Australian Government

Closing the Gap.

Footprints in Time

The Longitudinal Study of Indigenous Children

Report from Wave 4

Wave 4

The Footprints in Time team acknowledges all the traditional custodians of the land and pays respect to their Elders past and present.

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Initiated, funded and managed by the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs

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The document must be attributed as the Footprints in Time The Longitudinal Study of Indigenous Children Key Summary Report from Wave 4.

The photos of families and children used in the Report are taken from families participating in the study. Written permission to use these photos has been obtained in all instances.

Aboriginal and Torres Strait Islander peoples are warned that this report may contain photos of deceased persons.

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Chair's foreword

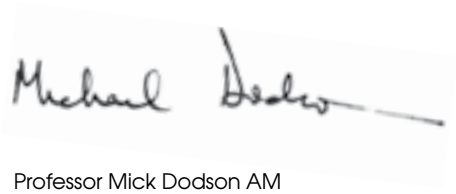
I am once again amazed by the continued commitment and generous support of our participant families to the *Footprints in Time* study. It is extraordinary that for four years more than 1200 Aboriginal and Torres Strait Islander families have repeatedly welcomed our interviewers into their homes. Each year, our people entrust *Footprints in Time* with data on significant experiences and struggles that our participant families have faced over the past year. I want to pass on my warm thanks and deep appreciation to both the *Footprints in Time* families and FAHCSIA staff for their continued dedication to the success of the study.

In many communities, the Research Administration Officers who visit the families to collect the data act as the face of *Footprints in Time* and help to keep our participants connected with the study. I appreciate that these connections are one of the reasons participation is so high.

Longitudinal studies like *Footprints in Time* provide both policy makers and researchers with a valuable source of data to understand the causes and pathways that lead to certain life outcomes. *Footprints in Time* is continually increasing in significance as a highly valued longitudinal data source about Aboriginal and Torres Strait Islander children and their families. With four waves of data currently available, *Footprints in Time* is at a point where it can be used longitudinally to identify possible connections in early life to later outcomes. These longitudinal connections can be vital in understanding complex areas such as the impact of family and community life on success at school.

As of wave 4, the majority of our study children have started school. Many *Footprints in Time* children are flourishing at school. Yet there are still a sizeable number of children having educational difficulties. Identifying the factors behind these different outcomes is crucial to helping our children thrive at school. For example, we have identified that reading to children predicts improved literacy scores. We also hope to identify, and promote, the positive influences teachers are having on our study children's development.

I hope that both policy makers and researchers will continue to employ the information derived from *Footprints in Time* to understand the lives of Indigenous children and their families. Such insights are needed to develop programs and policies that will enable Aboriginal and Torres Strait Islander children to have the strongest possible start to life.



Professor Mick Dodson AM
Chair
Steering Committee

Introduction to this report

Footprints in Time is the name given to the Longitudinal Study of Indigenous Children, an initiative of the Australian Government. The study is conducted by the Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) under the guidance of the *Footprints in Time* Steering Committee, chaired by Professor Mick Dodson AM. The study aims to improve the understanding of, and policy response to, the diverse circumstances faced by Aboriginal and Torres Strait Islander children, their families and communities.

This report is the fourth in a series of reports produced for each wave of the data collection. The report provides a selection of research findings from wave 4. The range of topics covered in this report showcases both the richness of the data and the potential for further research.

Further information about the study, including the fieldwork methodology and attrition rates, is available in the appendices. Readers may wish to refer to the previous reports for more detailed information about the developmental phase of the study and for results from the first three waves.

Important notes on reading this report

Analysis for this report is based on the beta, or preliminary, version of the dataset. Using the final release of the dataset may provide slightly different results.

The report has been written by non-Indigenous analysts from FaHCSIA. While every effort has been made to interpret the data within Indigenous contexts, there may be instances where a greater understanding of Indigenous cultures might aid interpretation. We strongly encourage potential data users to draw on the strengths of an interdisciplinary approach with Indigenous collaborators.

As a longitudinal study, *Footprints in Time* provides a unique opportunity to follow the development of a group of children and examine the factors contributing to their individual and collective outcomes. The children are divided into two cohorts. In previous reports they have been referred to as the 'B cohort' and the 'K cohort'. For ease of comprehension, this report uses the terms 'younger cohort' and 'older cohort' respectively. The younger cohort consists of children born in 2006, 2007 and 2008 and the older cohort consists of children born in 2003, 2004 and

2005. In wave 4, most of the younger cohort were 3½ to 5 years old (88.9 per cent), and the older cohort were 6½ to 8 years old (87.1 per cent). The mean ages of the two cohorts were 49 and 84 months respectively.

For the first time in wave 4, researchers can take advantage of the cross-sequential design of the study. In wave 4, children in the younger cohort are the same age as children in the older cohort were in wave 1. Data can therefore be pooled across cohorts to examine a larger sample of 3½- to 5-year-olds.

In wave 4, 749 children and their primary carers were interviewed for the younger cohort and 534 children and their primary carers were interviewed for the older cohort, bringing the total study sample to 1,283. Unless otherwise stated in this report, only those children interviewed for wave 4 of the study are referred to.

The majority of information was collected by Indigenous interviewers from the primary carer who was the person who had primary responsibility for the care of the child. It should be remembered that the term 'primary carer' has a broader meaning than 'parent.' Information was collected about both the child and the family context in which they live. Where possible, interviewers go back to the same primary carer each year. However, sometimes the parent or carer is not available or has limited time, and a different carer is interviewed about the study child. About 4 per cent of children had different primary carers from the previous interview. Although 92.5 per cent of children had a primary carer who was either their mother or their father, it is important to bear in mind that the term 'primary carer' has a broader meaning.

The demographics of the sample are very different from those of many other surveys about Indigenous people. The primary carers are predominantly women (98.1 per cent) with an average age of about 33, looking after young children. Although all the children are Indigenous, 17.2 per cent of primary carers in wave 4 are not.

The data is not meant to provide a comparison between Indigenous and non-Indigenous populations. The *Footprints in Time* sample is not representative of the Indigenous population and there are no weights to adjust for this. For example, the sample has a higher proportion of people living in areas of high or extreme isolation than is the case in the total Indigenous population. In 2008, the National Aboriginal and Torres Strait Islander Social Survey (NATSISS) (Australian Bureau of Statistics (ABS) 2009) found that 68 per cent of the Indigenous population was living outside major cities, 44 per cent in regional areas and 24 per cent in remote and very remote areas. By comparison, 72.3 per cent of *Footprints in Time* participants were living outside major cities, with 47.5 per cent in regional areas and 24.8 per cent in remote or very remote areas. However, some comparisons are used in this report to highlight differences or similarities between the *Footprints in Time* population and the general population. Others are provided to enable comparisons of the *Footprints in Time* sample with data from other Indigenous surveys and indicate how closely the results align with those of other studies.

Unless specifically stated, percentages provided in this report are based on the numbers of responses and do not include the numbers of participants who refused to answer a question or responded that they did not know. For most variables, the number of missing responses was very low (less than five). The number of respondents is provided in cases where the number of missing responses may make a significant difference.

The term 'average' in this report has been used instead of 'mean' but has the same meaning.

The term 'significant' may be understood to mean the same as 'statistically significant'. Significance tests have been applied where applicable and, unless otherwise stated, it may be assumed that the term 'significant' means that $p<0.05$.

PART A

Wave 4 update

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Learning

Attendance at school, child care and playgroup

At the time of wave 4, all the children in the older cohort and some of the younger cohort were attending school. Table 1 shows the percentage of each cohort enrolled in an education program. The majority of children not attending any of the listed programs were too young to be enrolled. Nearly 20 per cent of the children who did not attend school attended some kind of playgroup or mothers group.

Most of the older cohort children who were at school the previous year (89.6 per cent) attended the same school in wave 4. Of the 10.4 per cent (n=54) who had changed schools, the majority (59.3 per cent, n=32) did so because the family had moved house. A further 16.7 per cent (n=9) did so for convenience (for example, to be closer to home) and another 9.3 per cent (n=5) changed schools to improve their academic opportunities.

Primary carers of children in the older cohort were asked why they chose the school their child attends. Responses varied depending on levels of relative isolation (LORI).[1]

People in urban areas and areas with low isolation were most likely to have chosen the school based on convenience for the family (such as proximity to home or work) while children in more remote areas were more likely to have had no choice. Seven families (1.4 per cent) chose the school based on cultural appropriateness and all of these were in areas of no or low isolation.

In the week prior to interview, 20.3 per cent of children who were enrolled in school or preschool did not attend every day they were supposed to. The most common reason was illness or injury.

Getting to school

Children typically travelled to school by car (56.9 per cent), on foot (31.6 per cent) or by bus (24.8 per cent). Very few children went to school by bike. While most children used only one method of transport, 14.0 per cent combined two or even three methods. It is not clear whether these children used multiple methods each day (e.g. getting a lift in the car to the bus stop and then taking the bus) or used different travel arrangements on different days (e.g. walking one day and riding their bike the next). Table 2 shows how children travel to school by LORI.

Table 1: Enrolment in educational program by cohort, per cent

Educational program	Younger cohort	Older cohort
Preschool program in a school	29.0	-
Preschool program at a non-school centre	25.8	-
Pre year 1 program in a school*	4.5	5.3
Year 1	0.4	53.2
Year 2	-	40.5
Year 3	-	1.0
Mobile preschool	0.5	-
Does not attend	39.8	0.0

* Includes prep in QLD, VIC & TAS, kindergarten in NSW and ACT, transition in NT and pre-primary in WA.

1 Refer to appendix B for more information about LORI.

Table 2: Type of transport to get to school by LORI, per cent

Transport	Urban	Low	Moderate	High/extreme	Total
Car	75.0	60.3	34.0	24.0	56.9
Walk	26.9	24.0	43.1	64.6	31.6
Bus	11.6	26.6	42.4	27.1	24.8
Bike	1.1	1.9	0.7	2.1	1.5

Note: Columns do not total 100 per cent, as some children used multiple methods of transportation.

Table 3: Type of transport by type of school, per cent

	Government	Non-government	Total
Car	55.2	62.1	56.0
Walk	40.0	24.2	38.0
Bus	21.0	30.3	22.1
Bike	2.2	0.0	1.9

Note: The columns do not total 100 per cent, as some children used multiple methods of transportation. The totals in this table differ from the totals in the previous table, as it includes only those who answered both questions.

As the table shows, children in more remote areas were more likely to walk and children in more urban areas were more likely to be driven to school.

As seen in Table 3, the type of school is related to the method of transport used by children to travel to school. The non-government category includes Catholic and independent schools. Children who attended government schools were more likely to walk and less likely to be driven or catch a bus than those who attended non-government schools. This may partly be because the availability of non-government schools varies by LORI and partly because government schools were more likely to be chosen for their proximity.

Children's readiness for school

The children in the younger cohort are getting ready for school. Just over 60 per cent of them are enrolled in a preschool or a similar program that prepares them for school.

The Who Am I (WAI) score is one indicator of a child's readiness for school. In wave 4, 670 children in the younger cohort completed WAI for the first time. Out of a possible score of 27, the average score was 13.5 with a range of 0 to 26.

There is a strong link between how well children do in the WAI and their age. The average score of children who were 3 years old at the time of the interview was 11.4. Scores rose to 14.5 for children who were 4 years old and to 17.2 for those who were 5 years old.

Children who had better access to a wide range of educational and economic resources had higher WAI scores. Children whose primary carer received education or training beyond year 10 scored an average of 1.0 point ($p<0.05$) higher on the WAI than other children. Children in more advantaged areas[2] had higher average scores than children living elsewhere. Younger cohort children who had no children's books in the house (1.5 per cent of the sample[3]) had average scores of 10.2, while children with one to five children's books (15.0 per cent of the sample) had average scores of 12.1 and those with more than 50 children's books in the house (32.2 per cent) had average scores of 14.1. Similarly, children who used a computer at home or at school scored an average of 14.5 whereas those who did not use a computer at home or school scored an average of 12.6.

Another indicator of children's readiness for school is their social skills. Research has shown that children whose primary carer had a strong Aboriginal or Torres Strait Islander identity and children who spent quality time with their families in activities such as reading, storytelling or drawing had fewer social, emotional and behavioural difficulties and were better prepared for school (Armstrong et al., 2012). These factors may help children overcome some of the difficulties associated with living in a disadvantaged area.

2 Using the Index of Relative Indigenous Socioeconomic Outcomes —see appendix B for more details.

3 The sample here refers to respondents in the younger cohort only and for whom information on the number of books in their house was provided.

Using technology

In wave 4 primary carers provided information about whether their children used computers and the internet and, if so, where they used them—67.1 per cent of the children used computers and 39.1 per cent used the internet.

However, there are large differences in usage between the younger and older cohort. Only 48.2 per cent of the children in the younger cohort used computers, compared to 93.6 per cent of the children in the older cohort. This is due, in part, to school attendance. Many children did not use computers at home and relied on their school for access, and children in the younger cohort were less likely to be enrolled in and attending school. While 87.2 per cent of children in the older cohort used computers at school, only 19.5 per cent of children in the younger cohort did. Children in the younger cohort who attended school or a preschool program were more likely to use a computer than those who did not attend such a program.

Growing up in Australia: the Longitudinal Study of Australian Children (LSAC) also asks about home computer access. In 2010, 89.5 per cent of 6- to 7-year-olds had access to a home computer[4]. *Footprints in Time* children were much less likely to have access to a home computer than Australian children on average. In 2011, only 62.1 per cent of *Footprints in Time* 6- to 7-year-olds had access to a home computer.

For both cohorts, internet usage was lower than computer usage: 18.1 per cent of the younger cohort and 69.8 per cent of the older cohort used the internet. This difference is also partly due to differences in school enrolment and attendance. Just over 40.5 per cent of children in the older cohort used the internet at home. Internet use increases to 69.0 per cent once school use is taken into account. By comparison, 14.7 per cent of children in the younger cohort used the internet at home. This increases only slightly to 17.5 per cent, once school use is taken into account.

Among the younger cohort children not yet at school, 31.0 per cent of children in jobless families[5] used a computer compared with 45.0 per cent in families which were not jobless. This difference all but disappeared for children in the older cohort who were all at school: 92.3 per cent of children in jobless families used computers compared with 94.3 in non-jobless families. This suggests that schooling reduces socioeconomic differences in terms of providing children with access to computers. However, it should be noted that *Footprints in Time* does not include information about the amount of time children had access to computers at school.

