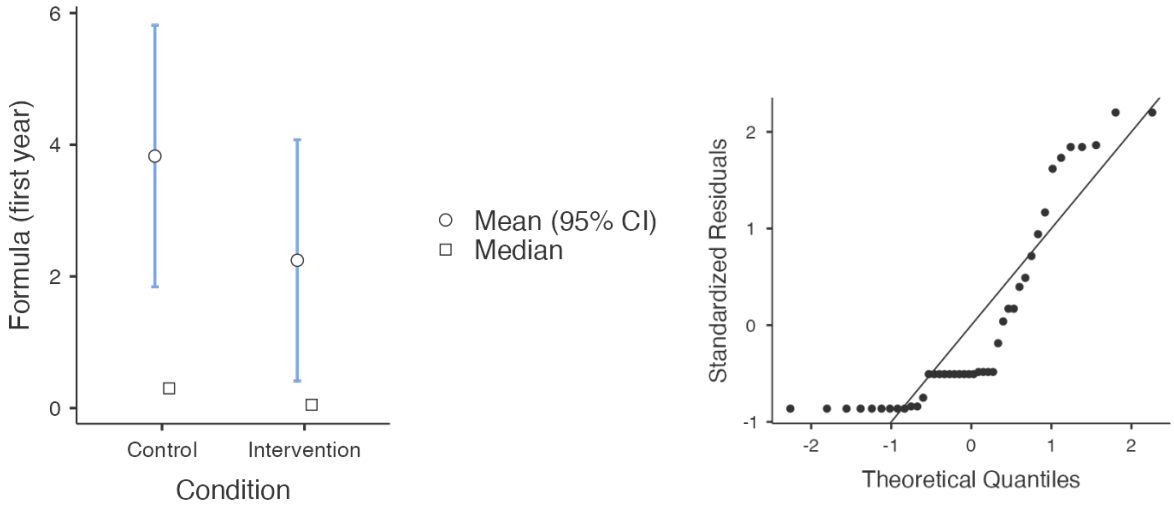


Figure W5.
Use of Artificial Breastmilk Substitutes During Babies' First Year (Final Questionnaire)