Learning through play

Children learn important physical, social and emotional skills needed to participate successfully in their environment by doing activities with their parents and other family members. In wave 4, primary carers of the younger cohort were asked which of nine activities they

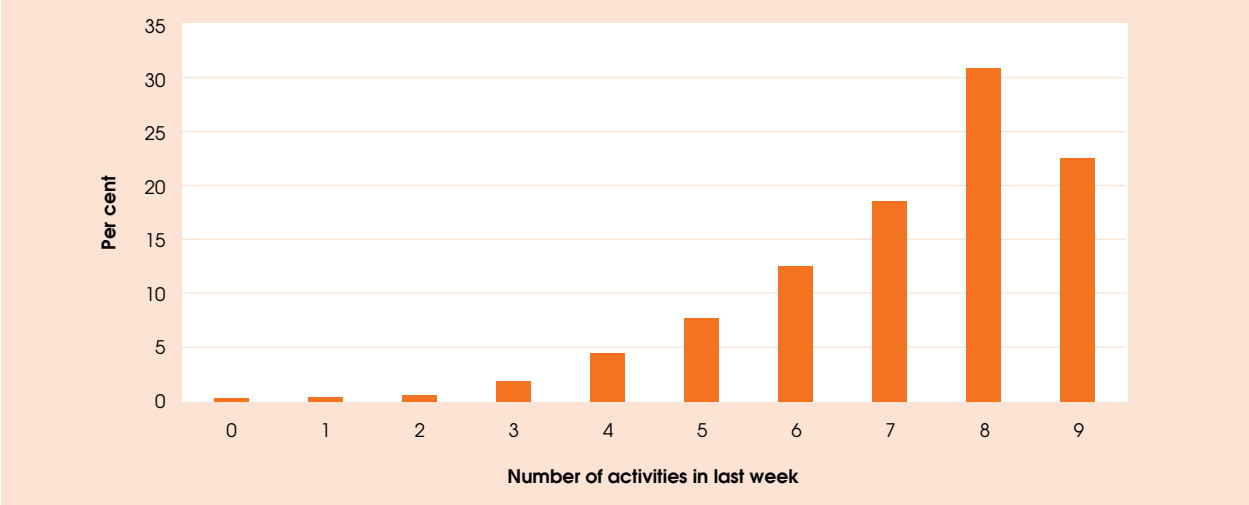
Table 4: Children involved in activities with one or more family members, per cent

In the last week	Participation rate
Play games outdoors	91.8
Take SC shopping	91.1
Music and dance	90.6
Play games indoors	84.4
Read a book to SC	82.6
Involve SC in housework	80.8
Craft activities	77.2
Tell SC an oral story	73.1
Play computer, Xbox etc.	47.7
In last month	**Participation rate**
Playground	74.6
Swimming	40.6
Library	29.0

4 This is from weighted LSAC data for children in the younger cohort who were aged 6- to 7-years old in 2010.

5 A jobless family is a partnered family in which neither of the partners is employed or a lone- parent family where the primary carer is not employed. It does not take into consideration the number of hours worked.

Figure 1: Number of activities children were involved in with family member



or another family member had been involved in with the study child (SC) in the last week; playing games outdoors, taking the child shopping, music and dance, playing games indoors, reading a book to the child, involving the child in housework, craft activities, telling the child an oral story and playing on the computer, Xbox or PlayStation. The activities with the highest participation rates were shopping, music and dance, and playing outdoors. The least common of the activities was playing on the computer or gaming consoles.

In general, *Footprints in Time* children do numerous activities with their family. Figure 1 shows that more than 50 per cent of the children had participated in eight or nine of the activities in the previous week.

Primary carers were also asked whether the child had been to the playground, library or swimming with them or another family member in the previous month. The majority of children (87.2 per cent) had participated in at least one of the activities done in the previous month, and 11.8 per cent of children participated in all three activities.

The high participation rate also indicates a high level of interaction between the children and family members. Table 5 shows which family member was involved in the children's activities.

Table 5: Family members involved in activities with the study child, per cent

	Of those children who participated in an activity							
In last week	**Mother**	**Father**	**Grandma**	**Grandad**	**Auntie**	**Uncle**	**Sister**	**Brother**
Play games outdoors	60.5	34.4	6.3	4.8	5.8	4.2	42.8	45.8
Take SC shopping	92.2	24.9	15.5	4.3	5.6	1.6	17.2	11.8
Music and dance	71.0	24.3	11.4	4.0	9.8	3.9	34.1	28.0
Play games indoors	64.6	27.9	9.4	4.5	6.5	4.5	40.9	42.8
Read a book to SC	72.5	24.2	11.1	3.4	4.7	1.8	21.3	9.1
Involve SC in housework	91.7	18.9	9.3	2.5	3.0	1.5	12.6	8.3
Craft activities	64.6	20.4	10.8	4.2	6.3	1.7	33.6	23.2
Tell SC an oral story	65.4	29.6	17.4	7.8	7.0	3.7	14.2	11.6
Play computer etc.	34.4	27.0	2.8	1.1	2.5	3.7	35.2	40.0
In last month								
Playground	76.8	34.4	11.2	4.1	9.4	3.4	39.5	38.4
Swimming	75.2	40.4	15.9	7.3	11.3	5.6	32.1	37.1
Library	40.5	7.9	4.7	0.9	0.9	0.0	12.1	10.2

Note: rows do not add up to 100 per cent as children may have participated in activities with more than one family member.

Children did activities with a wide range of family members. Over 60 per cent of children in the younger cohort participated in activities with three or four different family members and nearly 10 per cent participated with six or more family members. In most cases, these family members were parents and siblings. Children were most likely to be with their mothers during these activities. The only activity for which the mothers did not have the highest participation rate was playing on the computer or video games which was most likely to have been done with a sibling. On the whole, female relatives have higher participation rates than male relatives. These gender differences highlight the ways that some male and female primary carers share caring responsibilities. For example, fathers were least likely to participate in housework with their children, while housework was the second most common activity for mothers to do with their children. In turn, mothers had lower participation levels for activities like playing indoor and outdoor games and computer games, whereas fathers and siblings had increased participation rates.

Growing up

Nutrition—bush tucker

In each wave, primary carers were asked about their children's nutritional intake on the day prior to interview. In addition to asking about bush tucker eaten the previous day, in wave 4 primary carers were asked if the children had ever eaten bush tucker. While less than 7 per cent of children had eaten bush tucker in the day prior to interview, responses about types of bush tucker ever eaten were provided for a much greater proportion of children (around 55 per cent). Children living in more isolated areas were more likely to eat bush tucker than children living elsewhere (both in general and the day prior to interview).

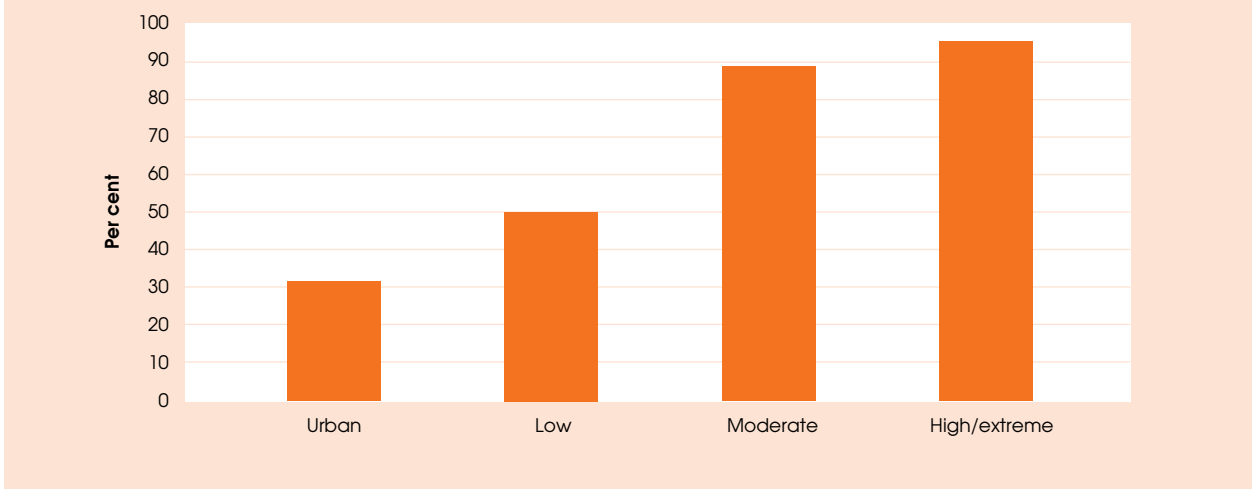
In terms of what types of bush tucker their children ate, responses showed that Australia is a well-stocked pantry with a wide array of foods available from the land and water. Over 45 per cent of children had eaten kangaroo. This may not be surprising due to its availability in many Australian supermarkets as well as on land. Other kinds of bush tucker reflect the availability of foods in the region. Dugong was eaten by children in the Torres Strait and turtle was eaten by children living near the sea or rivers. Land animals on the menu included native animals like goanna, echidna, emu and wombat as well as introduced species such as rabbit and camel. Bush tucker available from the sea includes shellfish, stingrays, squid, fish, oysters and prawns. Freshwater food includes freshwater turtle, freshwater fish, eel and yabbies. Children also ate a wide variety of bush fruit including native plums, berries, coconut, wild figs and lilli pilli.

While *Footprints in Time* does not collect data on the proportion of bush tucker included in a child's diet, it would seem that a large number of children in areas of moderate to extreme isolation have the opportunity to enjoy a rich and varied traditional diet courtesy of the land and water.

Bedtime routines

Research shows that children who have daily routines and predictable environments do better on most developmental measures (Fiese et al. 2002). One way that parents can provide this consistency is to follow a bedtime routine. Bedtime routines have the added benefit of encouraging children to develop good sleep habits and get sufficient sleep (Mindell et al. 2009). The amount of sleep a child needs for normal development depends on the individual child, but a preschool child generally needs between 10 and 12 hours of sleep every night and a schoolchild needs around 10 hours.

Figure 2: Children who had ever eaten bush tucker by LORI, per cent



When *Footprints in Time* primary carers were asked whether their children had a set routine or pattern for going to bed, 879 primary carers (68.6 per cent of the sample) answered that they did and went on to describe those routines. Routines often included a bedtime, dinner, a bath or shower, brushing their teeth, watching television, playing, and reading a book or being told a story.

Of the primary carers who described a bedtime routine, nearly half specified a bedtime for their children. These bedtimes ranged between 6.30 and 10.30 pm, with the majority going to bed at 8.00 or 8.30 pm. Only a few children went to bed at 9.30 pm or later.

The most commonly mentioned activity before bed was watching TV or a movie. For most children this was done before going to bed but for others this involved watching TV in their bed or going to sleep while watching TV with their family. Some parents mentioned TV in the context of using it as a time indicator for the child: 'Sleep at 7:30 when Prime Possum[6] is over'.

About 20 per cent of children had a story before bedtime. Most children had a story read or told to them by a parent. Reading together not only develops a child's reading and language skills but also provides a chance to spend time as a family at the end of the day.

As children become more confident in their reading, they become less reliant on other people to read to them. In wave 3, 81.5 per cent of the younger cohort and 81.9 per cent of the older cohort had a book read to them by a family member at some time during the previous week. While the percentage of the younger cohort who had a book read to them remained more or less steady (82.6 per cent) in wave 4, the percentage of the older cohort who were read to dropped to 76.0 per cent, presumably due to children becoming more independent in their reading.

Many *Footprints in Time* families found other ways to incorporate quality time with parents or siblings into their child's bedtime routines. Some parents specifically mentioned cuddling or lying down with their child as a part of the bedtime routine:

> '7.30 pm watches TV, gets into bed with stuffed toys then dad lays in bed with him until he goes to sleep.'

> 'She brushes her teeth, get her duck, kiss and cuddles, blanket, stereo and lamp and any other kiss and cuddle and she goes to (bed) around 8.30 on the dot.'

Other less frequently mentioned bedtime activities involved chores such as cleaning up after dinner, homework, saying prayers, singing songs, or talking about the day with their parents.

Outcomes for children with bedtime routines were better than for those with no bedtime routines. Children with bedtime routines scored better on average on the Strengths and Difficulties Questionnaire (SDQ)[7] scales, with average difficulties scores of 11.8 for those who did have a routine and 13.5 for those who did not. Similarly, children who had a bedtime routine had average scores of 14.0 on the WAI, while children with no bedtime routine had an average score of 12.6.

For the first time in wave 4, children in the older cohort were asked to complete the Progressive Achievement Test in Reading (PAT-R), which assesses a child's ability in reading. Children with a bedtime routine scored better on the PAT-R (on average 73.7, n=376) than children who did not (on average 66.6, n=131).

Health conditions requiring additional assistance

In each wave, primary carers are asked about any medical conditions the child has experienced in the previous 12 months. Primary carers who identified their child as experiencing at least one of a list of specified illnesses, injuries or conditions were asked if their child needed extra help with personal care, mobility or communication as a result of the illness injury or condition. Of the 155 (12.1 per cent of the sample) primary carers whose child had one or more of these conditions and who responded to the questions about needing additional help, 88 responded 'never' to all three questions and 67 (5.2 per cent of the sample) reported that their child needed additional help due to a health condition.

Table 6: Type and level of assistance needed, observations

Type of care	Always	Sometimes	Never	Total
Physical Care	28 (18.1%)	19 (12.3%)	108 (69.7%)	155 (100%)
Mobility	11 (7.1%)	14 (9.0%)	130 (83.9%)	155 (100%)
Communication	17 (11.0%)	25 (16.1%)	113 (72.9%)	155 (100%)

6 This is a short segment on Prime Television that airs at 7.30 pm in which the network's mascot, Prime Possum, encourages young children to go to bed.

7 See appendix B for more information about this measure.

Children were more likely to need extra help with personal care and less likely to need help with mobility. There were 15 children who needed this extra help in all three areas, five of whom always required assistance in all areas. Many of the children had several health conditions listed, and it was not always possible to determine which of the conditions or combination of conditions caused them to need extra care. It is also possible that children with multiple conditions require different types of care for each condition.

Primary carers were also asked how their child's condition had affected their family life. Of the 67 primary carers whose children needed extra help, 28 responded that it had not affected their family life. The remaining 39 gave responses showing that families are affected by children's care needs in different ways and to varying degrees. One common consequence was the physical toll on the primary carer because of the need to be vigilant and because of continual interruptions to their sleep. Specialised medical care can disrupt family routines and create financial strains, especially if travelling is required. In a small number of cases, primary carers felt some level of social isolation and exclusion due to their child's behavioural problems or not having the option to participate in the labour force.

Emotional development

Strengths and difficulties

Primary carers of the older cohort children were asked the full set of Strengths and Difficulties (SDQ)[8] questions in both waves 3 and 4. These questions can be used to provide information about children's social and emotional behaviour across five scales or domains. Using correlations allows comparison of the two waves to determine the extent to which a child's score in wave 4 can be predicted by their score in wave 3. Wave 3 results were found to be a reasonable predictor of the results in wave 4. There is a moderate correlation (0.58) between individual total difficulties scores for waves 3 and 4, indicating that children displaying problematic social and emotional behaviours in wave 3 were fairly likely to display the same problematic behaviours in wave 4. Prosocial behaviour scores were also moderately correlated across years (0.41).

Table 7 shows that, as a group, *Footprints in Time* children were at higher risk of emotional and behavioural difficulties in wave 4 than in wave 3, with the greatest increase in the emotional symptoms domain. The differences in the means of the two waves are significant for the emotional symptoms, conduct problems and total difficulties scales.

However, children also had significantly higher scores in the prosocial domain in wave 4 than in wave 3. This indicates *Footprints in Time* children were increasing in their ability to interact positively with peers. While 35.3 per cent of children maintained the same score as in wave 3, 38.3 per cent had better prosocial scores in wave 4. Of the remaining 26.4 per cent whose scores had decreased, the vast majority saw only marginal decreases.

Table 7: Average scores of the older cohort in SDQ domains

Domain	Wave 3	Wave 4	Difference
Emotional symptoms	2.4	2.7	0.3*
Conduct problems	2.3	2.6	0.2*
Hyperactivity	4.6	4.7	0.1
Peer problems	2.0	2.1	0.1
Total difficulties scale	11.3	12.1	0.8*
Prosocial behaviour	8.4	8.7	0.3*

* significant at 0.01

8 See appendix B for more information about this measure

Table 8: Average SDQ scores by domain and gender in wave 4

Domain	Males	Females	Difference
Emotion symptoms	2.8	2.6	0.2
Conduct problems	2.8	2.5	0.3
Hyperactivity	5.2	4.2	1.0*
Peer problems	2.2	2.1	0.1
Total difficulties scale	13.0	11.4	1.6*
Prosocial	8.3	9.0	0.7*

* significant at 0.01

Table 8 shows the average scores across each of the domains for boys and girls. In each of the difficulties domains, boys had higher mean scores than girls, suggesting that boys had higher risks of developing both specific difficulties and difficulties in general.

Differences for boys and girls were significant on the hyperactivity, total difficulties and prosocial scales.

Boys also showed greater increases in difficulties scores from wave 3 to wave 4; on average, boys' difficulties scores increased by 1.08 points while girls' difficulties scores increased by 0.46. Boys showed smaller increases in prosocial scores (on average 0.05 points) than girls (on average 0.57 points).

Table 9: Boys and girls in low and high total difficulties score categories for waves 3 and 4, per cent

	Wave 4					
	Boys		Girls		Total	
Wave 3	Low	High	Low	High	Low	High
Low	66.4	13.7	75.3	7.9	70.7	10.9
High	9.5	10.4	9.3	7.5	9.4	9.0

Footprints in Time data allows us to not only examine changes in overall difficulties scores but also track the score progression of an individual's difficulties over time. Do most children have relatively similar scores from year to year, or is it quite common for children to move from having the lowest scores in the sample to having one of the highest scores?

There are 469 children for whom there are complete SDQ data for both wave 3 and wave 4. Based on Goodman's research (Goodman, 2012) approximately 10 per cent of a sample will attain scores which indicate increased risk of clinically significant problems in social and emotional behaviour and a further 10 per cent will attain scores which indicate a high risk of clinically significant problems. The scores for the *Footprints in Time* children were divided to reflect this 80/20 split. Table 9 shows the changes between these low difficulties score and high difficulties score categories (labelled low and high) across the two waves for boys and girls.

In wave 3, a higher percentage of boys were in the high score category; 20.0 per cent of boys and 16.7 per cent of girls. This gap further increased in wave 4 with 24.1 per cent of boys and 15.4 per cent of girls in the high score category. The table shows that boys were more likely to move into the high difficulties category and girls were more likely to move out it.

For further discussion on factors influencing these outcomes, refer to the article in Part B titled 'Social and emotional wellbeing and learning to read English'.

Family finances

Financial situation

Primary carers were asked about their family's overall money situation in waves 1, 3 and 4, facilitating analysis of how people are doing financially over time. In wave 4, the majority of families received enough money to meet their needs: only 12.9 per cent reported not having enough money. Between waves 3 and 4, 54.8 per cent of families remained in the same financial situation, 21.5 per cent were worse off and 23.7 per cent were better off. Families that had enough money or were able to save were least likely to experience changes to their financial situation, while families that did not have enough money in wave 3 were most likely to change situations.

There were 1,038 families who responded in all three waves in which this question was asked. These responses can be used to examine the persistence of different financial situations. Table 10 shows the number of years families experienced each of the three financial scenarios.

Over two-thirds of respondents had enough money each year that the question was asked. Just under two-thirds of respondents said they were able to save in at least one year and 13.7 per cent were able to save in all three years. While 32.3 per cent of respondents reported not having enough money at least once, only 10.0 per cent experienced it more than once and 2.5 per cent reported not having enough money in all three years, suggesting persistent financial hardship is relatively rare.

Financial stress

In waves 3 and 4, primary carers were asked if, in the 12 months prior to interview, they had money shortages that resulted in stressful occurrences for the family, such as being unable to pay bills on time or to heat or cool their home. Table 11 shows the percentage of primary carers experiencing each type of financial hardship in waves 3 and 4 and the number of types of stressful events they experienced.

Table 10: Number of years in each financial situation, per cent

Money situation	0 years	1 year	2 years	3 years	Total
Not enough money	67.7	22.3	7.5	2.5	100
Just enough	21.7	32.5	29.2	16.7	100
Able to save	35.6	28.0	22.6	13.7	100

Table 11: Primary carer's experience of financial stress, per cent

Type of Financial Stress	Wave 3	Wave 4
Could not pay bills on time	32.4	32.0
Could not pay housing payments on time	11.2	10.6
Went without meals	8.0	7.5
Unable to heat or cool the home	8.8	8.4
Pawned/sold something	13.2	12.1
Asked for assistance from a welfare organisation	18.2	18.9
Could not send child to school or child care as often as they would like*	-	3.4
Did not experience financial stress	54.5	56.0
Experienced one or two types of stress events	31.9	31.1
Experienced three or more types of stress events	13.6	13.0

* Not asked in wave 3.

There is no significant difference in the experience of each type of stress between waves 3 and 4. Although there was a slight improvement in the overall level of financial stress (a 1.5 percentage point increase for those experiencing no financial stress), this was not statistically significant. Table 12 shows the persistence of financial stress across the two waves. The totals differ slightly from the table above as the sample includes only those who responded in both waves. Only questions that were asked in both waves are included.

Of the people who responded to these questions in both waves, 41.7 per cent experienced no financial stress in either wave. Overall, 62.0 per cent of people experienced the same level of financial stress in both waves, 20.4 per cent experienced less financial stress in wave 4 and 17.7 per cent experienced more financial stress in wave 4.

Living as a family

Fathers' time with children

Fathers play a vital role in their families. Research shows that children achieve better social and learning outcomes if their fathers make investments like spending time with their children, supporting other carers, engaging in positive and good parenting, and making financial contributions (Baxter & Smart 2010).

Information was collected in wave 4 from fathers (either the biological father or the main father figure) through the Dads Survey. The Dads Survey is based on the Parent 2 Survey from waves 1 and 2 and provides information about the contributions of *Footprints in Time* fathers and the diversity of fathering experiences.

In wave 4, 211[10] (of a possible 739) men responded to the Dads Survey, accounting for 28.6 per cent of male parents in wave 4.[11] Of those who responded, 91.5 per cent were biological fathers to the study child; 5.7 per cent were stepfathers, adoptive or foster fathers, and 2.8 per cent were grandfathers and other related persons. The vast

Table 12: Financial stress indicators in waves 3 and 4, per cent

	Wave 4			
Wave 3	**None**	**1 or 2**	**3 or more**	**Total**
None	41.7	10.6	2.0	54.3
1 or 2	11.9	15.4	5.0	32.3
3 or more	3.5	4.9	4.9	13.4
Total	**57.1**	**30.9**	**12.0**	**100.0**

Table 13: Involvement of fathers in study child's play activities, per cent

Activity	Very often (most days)	Often (1 to 3 days a week)	Occasionally	Never
Play outdoors	38.9	37.9	21.8	1.4
Play indoors with toys or games	41.2	29.9	23.2	5.7
Watch TV, DVDs or videos	42.7	30.8	24.2	2.4
Play computer or video games	9.5	16.1	27.5	46.9
Any of these activities	72.0	21.8	6.2	0.0

10 There are 213 individuals in the final dataset, but the data from 2 respondents were not available at the time this analysis was done.

11 This is a proportion of study children with either a male responding as primary carer (26) or another male with substantial responsibility for the child (714). Where both the primary carer and other parent were male (1 case), the study child was counted only once.

majority of responding fathers (89.1 per cent) lived in the same household as the child. Of those who were living elsewhere, 39.1 per cent were currently in a relationship with the primary carer. Of the responding fathers, 55.9 per cent had boys and 42.1 per cent of responding fathers had girls. The majority of responding fathers were Indigenous—67.6 per cent identified as Aboriginal, 2.4 per cent as Torres Strait Islander and 2.9 per cent as both Aboriginal and Torres Strait Islander—and 27.1 per cent were non-Indigenous. The following analyses are based on the responses to the Dads Survey and should not be considered to be representative of all *Footprints in Time* fathers.

Fathers were asked how frequently they did a range of play, social, learning and personal care activities with their child. Where applicable, questions were modified to be age appropriate for the two cohorts. (Table 5 reported mothers' responses to similar questions about all family members' involvement, including fathers', in activities with their children.)

Participating in play activities is an important aspect of fathering, especially during the young toddler to preschool years (Parke 1996). The responding *Footprints in Time* fathers were highly involved in their child's play activities; all fathers in the sample had at least some level of involvement in their child's play activities, with the vast majority playing with their child every day or most days, and only 6.2 per cent of fathers playing with their child less than once a week.

Fathers of older children were less likely to engage in daily play compared with fathers of younger children. On average, 77.9 per cent of fathers of children in the younger cohort played with their child most days, while 64.0 per cent of fathers of children in the older cohort did the same. As they start school, children in the older cohort are starting to expand their social world outside of the home and spend more of their time playing with peers (Baxter & Smart 2010). The types of play activities engaged in also changed; paternal involvement in playing on the computer or video game consoles was higher for the older cohort, with 12.4 per cent playing most days and 65.2 per cent ever playing. For the younger cohort, 7.4 per cent reported playing most days and 44.3 per cent reporting having ever played.

The sex of the child also had an impact on the choice of play activities. The fathers of boys were just as likely to spend their shared play time playing outdoors as indoors, while the fathers of girls spent more of their shared play time watching television, DVDs or videos or playing indoors. Figure 3 shows that, on average, fathers in this sample played more frequently with their male children. In particular, 44.1 per cent of fathers with boys played outdoors most days of the week compared to 32.3 per cent of fathers with girls.

Figure 3: Fathers involved in study child's play activities most days (4 or more days a week), by gender of the study child, per cent

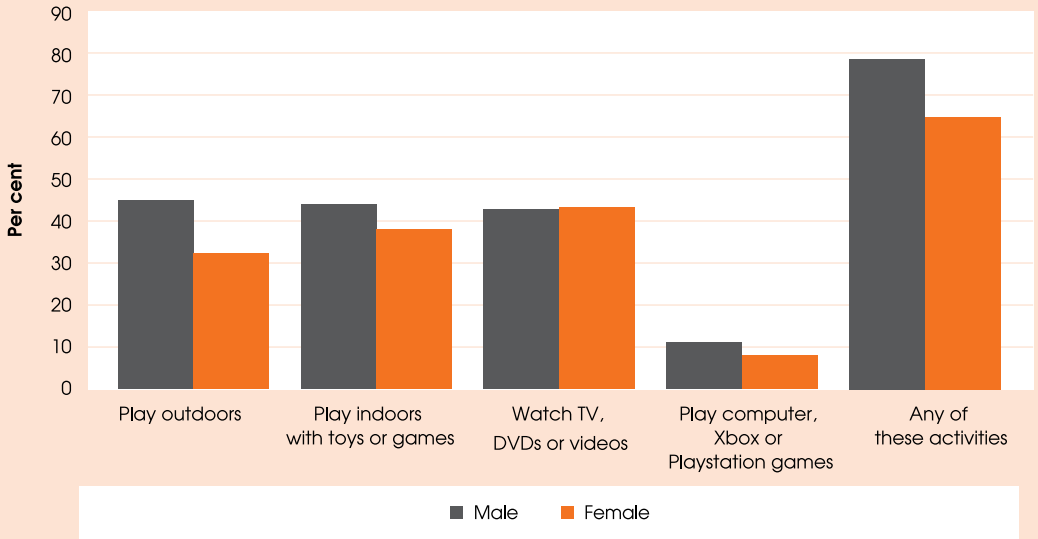


Table 14: Involvement of fathers in social activities with study child, per cent

Activity	Very often (most days)	Often (1 to 3 days a week)	Occasionally	Never
Involve study child in housework or cooking	30.8	29.4	26.5	13.3
Eat an evening meal with study child	80.6	9.5	9.5	0.5
Talk with study child about school or his/her day	73.0	15.2	10.4	1.4
Try and make study child laugh*	81.1	9.8	8.2	0.8
Any of these activities	93.8	4.3	1.9	0.0

* Question asked of younger cohort only.

Table 15: Involvement of fathers in study child's personal care activities, per cent

Activity	Very often (most days)	Often (1 to 3 days a week)	Occasionally	Never
Help study child brush teeth	26.1	19.9	25.1	28.9
Get study child ready for bed or put him/her to bed	46.9	26.1	18.0	9.0
Help study child get ready for school/going out*	25.4	25.4	15.6	33.6
Any of these activities	60.7	22.8	11.4	5.2

* Question asked of younger cohort only.

As seen in Table 14, *Footprints in Time* fathers who completed the questionnaire were also highly involved in the development of their child's social and communication skills. Nearly all *Footprints in Time* fathers in this sample interacted socially with their child every day or most days, and only 1.9 per cent of fathers reported interacting socially with their child less than once a week. Overall, fathers of boys and fathers of girls were equally involved in social activities, but the activities differed by sex of the child. Notably, fathers were much more likely to involve their girls in day-to-day housework or cooking duties, with 35.5 per cent of fathers of girls and 27.1 per cent of fathers of boys involving their children in these sorts of activities on most days of the week.