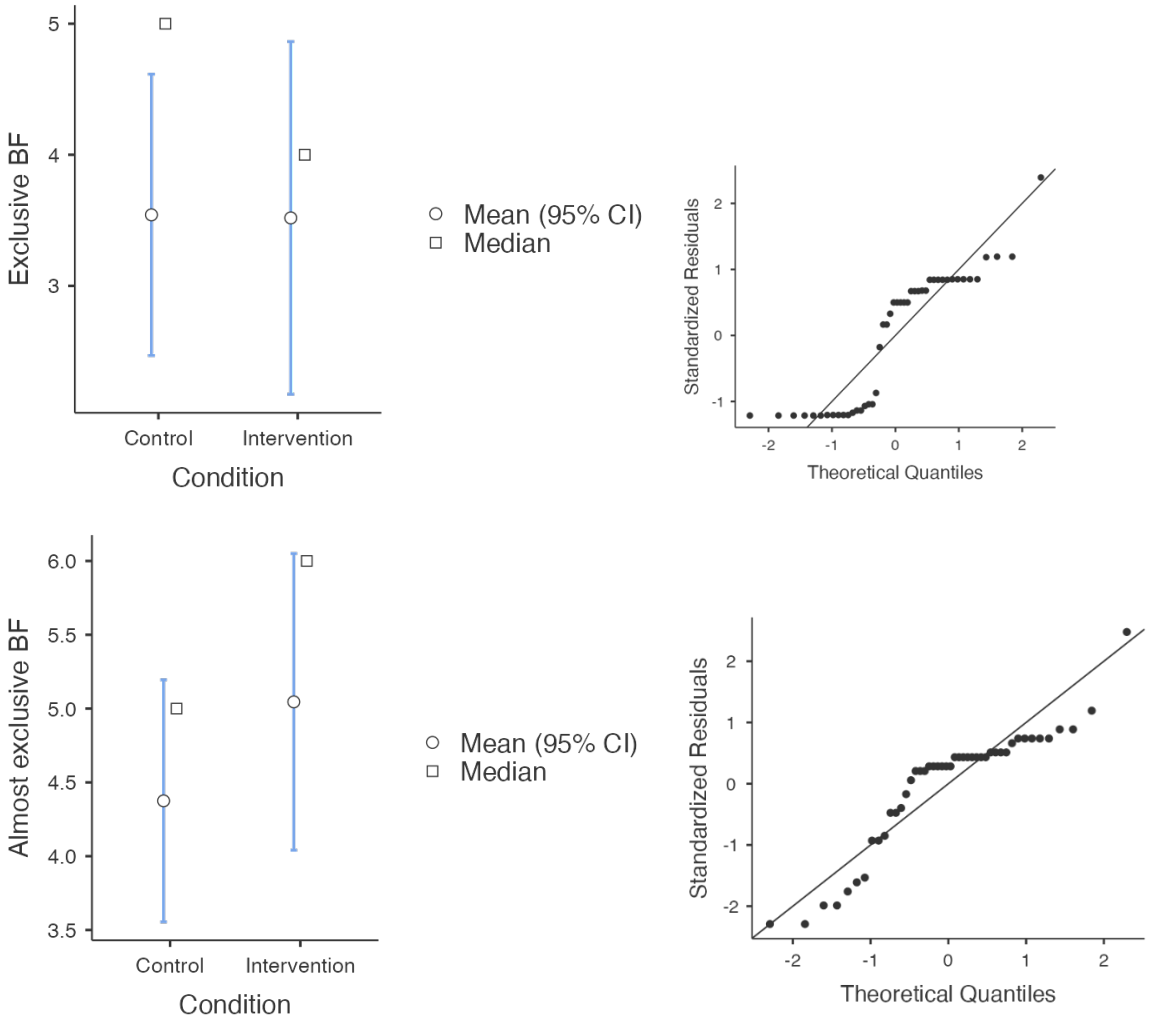


Exclusive Breastfeeding

Duration of exclusive breastfeeding was not higher in the intervention group as hypothesised, but this appears to be due to the practice of 'topping up' breastfed babies with formula during their first few weeks of life. Once these top-ups are removed from the data by creating a variable that ignores early partial formula use the pattern reversed and subsequent post hoc analysis approached statistical significance.

Figure W6.

(a) Exclusive and (b) Almost Exclusive Breastfeeding at 6 months by Study Condition (Home Visit Data) with Q-Q Plots of Residuals shown alongside



APPENDIX X: Health Outcomes – Postnatal Depression

Figure X1.
Mean Edinburgh Postnatal Depression Scale *(EPDS) Scores by Study Condition*

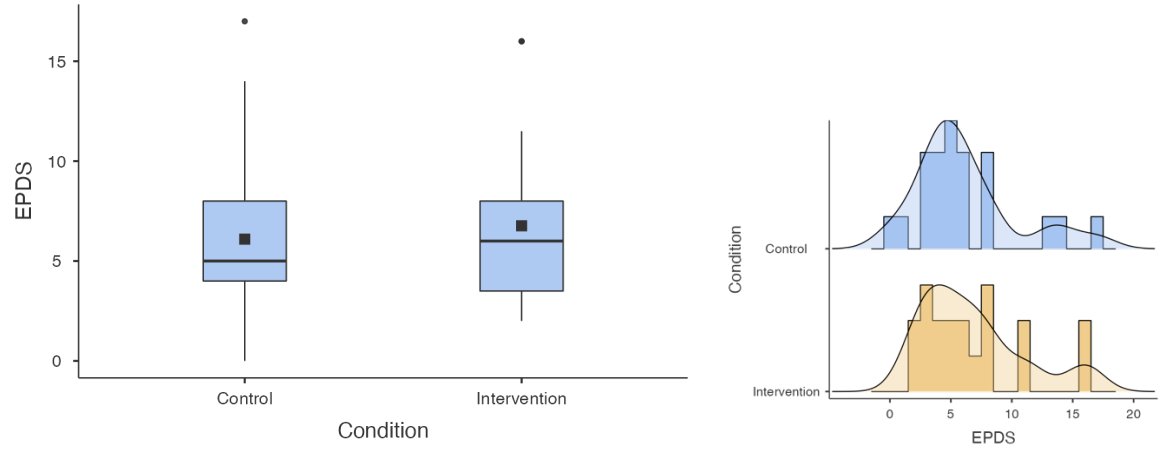
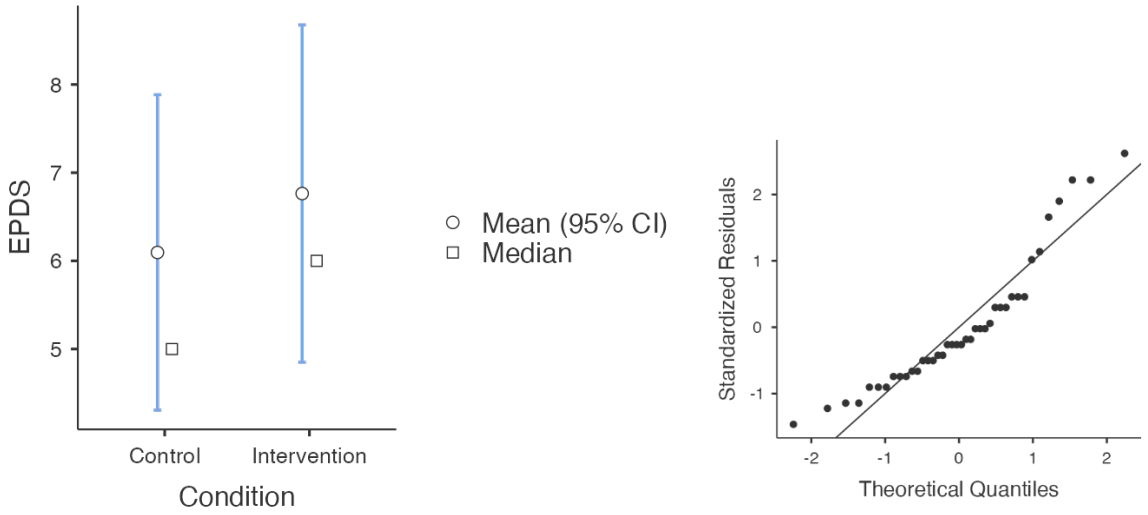