Research suggests that mothers and fathers tend to undertake different types of activities with their child. In general, mothers spend longer than fathers doing essential personal care tasks such as feeding and bathing children, while fathers are very likely to spend their time playing with or talking to their child (Craig 2006; Laflamme, Pomerleau & Malcuit 2002).

Table 15, shows fathers are generally less likely to be involved in personal care activities than in play and social activities as shown in Table 14. Nonetheless, most fathers in this sample were regularly involved in a range of essential child care tasks: 73.0 per cent put their child to bed, 50.8 per cent helped their child get ready to go out, and 46.0 per cent helped their child brush their teeth at least once a week (often or very often).

Fathers' involvement in their child's personal care activities may reflect the ways that mothers and fathers share child care, housework and paid employment. For example, fathers may be more likely to help put a child to bed

because it takes place after work hours, while helping a child get ready for school usually occurs during work hours. While working fathers may not participate in every care activity, they are still highly involved in their child's overall care. Averaged across all personal care activities, paternal involvement is the same or higher for employed fathers than non-employed fathers.

While frequency of activities is one way of measuring paternal involvement, it does not capture the quality of time spent with children or all the ways that fathers contribute to families. Most notably, fathers contribute income to the household. Fathers often work longer hours in the paid workforce than mothers, particularly when children are young (Baxter et al. 2006). Many *Footprints in Time* fathers saw paid employment as an important way of fulfilling their fathering roles. When asked, 'What is the best thing about being a dad?' fathers reported:

'Everything. I love seeing him grow, smile, laugh. But I'm glad I'm able to be a good father and role model and able to provide for him.'

'She's just the best thing I ever done. She gives me a reason to be better. When I come home from work she runs out to the car and gives me a kiss and cuddles.'

Fathers also have an important role to play in their child's education. For example, people whose fathers had high education attainment are much more likely to achieve university education themselves than those whose fathers did not (Cassells et al. 2011). In addition to being a role model, fathers also contribute to their child's education by participating in early learning activities, such as reading to children while they are young and helping them with homework.

As with the personal care activities, involvement in learning activities was lower than play and social activities. Nonetheless, the majority of *Footprints in Time* fathers who responded to the Dads Survey were involved in their child's learning most days of the week, and all of them reported at least some level of involvement. Furthermore, responses from *Footprints in Time* show that fathers highly value their role in their children's early education, socialisation and learning. Some of the responses to the question 'What is the best thing about being a dad?' were:

'He has a real spark about him, his enthusiasm to learn and explore, it's a joy to be around him.'

'Teaching him things, we get to hang out together and cracking jokes.'

'Seeing her change and the little characters they become.'

Of the learning activities, fathers were more likely to be involved in reading and musical activities, and least likely to be involved in arts and craft. Fathers tended to help with homework a few days a week or a few times a month rather than every day, possibly because at these ages children do not tend to receive homework every day.

Table 16: Involvement of fathers in learning activities, by gender of the study child, per cent

Activity	Very often (most days)	Often (1 to 3 days a week)	Occasionally	Never
Play music, sing songs or do other musical activities	26.1	34.6	25.6	13.7
Read a book to study child	21.3	28.4	36.0	14.2
Listen to study child read or pretend to read*	37.1	33.7	27.0	2.2
Tell study child a story	28.9	24.2	32.7	14.2
Draw pictures or do other art or craft with him	12.3	26.5	42.7	18.5
Help study child with homework*	20.2	31.5	34.8	13.5
Any of these activities	62.1	27.5	10.4	0.0

* Question asked of older cohort only.

In contrast to fathers' involvement in play activities, fathers of girls participated more frequently in these learning activities than the fathers of boys. This may reflect the preferences of girls or the preferences of fathers for their girls to play and have fun in these activities over outside play or electronic gaming.

Fathers play an important role in preparing their children for the challenges and opportunities of the world outside. Children are guided in their own behaviour by the way that their fathers treat people, spend their time and energy, and handle the joys and stresses of life. One of the hardest things that children may learn is how to handle racism, discrimination and prejudice. When asked how they teach their children to deal with racism, *Footprints in Time* fathers said:

'I will tell her my past history about what happened then I'll help her and teach her to find words to defend herself.'

'I am totally against violence, talk through the situation. To do Aboriginal studies so he can have a better understanding of his heritage and be a part of the solution.'

'Let her know it's not the race that makes the person. To be proud of her cultural background.'

The majority (70.0 per cent) of *Footprints in Time* fathers responding to the Dads Survey cared for their child on their own at least several times a week, and 27.1 per cent did so every day. This is lower than the number of fathers who reported involvement in their child's daily play, social, personal care and learning activities. This suggests that, similar to the fathers in LSAC (Baxter & Smart 2010), much of the time *Footprints in Time* fathers spend with their child occurs when mothers or other carers are also present.

Exercising as a family

Helping young children to develop good eating patterns and enjoyment from sport and exercise may help them avoid later health problems. Younger children are more likely to be active if their family, including their parents, are active (SA Government 2013).

Primary carers were asked whether they played sport or regularly exercised, and whether the study child got involved in their exercise. Just over half of primary carers (50.8 per cent) regularly exercised and, of these, 77.8 per cent involved the study child. Fathers who responded to the Dads Survey were also asked and were slightly more likely to be involved in regular exercise (55.0 per cent) than the primary carers, with 69.8 per cent of them involving their child in their exercise routine.

Fathers exercised and played a variety of sports with their children, including:

'Goes for a ride together, she rides her bike.'

'I train him on Fridays, and game day he plays in the team, rugby league.'

'Go for walks, lifts her own little weights and skips.'

'Follow me round training, comes to games.'

The relationship between major life events and social and emotional outcomes

As discussed in previous wave reports, the greater the number of types of major life events a child experiences in a single period (in this case the 12 months prior to interview), the greater the risk of clinically significant social and emotional difficulties (FaHCSIA 2012). In this section we examine the relationship of individual types of events on children's outcomes, specifically social and emotional difficulties.

The section poses three questions:

- Do all types of major life events have a significant association with children's social and emotional outcomes?
- Does experiencing an event in multiple years make a difference?
- How much of a difference does experiencing an event make?

Each of the major life events is examined individually, but in reality many children experience multiple events. In wave 4, 86.2 per cent of children experienced two or more types of events. Certain combinations of events or additional factors may influence whether a particular type of event is significantly associated with an individual child's outcomes.

For this analysis, the sample includes only children from the older cohort as there are no social and emotional difficulties scores for the younger cohort in wave 4. Scores range from 0 to 40 with an average score in wave 4 of 12.2. Lower scores indicate lower levels of difficulties. The sample is also limited to children for whom there are responses to the major life events questions in all waves. The sample numbered between 405 and 419 children for individual events.

A feature of the *Footprints in Time* major life events questions is that primary carers who answer yes are further asked who the events happened to. This allows examination of the effect of the events when they occur to both someone within the household and someone not living in the household. For the questions specifically about the children, we can look at the effect on the study child of when they are directly involved or when another child within the household is involved.

For each event, we calculated the number of years that each child experienced the event. A bivariate regression analysis was then used to determine whether there was a

significant relationship between the event and the study child's total difficulties score. In cases where there was a significant relationship, further analysis was conducted to determine whether there was a statistical difference between the number of years experienced and, if so, the average level of difference it made to the total difficulties scores of children in each category.

This analysis shows the following major life events did not have a significant relationship with total difficulties scores: a pregnancy or new baby to someone in the household; the death of someone in the household; the death of someone not in the household; a carer of the study child within the household getting a job or returning to study; a carer of the study child within the household losing their job; someone in the household being mugged, robbed or assaulted; one of the study child's parents or carers leaving because of a family split. Neither the primary carer nor the secondary carer returning to work or study showed a significant relationship to children's total difficulties score. It should be noted here that not finding a significant relationship may be due to factors such as low occurrences or sample size. For example, only a few children experienced the death of a family member in the household.

Children who had been badly hurt or sick or who had a family member in the household who had been sick or hurt were more likely to have higher difficulties scores. However, the number of years in which this was experienced did not make a significant difference to children's outcomes. Children who had experienced this event in any year scored on average 1.3 points higher ($p<0.05$) than those who had never experienced it.

There was also a significant difference in the scores of children in families where the primary carer had experienced serious money worries and children in families who had not experienced serious money worries. However, when this was examined across the four years, the scores of children whose families had experienced this in one or two years were not significantly different from those whose families had not experienced it. There was a significant difference for those children whose families had experienced money worries in three or four years. However, having this experience in three waves was not significantly different from experiencing it in four waves. Children who experienced it in three or four years scored an average of 2.4 points higher ($p<0.01$).

Similarly, someone within the household being harassed for money had a significant effect on the scores of only those children whose families had reported experiencing it in three or four years. Children who experienced it in three or four years had average scores of 2.4 points higher ($p<0.05$) than those children who had not experienced this event or who had experienced it in one or two years.

Primary carers were asked whether they had experienced housing problems or overcrowding where they lived or had moved in the last year. In the first three waves, this was asked with a single question. In wave 4, primary carers were asked which of the three events they had experienced. Due to the change, this analysis does not distinguish between the three housing related events. The results again show that children whose families had experienced housing events in three or four years were significantly more likely to have difficulties scores of 2.5 points higher ($p<=0.01$) than children who had not experienced it or who had experienced it in one or two years.

Drug or alcohol problems of a close family member were not shown to have a significant effect on difficulties scores if the person with the problem lived outside the household. There was however, a significant effect if the person lived in the same household as the child. Compared with children who had not experienced this type of event, children who had experienced it had higher average difficulties scores of 2.8 ($p<0.01$).

Primary carers were asked whether they, a close family member, or (from wave 4) the study child had been arrested, been in jail or had problems with the police. No children had had problems with the police themselves and no children experienced this event in more than three waves. The results show that children who had experienced this type of event in one year did not have significantly different results from those children who had not experienced it. However, children who had experienced it in two or three years did have significantly different results; they had scores which were on average 6.1 points higher ($p<0.01$) than those who had not experienced it or had only experienced it in one year.

In addition to the major life events which affected various family members, *Footprints in Time* includes three questions about events that have a direct impact on the children in the household: whether they have been involved in or upset by family arguments; whether they had been badly scared by other people's behaviour; and whether they had been cared for by someone else for at least a week. This analysis does not distinguish between whether the affected child was the study child or another child in the household, as there are very few cases where the study child was not affected but another child in the household was.

The average scores of children who had been involved in or upset by family arguments in any number of waves had scores of 1.8 points ($p<0.01$) higher than those who did not experience this type of event.

Having been scared by other people's behaviour had a significant relationship with children's difficulties scores. Children who had only experienced this type of event in one or two years had average scores of 2.0 points higher ($p<0.01$) than children who had not experienced it. For children who had experienced it in three or four years, scores were 4.4 points higher ($p<0.01$).

Children who had been cared for by someone else for at least a week also tended to have higher scores than those who had remained constantly with their regular carers. Average scores for children who had experienced this in one or two years rose on average by 1.3 points ($p<0.05$) and to 4.9 points higher ($p<0.01$) for children experiencing it in three or four years.

While not all types of major life events experienced by the children and their families were found to have a strong statistical association with children's social and emotional difficulties scores, some events did. Further, the relationship between some types of events and difficulties scores only became significant when experienced over more than one year. While housing events, money worries and being harassed for money were found to have associations with difficulties scores, these were not significant unless the event was experienced in at least three waves. Trouble with the police, being jailed or being arrested only had a significant effect on difficulties scores if it was experienced in more than one year. However, those children experiencing it more often were likely to have greater difficulties than if they had repeated experience of other events within the household. All three types of events experienced by the child directly were associated with higher difficulties scores. Being scared by other people's behaviour or being cared for by other people particularly reflects increased scores, as the average scores increase with every wave.

Future waves of data will provide opportunity to determine whether continued experience of types of events increases the size of the effect or whether there is a point at which further experience does not make a difference. Further analysis could also be done to determine whether the length of time since the last experience has a significant relationship to outcomes.

The Australian Early Development Index

For the first time in Release 3.1, the *Footprints in Time* dataset included Australian Early Development Index (AEDI) community level data. The AEDI is a population measure of young children's development. Information was first collected in 2009 and will be collected nationally every three years. Teachers complete a checklist for children in their first year of full-time school over five domains: physical health and wellbeing; social competence; emotional maturity; language and cognitive skills; and communication skills and general knowledge. Although the AEDI is completed through schools, the data is reported for the communities in which the children live rather than where they attend school (Centre for Community Child Health 2011).

At the time of AEDI data collection, about one in five of all the *Footprints in Time* children were in their first year of school. Most of the children in the study did not contribute directly to the AEDI data. In most cases, however, information is available about the child's community based on the information collected from all the children in the community who were in their first year of school in 2009.

The data is useful as it provides important information about how young children in general are developing in the areas in which our study children live. In the *Footprints in Time* dataset, each child has been assigned the score of the community in which they live. Of the 1,523 children in the wave 2 data (collected in 2009), there is community level AEDI data for 1,472 children. AEDI community level data for the remaining children was not able to be assigned because they lived in communities for which AEDI data was not available, which were not surveyed or which were unknown in the AEDI geography.

The AEDI assigns children a score out of 10 for each domain. A higher domain score indicates a higher level of development in that particular domain. Children are classified as **being on track** if they are in the top 75 per cent of the AEDI population. Children who score in the lowest 10 per cent are considered to be **developmentally vulnerable** and those children who score between the 10th and 25th percentile are considered to be **developmentally at risk**.

The AEDI National Report 2009 (Centre for Community Child Health 2011) showed that the majority of Indigenous children were developmentally on track on all AEDI domains with the exception of the language and cognitive skills (school based) domain. However, there were higher proportions of Indigenous children developmentally vulnerable in each of the AEDI domains compared with non-Indigenous children.

Table 17: Average AEDI scores by domain

	Physical health and wellbeing	Social competence	Emotional competence	Language and cognitive skills	Communication skills and general knowledge
Indigenous population	8.8	8.1	7.9	7.3	7.5
Non-Indigenous population	9.6	9.2	8.7	9.2	9.4

Source: *A Snapshot of Early Childhood Development in Australia—AEDI National Report 2009*, Australian Government, Canberra.

Socioeconomic disadvantage and children's outcomes

Footprints in Time data from wave 2 were combined with AEDI community level data to examine whether the relationship between socioeconomic disadvantage and developmental vulnerabilities reported in the AEDI National Report holds for *Footprints in Time* children.

Table 17 shows the average scores for the non-Indigenous and Indigenous populations across Australia as shown in the AEDI National Report.

As previously stated, *Footprints in Time* includes only community scores. These are the average of the scores of the children in the community for whom the information was collected. Therefore, any comparisons should be made with caution. It should also be noted that community scores do not distinguish between Indigenous and non-Indigenous children living in the community.

Table 18 provides AEDI domain scores for *Footprints in Time* communities with different levels of socioeconomic disadvantage as defined by the IRISEO[12]. IRISEO levels are presented as quintiles, where quintile 1 represents people living in communities of greatest disadvantage. Of the *Footprints in Time* children, 14.9 per cent live in quintile 1, 15.8 per cent in quintile 2, 40.4 per cent in quintile 3, 14.3 per cent in quintile 4 and 14.6 per cent in quintile 5. The table shows that, in keeping with the general AEDI population, children from the *Footprints in Time* communities score highest in the physical health and wellbeing domain. The largest difference in AEDI scores between quintiles for each of the domains is between quintiles 1 and 2, while the variation in scores between quintiles 2 and 5 is relatively small. This suggests that being in the lowest socioeconomic quintile increases the risk of poorer results across the five domains.

As well as looking at average scores, it is possible to use the AEDI data to examine the average percentage of children in *Footprints in Time* communities who are developmentally vulnerable, that is, the percentage of children in the bottom 10 per cent of the Australian population in each domain. Table 19 shows this data for the communities of *Footprints in Time* children by IRISEO. While this is not a reflection on the individual child's vulnerability in the domain, the higher the percentage of vulnerable children in the community, the more likely it is for an individual child to be vulnerable. Once again, the gap between the lowest two quintiles is much greater than between quintiles 2 to 5. This gap is particularly pronounced in the language and cognitive skills domain, which was identified by the AEDI National Report 2009 as being the domain in which Indigenous children were least likely to be on track. For the most part this domain also has the highest proportion of developmentally vulnerable children in each quintile in comparison with the other domains for the *Footprints in Time* communities.

In addition to the information about the proportion of vulnerable children in each domain, AEDI includes information about the proportion of children in the

Table 18: Average community AEDI scores for Footprints in Time communities by AEDI domain and IRISEO

IRISEO quintile	Physical health and wellbeing	Social competence	Emotional competence	Language and cognitive skills	Communication skills and general knowledge
1	8.0	7.2	7.5	6.0	6.3
2	9.1	8.5	8.3	8.2	8.4
3	9.4	8.8	8.5	8.7	9.1
4	9.4	8.8	8.4	8.8	8.8
5	9.4	8.9	8.5	8.5	8.8
Total average*	**9.2**	**8.6**	**8.3**	**8.3**	**8.5**

* This is the total average of community scores for the Footprints in Time children

Table 19: Proportion of developmentally vulnerable children in Footprints in Time communities by AEDI domain and community IRISEO, per cent

IRISEO quintiles	Physical health and wellbeing	Social competence	Emotional competence	Language and cognitive skills	Communication skills and general knowledge
1	30.3	28.9	20.3	44.2	30.6
2	16.5	16.8	14.3	18.2	14.7
3	14.1	15.0	12.6	15.0	11.9
4	12.4	11.4	10.8	12.3	10.5
5	10.8	12.0	11.2	12.0	11.1
Total Average*	**15.8**	**16.1**	**13.4**	**18.4**	**14.4**

* This is the total average percentage of vulnerable children in the community for the communities of the *Footprints in Time* children.

12 See Appendix B for more details

Table 20: Average percentage of developmentally vulnerable children in the *Footprints in Time* communities by IRISEO, per cent

IRISEO quintiles	1 or more vulnerability	2 or more vulnerabilities
1	62.6	42.0
2	35.6	22.2
3	32.9	18.4
4	28.4	15.3
5	28.3	14.9
Average percentage of vulnerable children in *Footprints in Time* communities	**35.8**	**21.1**

community who are developmentally vulnerable in one or more domains and two or more domains. The AEDI National Report 2009 found that 23.6 per cent of Australian children were developmentally vulnerable in one or more of the five domains and 11.8 per cent were vulnerable in two or more. For Indigenous children the comparative rates were 47.4 per cent and 29.6 per cent.

Table 20 shows the average proportion of children in a community with one or more and two or more vulnerabilities for the *Footprints in Time* communities. As with average scores, the average proportion of children with vulnerabilities decreases as socioeconomic advantage increases, with the biggest jump between the first two quintiles. This is in line with the AEDI population as a whole and reflects that *Footprints in Time* children are generally performing in line with the general population.

Community characteristics

The AEDI National Report 2009 reported that children living in more remote areas and children living in socioeconomically disadvantaged communities were more likely to be developmentally vulnerable.

This section examines whether there is a link between community characteristics and the average proportions of developmentally vulnerable children in the community for *Footprints in Time* communities.

Figure 4 shows that as the level of isolation increases so does the proportion of vulnerable children in the community, although there is no significant difference between urban communities and communities with low isolation. The average percentage of children with one or more vulnerabilities in communities with high or extreme levels of isolation is twice that of urban communities. The percentage with two or more vulnerabilities in communities with high or extreme levels of isolation is nearly three times that of urban communities.

Figure 4: Average proportion of vulnerable children in community by LORI in wave 2, per cent

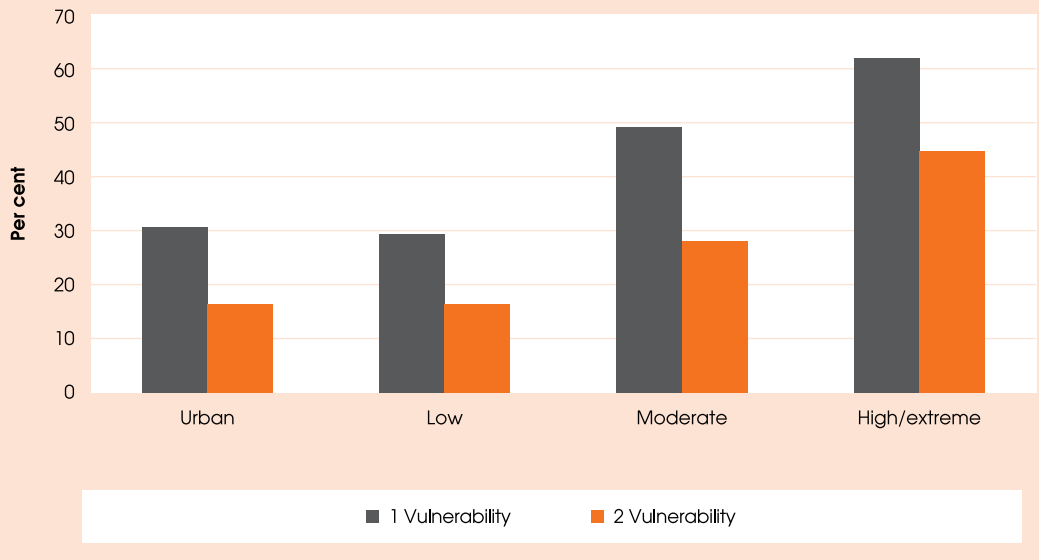
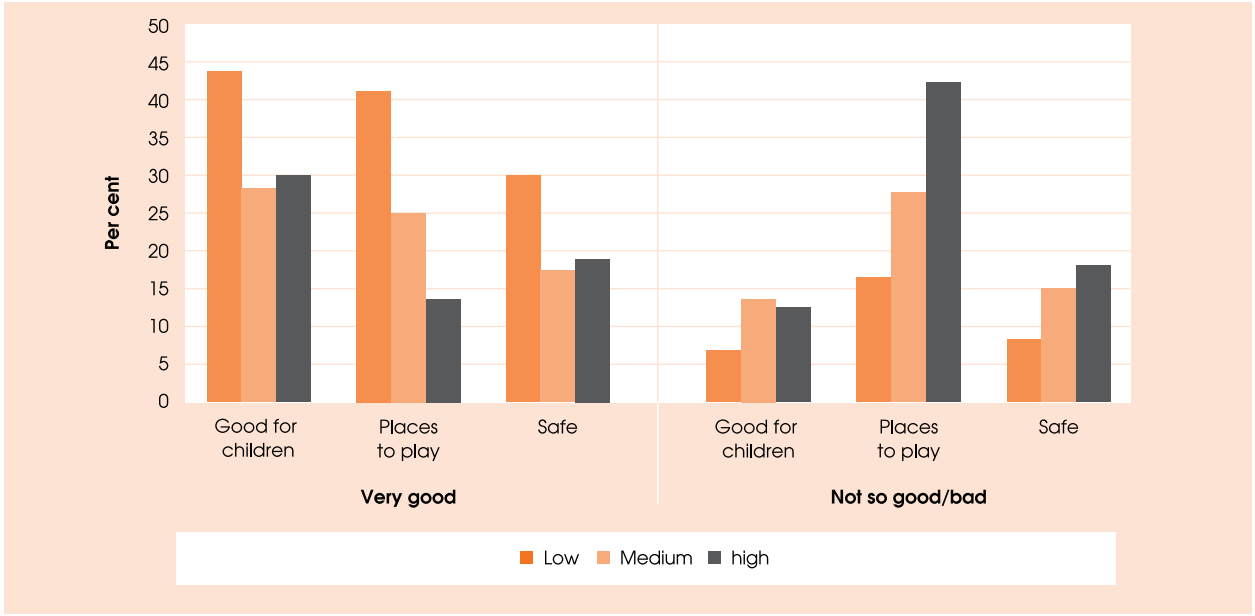


Figure 5: Community characteristics by level of vulnerabilities, per cent



Note: All differences between levels of vulnerabilities in communities are significant at 0.01 using chi square.

In waves 1 and 2, primary carers were asked whether they thought their community was good for little kids, whether there were good places for children to play, and whether the community was safe. Primary carers responded on a five-point scale with options ranging from very good to very bad. For this analysis, communities are divided into three categories by their relative level of vulnerability:

- Low: less than 26 per cent of children in the community have one or more developmental vulnerability (25 per cent of the *Footprints in Time* sample)
- Medium: 26 to 42 per cent of children in the community have one or more developmental vulnerability (50 per cent of the *Footprints in Time* sample) and
- High: more than 42 per cent of children in the community have one or more developmental vulnerability (25 per cent of the *Footprints in Time* sample).

More than half of the primary carers rated their neighbourhood as very good or good against all three criteria. Figure 5 shows that primary carers were more likely to rate their neighbourhood as very good if they lived in communities with lower proportions of vulnerable children.

The reverse is also true; primary carers who indicated the neighbourhood is not a good or safe place are more likely to live in areas with higher levels of vulnerable children.

Cultural outcomes and child composition of the community

Children develop their cultural identities and values from the people who surround them. Generally, parents and other household members have the strongest influence. However, the communities in which children live also play an important part, both directly and indirectly through their parents' connections and interactions with the community. Indigenous people who live in highly urbanised areas usually have access to a wide range of jobs, greater educational choices for their children and better access to medical care. However, lower proportions of Indigenous people in urban areas can result in feelings of cultural isolation. Living on country or in smaller communities may make it easier to live a more traditional life and to pass on traditional knowledge to children.

The following sections use the AEDI measure of the proportion of the AEDI sample of children in the community who are Aboriginal or Torres Strait Islanders as a proxy for the proportion of Indigenous children of all ages in the community. This gives a different perspective on Indigenous identity and culture from the analysis presented in the wave 3 key summary report which primarily used Level of relative Isolation (LORI). The AEDI measure has been broken down into three categories:

- mostly non-Indigenous—communities where Indigenous children make up less than 10 per cent of the child population (21.8 per cent of the *Footprints in Time* sample)
- both Indigenous and non-Indigenous—communities where Indigenous children make up between 10 and 49.9 per cent (55.8 per cent of the sample) and
- mostly Indigenous—communities where Indigenous children make up 50 per cent or more (22.4 per cent of the sample)

Based on the AEDI data, *Footprints in Time* children live in communities whose compositions range from having less than one per cent Indigenous child population to 100 per cent. Half of the *Footprints in Time* children live in communities where the Indigenous child population accounts for 23.5 per cent or more of the total child population. Of the total *Footprints in Time* sample, nearly 11 per cent of the children live in communities where all the children are Indigenous.

Cultural identity

In wave 3, Indigenous primary carers were asked, 'Who is your mob?' to find out whether they identified with any Aboriginal and/or Torres Strait Islander group, tribe or clan (hereafter referred to as group). Those who identified with a particular group (64.9 per cent of all primary carers) lived in communities where, on average, 39.0 per cent of the child population was Indigenous. This was higher than the average for communities of primary carers who did not identify with a particular group (11.0 per cent of the sample), where 23.7 per cent of the child population was Indigenous, and the average for communities of primary carers who were not Indigenous (16.5 per cent of the sample), where 15.2 per cent of the community child population was Indigenous. If the non-Indigenous primary carer's partner identified with a group, the proportion of the child population who were Indigenous rose to 16.9 per cent. This suggests that children who live in communities with larger proportions of Indigenous children are more likely to have parents who identify with a particular group than children living in communities with smaller proportions of Indigenous children.

Table 21 shows whether or not a child's primary carer and the partner of the primary carer identifies with a particular group by child composition of the community. It includes only couple families in which at least one parent is Indigenous and where a response was provided to the

Table 21: Parental affiliation with a group by child composition of community, per cent

	Composition of children in the community		
Parent affiliation	**Mostly non-Indigenous**	**Both Indigenous and non-Indigenous**	**Mostly Indigenous**
Only Mum identifies with specific group	28.3	21.6	10.1
Only Dad identifies with specific group	28.3	19.5	6.7
Both identify with specific group	20.0	45.3	82.4
Neither identify with specific group	23.3	13.6	0.8
Total % **Number**	**100** **120**	**100** **236**	**100** **119**

Note: All differences between types of communities are significant at 0.01 using chi square.

question about their group. The likelihood of both parents identifying with a particular group increases with the proportion of Indigenous children in the community.

The key summary report from wave 3 reported on the top five cultural aspects that parents wished to pass on to their children. Table 22 shows the percentage of respondents who selected each cultural aspect by the composition of the community in which they live.

The composition of the community did not make a significant difference to the likelihood of selecting knowing family history, showing respect or spiritual beliefs. Of those cultural aspects for which the composition of the community made a difference, primary carers in communities that were mostly non-Indigenous or both Indigenous and non-Indigenous indicated that pride in identity was the most important cultural aspect they wished to pass on to their children. Primary carers in communities that were mostly Indigenous were much more likely to select learning to find bush tucker, hunting and fishing.