Figure X2.
Edinburgh Postnatal Depression Scale (EPDS) *Score by Study Condition*



APPENDIX Y: Glossary of Māori Terms

Aotearoa	New Zealand
Aroha	(verb) To love, feel compassion for, empathise; (noun) Love, affection, sympathy, compassion
Atua	Spiritual being; ancestor with continuing influence; god; demon; deity; ghost; ways of rationalising or perceiving the natural world
Hapū	Close groups of related individuals
Harakeke	New Zealand flax, *Phormium tenax*. A native plant with long, stiff, upright leaves used for weaving
Hauora	Health
Hui	Gathering
Hui Process	Use of traditional hui structure in clinical interactions
Ipu whenua	Vessel to hold the placenta after birth
Iwi	Extended kinship group; tribe; nation; people
Kapa haka	Māori performing group; *haka* (posture dance) group
Karakia	Blessing
Kaumātua	Elder/s; elderly man/woman; a person of status
Kaupapa	Topic; purpose
Kaupapa Māori	Māori approach, agenda, practice, customary knowledge, or ideology
Kāinga	Home; address; residence; village; settlement; dwelling
Kaimahi	Worker/s
Kairaranga	Weaving experts
Kaiwhakawhānau	Traditional Māori birth supporters
Kōrero	Talk; conversation
Koro	Grandfather; elderly man; male elder
Korowai	Cloak (specifically a tag cloak)
Koru	Spiral pattern
Kōruru	Traditional game very similar to 'knucklebones', played with five stones
Kuia	Grandmother/s; elderly woman; female elder
Kura	School/s
Mana	Power; prestige
Manatū Hauora	New Zealand Ministry of Health
Mana wahine	The power and prestige of women
Mātauranga Māori	Māori knowledge
Mihimihi	Appropriate greetings
Muka	Prepared flax fibre (specifically used as a string tie to bind the umbilical cord after birth)
Oranga Tamariki	New Zealand Ministry for Children
Pākehā	Non-Māori; people of European descent
Pēpi	Baby; babies
Pīkau/waha	Babywearing; infant carrying
Poroaki/poroporoaki	Farewell; end gathering

Putanga	Outcomes
Tamaiti	Child; boy – used only in the singular
Tamariki	Children – normally used only in the plural
Tāne, koro, kuia	Men; man; husband; male gender
Tangata tiriti	People of the treaty; non-Māori New Zealanders
Tangata whenua	People born of the whenua (placenta), and of the land where the placenta of ancestors are buried; Māori
Tapu	Under special rules and restrictions
Tāpuhi	Traditional Māori midwives
Tauiwi	Non-Māori people
Teina/taina	Younger sibling of the same gender; junior relative
Te Kāwanatanga o Aotearoa	New Zealand Government
Te Reo Māori	The Māori language
Te Ao Māori	The Māori world
Te Tiriti o Waitangi (1840)	The founding document of Aotearoa. A legal agreement between Māori and the Crown
Tikanga	Right cultural practice
Tīkanga Ririki	Māori parenting education programme
Tino rangatiratanga	Self-determination; sovereignty
Tīpuna	Ancestors, grandparents. Plural of 'tipuna'
Tī rākau	Stick game involving tossing light rods in time to a song
Tohunga	Traditional experts; Indigenous healers
Tuakana	Older sibling of the same gender; same-gender cousin from a more senior branch of the family
Tuku	To release; let go; give up; descend; relinquish; set free; allow
Ūkaipo	Breastfeeding
Wahakura	Infant sleep basket woven from NZ flax
Wahakura wānanga	Events in which cultural parenting knowledge is passed on alongside the weaving of infant sleep baskets
Wāhine Māori	Māori women. 'Wahine' = woman (singular)
Waiata	(verb) To sing; (noun) Song; chant; psalm
Whāinga	Goals
Wairua	(verb) attitude; atmosphere; feeling; mood; nature (noun) Spirit; soul
Wānanga	(verb) To meet and discuss (noun) Seminar; conference; forum; tribal knowledge
Whare	House; building
Whangai ū	Breastfeeding; breastmilk; source of sustenance; origin
Whakaarotau	Priorities
Whakamutunga	Ending
Whakapapa	Genealogy
Whakataukī	Proverb; significant saying
Whakawhanaungatanga	Relationship-building
Whānau	Family; families
Whānautanga	Birth
Whenua	Land; placenta