In a separate analysis examining the association between these aspects of culture and the primary carer identifying with a particular group, the only aspects that were found to be statistically significant were traditions and ceremony, speaking a language, learning to find bush tucker, pride in identity and showing respect.

Table 22: Key cultural aspects to pass on by child composition of the community, per cent

	Composition of children in the community		
Cultural aspect	**Mostly non-Indigenous**	**Both Indigenous and non-Indigenous**	**Mostly Indigenous**
Family history	67.7	63.9	62.3
Showing respect	65.5	62.0	62.8
Pride in identity	64.2	60.7	45.6*
Singing, music, dancing	45.1	32.5*	46.5
Knowing country	40.3	55.5*	57.2*
Family networks	39.4	40.1	14.4*
Storytelling, yarning	39.4	31.9	20.9*
Traditions and ceremony	32.7	28.4	46.0*
Bush tucker, hunting, fishing	23.9	37.7*	72.1*
Spiritual beliefs	23.5	17.3	18.6
Speaking language	23.0	32.1	40.0*
Painting or weaving	19.5	16.6	8.4*

* Significantly different from 'Mostly non-Indigenous' category at p<0.01

Table 23: Child's Indigenous identity in wave 1 and 2 by child composition of community, per cent

	Composition of children in the community		
Indigenous identity	**Mostly non-Indigenous**	**Both Indigenous and non-Indigenous**	**Mostly Indigenous**
Child identified with a group	41.5	60.2	72.1
Child has a connection to country	45.7	61.2	74.8
All differences between types of communities are significant at 0.01 using chi square			

Table 24: Experience of racism by composition of child community, per cent

	Composition of children in the community			
	Mostly non-Indigenous	**Both Indigenous and non-Indigenous**	**Mostly Indigenous**	**Total**
Frequent racism	7.7	5.9	1.4	5.4
Some racism	32.3	30.6	16.3	28.1
No racism	60.0	63.5	82.3	66.6
The Z test of population proportions shows that results for communities in which the population is mostly Indigenous is significantly different from those in which the population is mostly non-Indigenous but there is no significant different between the first two categories.				

Primary carers were asked whether they identified the study child with a group or whether the child had a connection to country (see Table 23). Not surprisingly, Table 23 shows that if a child lives in a community where most children are Indigenous, they are much more likely to be identified with a group and have a connection to country.

Racism

Experiencing racism, discrimination and prejudice (hereafter referred to as racism) can have a negative effect on children's outcomes and development (NSW Department of Education and Training 2010). Table 24 shows the frequency with which primary carers reported their families experience racism by the composition of the community. In this analysis, frequent racism was classified as experiencing it every day or every week, some racism was classified as experiencing it sometimes or only occasionally, and no racism was classified as never or hardly ever experiencing racism.

Two-thirds of the *Footprints in Time* primary carers reported that they never or hardly ever experienced racism. When racism was experienced, it was more likely to be experienced by people who lived in communities that were mostly non-Indigenous or both Indigenous and non-Indigenous than by people living in mostly Indigenous communities.

Learning Indigenous languages

The use of community languages is important for both individual and group identity. While English is the standard language in Australia, many different dialects and ways of speaking have developed within communities (NSW Department of Education and Training 2010). The *Footprints in Time* study includes a question about the type of English spoken in the home, recognising Aboriginal English as a dialect of English. The question asks whether the English spoken in the home includes lots of Aboriginal or Torres Strait Islander words, a few Aboriginal or Torres Strait Islander words, or only English words.

English mixed with lots of Aboriginal or Torres Strait Islander words was much more likely to be spoken in mostly Indigenous communities. Unsurprisingly, speaking only English was most common in communities with low proportions of Indigenous children.

Primary carers were also asked whether they would like their child to learn an Indigenous language at school. The AEDI measure of Indigenous 5-year-olds in the community was again used as a proxy measure for the proportion of Indigenous children in the community to examine how composition of the child population affects attitudes to how languages should be taught in schools.

Table 26 shows that the vast majority of primary carers were in favour of having Indigenous languages programs in their children's schools, but the favoured method of delivery varied according to the composition of the local community. Primary carers who lived in communities in which most children were Indigenous were most in favour of a language taught through a bilingual program, whereas those in communities with smaller proportions of Indigenous children preferred to see languages available as a second (non-compulsory) language.

Children were much more likely to speak an Indigenous language in communities with higher proportions of Indigenous children. Nearly two thirds of the children (64.2 per cent) who lived in communities in which most children were Indigenous spoke an Indigenous language. This is more than three and a half times the proportion of children in communities that were both Indigenous and non-Indigenous (17.5 per cent) and more than ten times higher than the proportion of children in communities that were mostly non-Indigenous (5.5 per cent).

Cultural activities

Over three-quarters of study children attended Indigenous cultural events or ceremonies or sorry business. Children in

Table 25: Type of English spoken in the home by child composition of community, per cent

	Composition of children in the community			
Type of English spoken	**Mostly non-Indigenous**	**Both Indigenous and non-Indigenous**	**Mostly Indigenous**	**Total**
Many Aboriginal or Torres Strait Islander words	5.1	10.2	52.6	17.7
Some Aboriginal or Torres Strait Islander words	28.9	32.7	26.8	30.6
English words only	66.0	57.1	20.7	51.6
* All results significant at 0.01				

Table 26: Learning Indigenous languages in school by child composition of community, per cent

	Composition of children in the community			
Preferred delivery method	**Mostly non-Indigenous**	**Both Indigenous and non-Indigenous**	**Mostly Indigenous**	**Total**
As the main language in school	0.4	0.9	2.4	1.1
Bilingual program	33.3	19.4	57.5	30.5
Compulsory as a second language	10.0	9.5	15.6	10.9
Available as a second language	50.6	57.5	18.9	47.9
Not at all	5.6	12.7	5.7	9.6
* All results significant at 0.01				

Figure 6: Child participation in an Indigenous cultural event, traditional practices and traditional arts, by child composition of the community, per cent

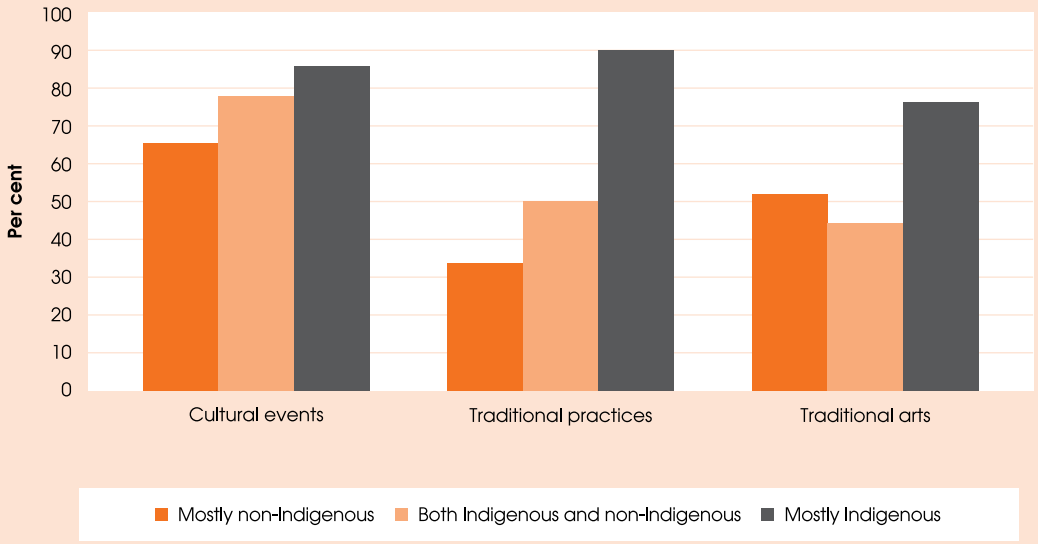


Table 27: Child learns about traditional practices, by child composition of the community and importance of being Indigenous, per cent

	Composition of children in the community		
Importance of being Indigenous	**Mostly non- Indigenous**	**Both Indigenous and non-Indigenous**	**Mostly Indigenous**
Most important	44.8	65.7	91.4
Not the most important or unimportant	32.1	47.6	87.2

* Results for communities in which the population is mostly Indigenous are significantly different at 0.01 from those in which the population is mostly non-Indigenous but there is no significant different between the first two categories.

the older cohort (81.4 per cent) were more likely to have attended a cultural event than children in the younger cohort (73.5 per cent). As shown in Figure 6, children who lived in communities in which most children are Indigenous were more likely to regularly participate in these cultural events and practices than children living elsewhere.

For many families, learning traditional practices like fishing, hunting and finding food, and performing traditional arts like painting, dance, and singing are an important part of their child's early learning. More than half the study children had been taught traditional practices (56.2 per cent) and traditional arts (53.8 per cent). These teachings were more common in communities in which the proportion of the Indigenous population was 50 per cent or more.

Differences between types of community are significant at 0.01 except for the difference between the mostly non-Indigenous and both Indigenous and non-Indigenous categories in traditional arts which is not significant at either 0.01 or 0.05.

Although there were fewer opportunities for children to learn traditional practices and arts in communities that are mostly non-Indigenous, this disadvantage was mitigated by having a primary carer with a strong Aboriginal and Torres Strait Islander identity. In wave 3, primary carers were asked about the personal importance of their Aboriginal and Torres Strait Islander identity. Primary carers who stated that being Aboriginal or Torres Strait Islander was the most important part of their identity were more likely to have taught their children these practices.

Similarly, primary carers who placed a high priority on their children learning how to find bush tucker, hunting and fishing were more likely to teach their children these traditional practices than primary carers who did not. Parental cultural identity and values had the strongest effect on children's participation rates when children lived in in mostly non-Indigenous communities.

Table 28: Child learns about traditional practices, by child composition of the community and primary carer's prioritisation of bush tucker, per cent

Bush tucker	Mostly non-Indigenous	Both Indigenous and non-Indigenous	Mostly Indigenous
Top priority	52.2	70.4	93.4
Other priority	28.4	41.1	81.6

* All results significant at 0.01.

This analysis has looked at the association between the composition of the community and the ties people feel to their Indigenous identity and culture through their attitudes, beliefs and activities. While it is clear that the proportion of Indigenous children in the community is associated with their cultural beliefs and practices, this analysis has not explored the causal direction. That is, it has not shown whether parents who value traditional practices and languages choose communities with higher Indigenous populations or whether living in a community with a high proportion of Indigenous people increases parents appreciation of Indigenous practices and languages.

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PART B

Feature articles

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Breastfeeding of Aboriginal and Torres Strait Islander babies: Predictors of initiation and duration

Laura Bennetts Kneebone

The wide-ranging positive effects of breastfeeding on children have been demonstrated in numerous studies. These benefits include reduced rates of asthma, obesity, otitis media and gastrointestinal illnesses (Ip et al. 2007; Smith 1998). Many of these benefits continue past infancy and into childhood and adulthood.

Rates of initiation of breastfeeding and duration have gone up and down significantly in the last century. Infant feeding practices that were once universal and normal have variously been seen as too difficult, sub-optimal, inconvenient or idealistic. In Australia, breastfeeding was at an all-time low in the early 1970s but has since enjoyed a resurgence, with around 83 per cent of Australian mothers initiating breastfeeding in 2002 and 18 per cent continuing for six months or longer (House of Representatives Standing Committee on Health and Ageing 2007).

However, there is a sharp decline in breastfeeding in the early weeks and months as many women having difficulties breastfeeding switch to formula feeding and others simply choose to wean. The World Health Organization (WHO) recommends exclusive breastfeeding (not supplemented with formula or other drinks or solid foods) for the first six months of life, and continued breastfeeding past two years of age (ABS 2003).

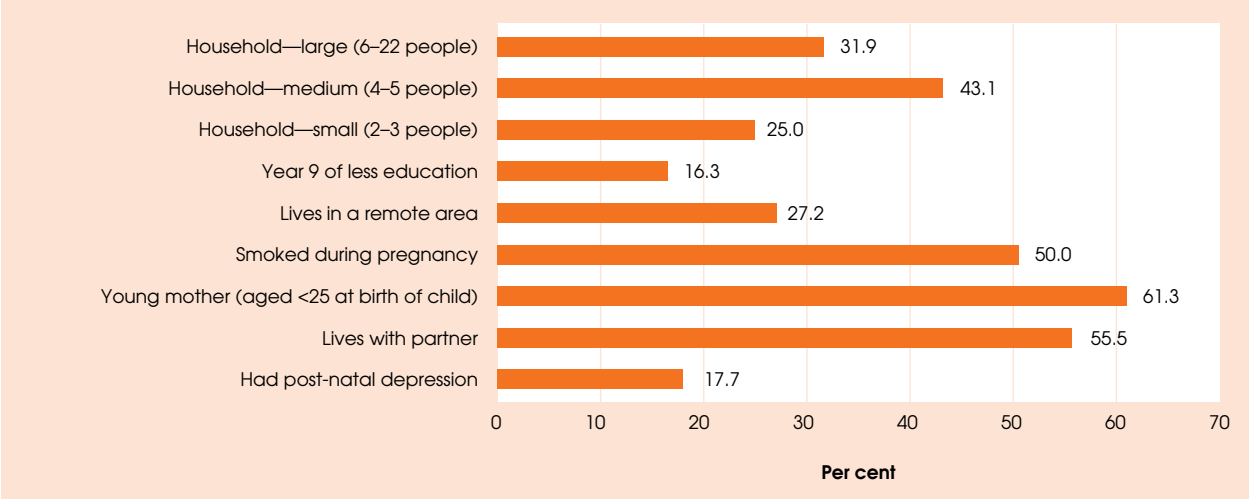
Using the National Aboriginal and Torres Strait Islander Health Survey and the Longitudinal Study of Australian Children datasets, the Australian Institute of Health and Welfare (AIHW) found that, in 2004–05, 80 per cent of Indigenous babies in non-remote areas were breastfed: at less than 1 month of age, dropping to 62 per cent and 48 per cent at 4 and 6 months of age, respectively. The corresponding proportions for non-Indigenous infants were 88 per cent, 58 per cent and 52 per cent (A picture of Australia's children *2009*).

In wave 1 of *Footprints in Time*, primary carers were asked whether the study child had ever been breastfed and, if so, the age at which they completely stopped being breastfed. If they were still breastfeeding in wave 1, they were asked again at wave 2. The questions were not repeated after that time, so some data is right–censored[13] for parents practicing extended breastfeeding or who were not reinterviewed at wave 2. Parents were also asked the age at which the study child first had formula or any milk other than breast milk.

In the literature, potential barriers to initiation or continuation of breastfeeding included overcrowded housing, smoking, being a young mother, postnatal depression, and low education. Having a partner and living in a remote area were identified as being protective factors for breastfeeding (Ip et al 2007; Jain 1996; House of Representatives Standing Committee on Health and Ageing 2007).

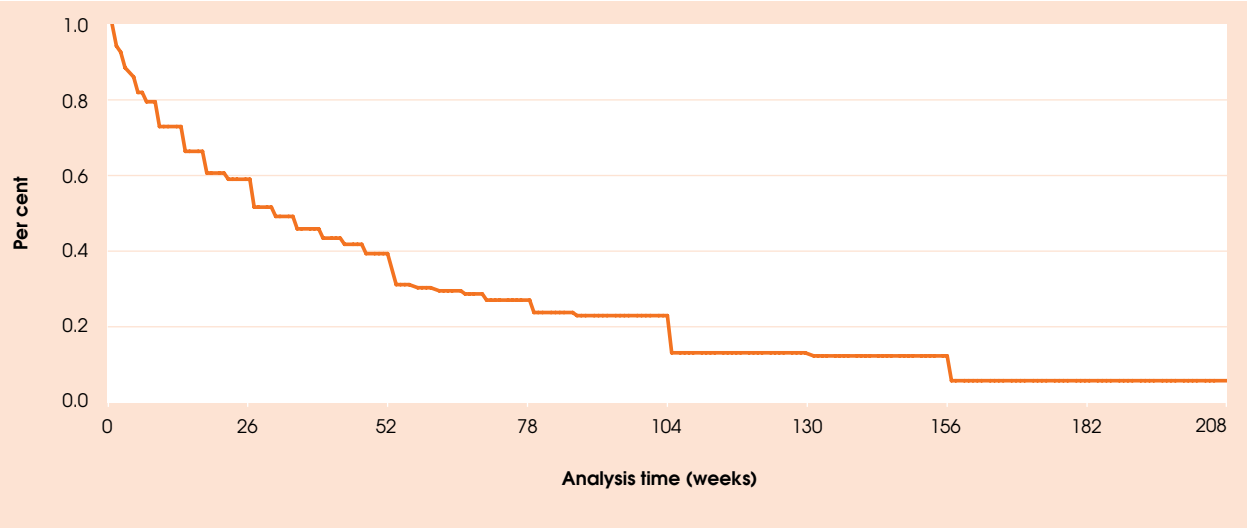
This analysis examines how these circumstances affect whether breastfeeding was initiated and whether the child was fully breastfed for six months or more. It also looks at predictors of duration of breastfeeding. Of the 79.9 per cent of mothers who had ever breastfed, 85.3 per cent had ceased breastfeeding at the time of interview. Duration of breastfeeding ranged from less than

Figure 7: Sample characteristics of mothers



13 There may be some cases where breastfeeding continued beyond the wave 2 interview. These cases would show a shorter duration of breastfeeding than in fact actually occurred.

Figure 8: Kaplan-Meier survival estimate: duration of breastfeeding



one week to 274 weeks. A third of all children were fully breastfed for six months or more (i.e. had not had cow's milk or formula in that period).

Child ever breastfed

Of the 1,759 children in the sample, 79.9 per cent were breastfed, even if only for a day. A multivariate logistic regression model (n=1,247) was used to analyse the predictors of initiation of breastfeeding. All the above characteristics were controlled for, but only three were significant. Mothers living in remote areas had more than five times the odds of breastfeeding than mothers living in urban areas or areas of low isolation. Partnered women were more likely to initiate breastfeeding (1.8 times the odds of unpartnered women). Women with an education up to year 9 or below had lower odds of breastfeeding (67 per cent of the odds of women with a year 10 or higher education). Being a young mother, smoking during pregnancy, having postnatal depression or living in a larger household did not have a statistically significant impact on whether mothers initiated breastfeeding.

Fully breastfed for six months or more

In this analysis, full breastfeeding is defined as the period when the baby was having breast milk and had not yet had any milk or formula other than breast milk (without reference to introduction of solids and/or water). Using multivariate logistic regression (n=988), it was possible to see whether the above characteristics predicted full breastfeeding, in comparison to mothers who started breastfeeding but introduced formula prior to six months. Less than half the mothers (47.6 per cent) who had breastfed were still fully breastfeeding at six months. Remoteness was the strongest predictor of full breastfeeding, with 1.9 times the odds compared to mothers from urban areas or areas of low isolation. Younger mothers had lower odds of full breastfeeding (64 per cent of the odds compared to older mothers). Mothers with postnatal depression had 59 per cent of the odds of full breastfeeding compared to mothers who were not depressed.

Duration of breastfeeding

To examine duration of breastfeeding, the length of time children were breastfed was converted into weeks. Children who were not breastfed at all were excluded from this analysis. Figure 8 shows a Kaplan-Meier survival estimate (n=1,344) of the percentage of children still being breastfed by the number of weeks. It shows a sharp decline in breastfeeding in the early weeks, with:

- 82 per cent breastfeeding at the end of one month
- 67 per cent breastfeeding at three months
- 52 per cent breastfeeding at six months
- 31 per cent breastfeeding at one year, and
- 13 per cent still breastfeeding at two years (as recommended by WHO).

The graph shows some steep drops at the year marks. As the data is based on parent recall, this is probably because many parents cannot remember exactly how many weeks they breastfed for. However, the pattern is a realistic representation of the overall pattern.

A Cox regression (n=997) was used to see the significant predictors of earlier cessation of breastfeeding. Experiencing postnatal depression predicted shorter duration of breastfeeding while mothers living in a remote area breastfed for a longer period. Household size was the other significant factor, with mothers in medium and large

Figure 9: Kaplan-Meier survival estimate: duration of breastfeeding where mother experienced postnatal depression

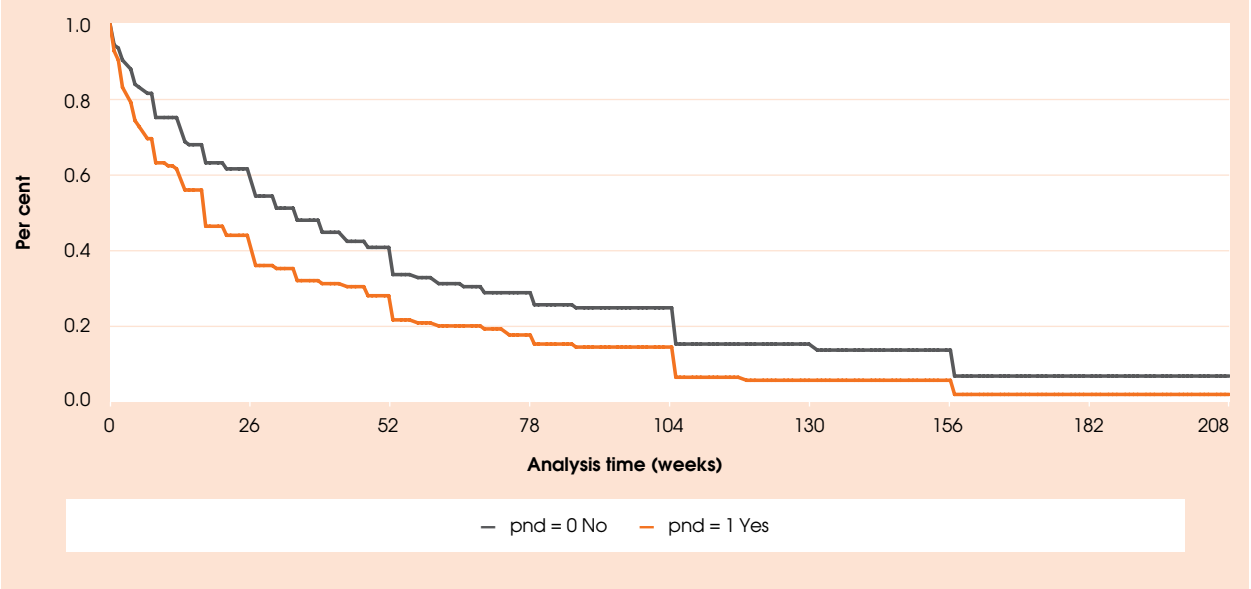
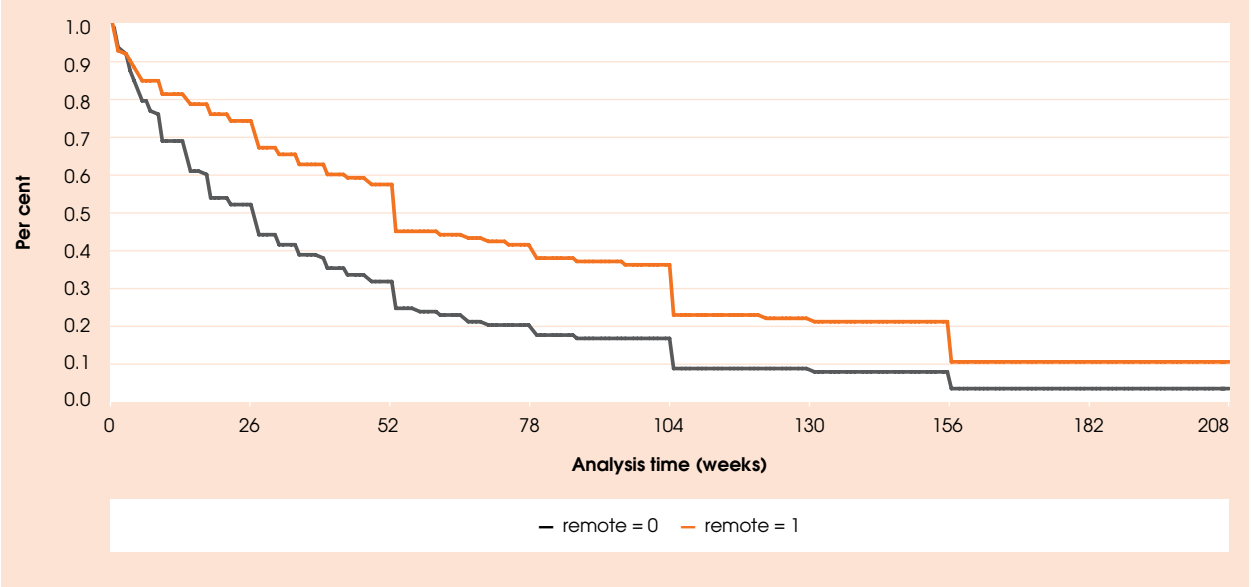


Figure 10: Kaplan-Meier survival estimate: duration of breastfeeding where mother lives in a remote area



households breastfeeding for longer than women in small households, even after controlling for other variables. None of the other explanatory variables were found to have a significant relationship with duration of breastfeeding.

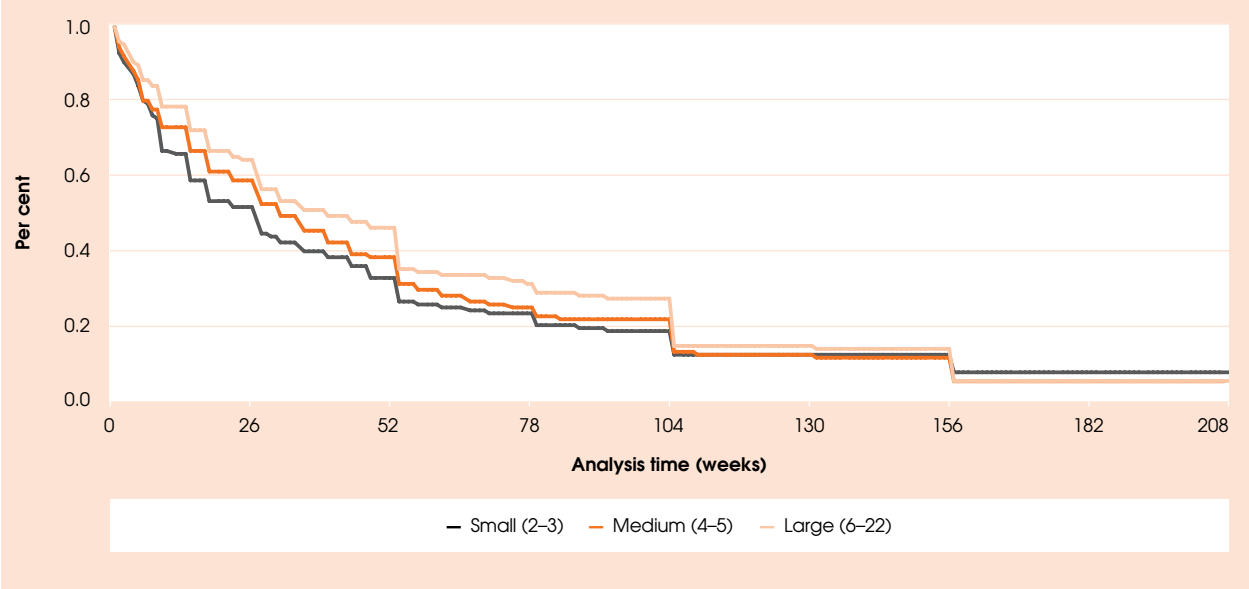
All models were significant ($p<0.0000$) and satisfied the assumptions for the appropriateness of their use.

Discussion

Women who were partnered were more likely to initiate breastfeeding, but being partnered made no difference to full breastfeeding or to duration.

In the literature, young mothers were much less likely to breastfeed (House of Representatives Standing Committee on Health and Ageing 2007), but for Indigenous mothers

Figure 11: Kaplan-Meier survival estimate: duration of breastfeeding by size of household



this does not seem to be the case. Being young had a significant effect only on full breastfeeding, not on initiation or duration.

Smoking during pregnancy is much more prevalent among the mothers of Indigenous children, with 50 per cent of mothers in the sample reporting having smoked during pregnancy. Although the odds of initiating breastfeeding were slightly lower and durations slightly shorter, smoking was not a significant predictor of initiation of breastfeeding, full breastfeeding at six months or duration of breastfeeding.

Household size (divided into three groups) was the final predictor considered and was interesting because it directly contradicted the prediction in the literature that women in larger households might find it more difficult to breastfeed (House of Representatives Standing Committee 2007, p. 121). Mothers in *Footprints in Time* from larger households were actually significantly more likely to breastfeed longer.

For the majority of women, there was little difference in breastfeeding behaviour by highest educational qualification, except those with the lowest education (year 9 or below).

Living in a remote area was the only variable that was a significant predictor for all three outcomes. This suggests that research around breastfeeding behaviour of Indigenous women needs to sample carefully to ensure adequate representation from urban, regional and remote families.

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Social and emotional wellbeing and learning to read English

Fiona Skelton and Deborah Kikkawa

This article explores factors related to English reading scores and the social and emotional wellbeing of Aboriginal and Torres Strait Islander children. Zubrick et al. (2006) found a significant association between high risk of clinically significant emotional and behavioural difficulties and low academic performance for children in the Western Australian Aboriginal Child Health Survey (WAACHS). It was expected that a similar relationship would be present in *Footprints in Time*. It was also expected that this and other variables relating to increased social and emotional difficulties scores would be related to English reading scores, so a multivariate regression model was developed to explore the relative contribution of particular variables to both outcome measures.

Background

There is evidence that Indigenous children are more likely to experience poor social and emotional wellbeing than other Australian children. The WAACHS showed that 24 per cent of 4- to 17-year-old Aboriginal children in WA were at high risk of clinically significant emotional and behavioural problems compared with only 15 per cent of all Australian children (Zubrick et al. 2005). This difference becomes greater in adulthood, with Indigenous Australians 2.5 times more likely to experience psychological distress than non-Indigenous Australians (Australian Bureau of Statistics 2010). There are a number of contributing factors known to affect children's mental health, one of which is exposure to stressful life events. Zubrick et al. (2005) found stressful events predicted emotional and behavioural problems for Aboriginal children, as did a child's poor physical health, their carer's ill health or use of mental health services, and high residential mobility. According to Green et al. (2010) life stressors as a child account for 45 per cent of disorders that begin in childhood and between 26 and 32 per cent of the variance in adult mental health disorders.

Children who receive poor quality parenting and live in poorly functioning families with poor communication, poor emotional support, little time together and poor cooperation are more likely to have emotional and behavioural problems, as are those who had experienced racism (Priest et al. 2011a; Zubrick et al. 2005). Although Priest et al. (2011a) found a strong association between racism and poor mental health, they did not find the same relationship between racism and the Strong Souls resilience measures developed for the Aboriginal Birth Cohort study. Further work by Priest et al. (2011b) with an urban sample of young Aboriginal people suggests racism is more prevalent in urban than in regional and remote areas of Australia.

It is important to focus not just on gaps and problems but on the things that promote social, emotional and behavioural wellbeing for Aboriginal and Torres Strait Islander children. A recent report from the Australian Council for Educational Research (ACER) (Armstrong et al. 2012) showed that a parent or carer's strong sense of cultural identity is related to a child's lower social, emotional and behavioural difficulties scores.[14] Children involved in a greater number of activities with family members, such as being read to, hearing stories and drawing, also had greater levels of prosocial behaviour than the children who did not experience as many activities (Armstrong et al. 2012).

The *Footprints in Time* wave 3 report (FaHCSIA 2012) notes that children in the study have, on average, higher prosocial scores than children in the *Longitudinal Study of Australian Children*, although this may be due to different interpretation across cultures. Nevertheless, it suggests that prosocial skills may be a strength of Aboriginal and Torres Strait Islander children that parents, carers and teachers can build on. Children who have strong social skills and good family support will be less likely to develop emotional and behavioural problems.

For the purpose of this analysis it is hypothesised that learning to read and social and emotional wellbeing outcomes for young Aboriginal and Torres Strait Islander children will be affected by many of the same factors found for all Australian children (see Wake et al. 2008). As such, scores are expected to improve with age, higher parental education, being read to, experiencing lower levels of stress, and living in a more advantaged area, and girls are expected to have higher scores than boys on the reading measure. In addition, it is expected that Indigenous children's outcomes will be affected by their own health, their parent's or carer's mental health (Zubrick et al. 2005) and living in a more socioeconomically advantaged area.

The current study also included a number of other factors that might contribute to positive outcomes, such as the child wanting to go to school, teachers understanding the needs of Indigenous families and parent resilience.

Methods

Data

The data used in this analysis is primarily drawn from the preliminary wave 4 data and is restricted to the 534 older cohort children, who were around 7 years old at the time of interview.

Outcome variables: child social and emotional wellbeing

Social and emotional wellbeing was measured using the Strengths and Difficulties Questionnaire (SDQ) (Goodman

14 Inclusion of the cultural identity measure reduces the sample size and has therefore not been included in this analysis.

2012) which is further explained in Appendix B of this report. Children in the sample had difficulties scores ranging from 0 to 30, with a mean of 12.2 and a standard deviation of 5.9. Continuous SDQ difficulties scores were used for both multivariate models.

Outcome variables: reading ability

The *Footprints in Time* version of the Progressive Achievement Test in Reading (PAT-R) was used to measure reading achievement. PAT-R was administered on a computer touch screen and sequenced children out if they got more than three questions in a row incorrect. The PAT-R Level P (year 1 minus 1) and PAT-R Level 1 versions were administered sequentially to account for a range of abilities and year levels. The majority of wave 4 older cohort children (55 per cent, n=286) were in year 1, 38 per cent (n=199) were in year 2 and the remainder were in pre-year 1, or year 3. The scores were scaled by ACER based on the number of correct answers and relative difficulty of the questions. The scores ranged from 17.7 to 122.8, with a mean of 71.8 and a standard deviation of 22.5.

Explanatory variables

Possible explanatory factors for the variability in child outcomes were divided into study child characteristics, primary carer characteristics and community level factors. SDQ prosocial scores were not included in the final model as the focus of the analysis was on difficulties.

Study child's characteristics included:

- Age in months (range between 59 to 106 months)
- Sex (female=49.1 per cent)
- Renfrew vocabulary scores from wave 3 above the bottom 25 per cent of range of normed scores[15] (57.4 per cent)
- Global health (good, fair, poor=25.1 per cent /excellent and very good=74.9 per cent)
- Had sleep problems (yes=20.2 per cent) Whether the child asked to stay home from school (yes or sometimes=66.5 per cent)
- Activities with family (total of whether children were read to, read to someone or read by themselves, did chores, played music or sang and/or did organised sport or dance, median = 4 activities) and
- Whether the child was subject to racist bullying or unfair treatment in wave 4 (yes=8.9 per cent).

Primary carer characteristics included:

- Experience of seven or more major life events (yes=17.5 per cent)
- Social and emotional wellbeing scores (split at the median, greater wellbeing=45.2 per cent)
- A measure of personal, social and cultural resilience (split at the median, with greater resilience=57.8 per cent)
- Parent 1 education (less than year 12=55.9 per cent/ year 12 or further=44.1 per cent) and
- Whether primary carers thought their child's teacher understood the needs of Indigenous families well or very well in both wave 3 and wave 4 (yes=29 per cent).

Community level factors included:

- At the community level Index of Relative Indigenous Socioeconomic Outcomes (IRISEO)[16] is used as a continuous measure of Indigenous socio-economic outcomes. Increasing scores indicate communities with increased Indigenous employment and income, higher education levels and better housing (Biddle 2009). As IRISEO is moderately to strongly correlated with remoteness in the *Footprints in Time* data and speaking a language other than English at home (see also Biddle for the latter, 2009) only IRISEO was included in the final models.

Statistical analysis

Bivariate relationships between children's difficulties scores, children's reading scores and independent variables were explored using ordinary least squares (OLS) regression. All of the above explanatory variables were checked for relationships with children's difficulties scores and reading scores. All variables were significantly related to at least one of the dependant variables and most variables were significantly related to both. Multivariate analyses using OLS regression were carried out for the two dependent variables to further test the strengths of these relationships.

15 These are normed by age and gender.

16 For more information see Appendix B.

Table 29: Factors associated with SDQ difficulties scores and PAT-R scores for Footprints in Time children in wave 4

	SDQ		PAT-R	
Dependent variables	**Coefficient**	**P-Values**	**Coefficient**	**P-Values**
Study child's age in months	0.008	0.869	0.832	0.000
Study child's sex (boys=0, girls=1)	-0.682	0.230	5.913	0.009
Vocabulary above the mean across three waves	-0.911	0.136	15.321	0.000
Study child healthy	-1.487	0.035	3.492	0.211
Study child has sleep problems	1.650	0.023	-0.648	0.822
Study child asks to stay home from school (dichotomised)	1.207	0.046	5.263	0.029
Study child experienced racist bullying or unfair treatment wave 4	1.692	0.124	-5.904	0.177
Child activities count	-0.246	0.377	2.192	0.048
Major life events (7 or more)	3.103	0.000	-0.990	0.761
Parent social and emotional wellbeing score (dichotomised)	-1.921	0.001	6.301	0.007
Parent resilience scale (dichotomised)	-0.419	0.474	7.786	0.001
Parent education (Year 12 or above)	0.310	0.598	3.866	0.099
Teacher understands needs of Indigenous families W3 & W4	-1.243	0.045	2.981	0.226
Indigenous socioeconomic deciles	-0.260	0.051	0.903	0.088
Adjusted R squared	0.1858		0.2519	
Number	357		357	
Highlighted cells indicate statistically significant results p<0.05.				

Results

Difficulties scores were available for 533 children; however the final multivariate difficulties model had 357 observations after missing cases from the explanatory variables were excluded. The model explains 18.6 per cent of the variance in difficulties scores (adjusted R^2 = 0.1858).

Table 29 presents a summary of the results of the multivariate regression model with statistically significant results highlighted. The coefficient column shows the extent to which the dependent variable affects difficulties scores. As expected, difficulties scores are lower (remembering that lower scores mean a better outcome) for children with better global health scores and those whose primary carers have higher levels of social and emotional wellbeing. Having a primary carer who felt their child's teacher understood the needs of families from an Indigenous background 'well' or 'very well' as opposed to those where the teacher understood 'just OK' or 'not at all' in wave 3 and wave 4 is associated with lower difficulties scores. Difficulties scores are higher for children who experience sleep problems, who ask to stay home from school and for children from families experiencing a greater number of major life events. Primary carer education and resilience do not significantly affect difficulties scores.

The multivariate OLS model predicting PAT-R scores had 357 observations and explains 25.2 per cent of the variance in scores (adjusted R^2 = 0.2519).

Being a girl and being older are also associated with significantly higher reading scores. The strongest predictor of PAT-R scores was having wave 3 vocabulary scores above the bottom 25 per cent of range of normed scores (Renfrew 1995). Children of primary carers with high resilience scores have higher reading scores as do children of primary carers with high social and emotional wellbeing scores. There is no statistically significant difference for children of primary carers who said their child's teacher understood the needs of Indigenous families or for children who had experienced bullying or unfair treatment.

Discussion

It was expected that many of the independent variables would affect both dependent variables. However, this is not the case. The only variables that were significantly associated with both sets of scores were primary carer social and emotional wellbeing and the child asking to stay home from school. Although participation in activities with family members, the child experiencing racist bullying or unfair treatment and socioeconomic advantage all demonstrated significant associations in bivariate analyses with the two dependent variables, they were not significant at the 5 per cent level when other variables were controlled for.

Interestingly, difficulties scores decreased when primary carers felt teachers understood the needs of Indigenous families, but reading scores were not significantly affected. As expected, child social and emotional wellbeing is clearly related to life stressors and to parent social and emotional wellbeing.

Arguably the most interesting finding is that the social, personal and cultural resilience of the parent or carer has a strong positive effect on a child's reading score, despite having no significant effect on their difficulties scores. It is not surprising that vocabulary has a large impact on reading scores and this supports efforts to encourage vocabulary development in early childhood. As expected, girls are doing better than boys at this age, older children are doing better and the level of primary carer education is associated with children's reading outcomes.

These analyses were exploratory and involve only one wave of English reading data. In an American study of literacy achievement in high poverty schools, Hemphill and Tivnan (2008) showed that children's vocabulary at the commencement of school continues to show positive associations with their reading ability over at least the first three years of school. Further research might look at the contribution of vocabulary in the early years to subsequent reading outcomes for Indigenous Australian children. It would also be worth exploring whether major life events have ongoing impacts on social and emotional wellbeing or can have shorter term effects.

Indigenous children's social, emotional and behavioural difficulties are related to a range of child outcomes, supporting the case for prevention and early intervention in childhood and adolescence. The relationships found here illustrate the importance of using a holistic approach to improving outcomes for Indigenous peoples. Building on strengths (Armstrong et al. 2012) such as parent or carer resilience may have positive effects on literacy as well as social and emotional wellbeing.

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How do housing conditions affect the health of Indigenous Australian children over time?

Jason Brandrup

There is limited research published specifically on how housing conditions affect the health of Indigenous Australian children. Furthermore, published research has almost entirely focused on the housing circumstances of Indigenous Australian children living in remote areas; however, the housing circumstances of children living in metropolitan and regional areas are also of interest.

The pathways through which housing conditions can affect health outcomes are many and have been described in relation to Indigenous Australians by various researchers, with good overviews provided by Bailie and Wayte (2006) and Dockery et al. (2010). Researchers have often focussed on the hypothesised impact on health of the quality of housing—for example, Bailie et al. (2010). Especially important is the state of 'health hardware', which is the physical household equipment necessary for healthy, hygienic living (FaCSIA 2007), such as sinks, washing machines, hot water heaters, showers, toilets, stoves and refrigerators.

Although the majority of Indigenous children participating in *Footprints in Time* live in healthy and happy homes, some may be vulnerable to infectious and parasitic diseases that can be attributed to poor housing conditions (Bailie & Wayte 2006, Bailie et al. 2010, McDonald et al. 2009), and they may also be exposed to risks of injury or dangerous materials and substances (FaCSIA 2007). Infections, injuries and other diseases and disorders can lead to long-term health problems, such as hearing loss (Leach 1999, Zubrick et al. 2004), which in turn can lead to language problems and learning difficulties (Zubrick et al. 2004). Overcrowding is another housing circumstance that can contribute to poorer health outcomes through many possible causal pathways. These pathways include strain on a home's health hardware, spread of infections and parasitic diseases, and psychological distress caused by stressors such as noise, lack of privacy and disrupted sleep (Bailie & Wayte 2006, Bailie et al. 2010, Silburn et al. 2006).

Footprints in Time provides an opportunity to investigate these issues with a longitudinal dataset that enables us to observe how housing conditions are associated with the health of two cohorts of Indigenous children who participated in the survey annually over four years. The children's ages ranged from six months to 8 years over the four years.

Methodology

Answering the question of how specific housing conditions affect the health of Indigenous Australian children poses a number of methodological challenges. For example, there are many other factors, both housing and non-housing related, that could possibly affect children's health (Dockery et al. 2010), and attempting to control for all these factors is beyond the scope of this article. However, the multivariate models in this study used a range of relevant independent variables based on a review of the literature and available in the *Footprints in Time* datasets. Another methodological challenge is the probability that housing conditions may not have an immediate impact on children's health and developmental outcomes but may materialise after a substantial amount of time has passed (Dockery et al. 2010). This second challenge cannot be addressed here, and as such the findings are likely to underestimate relationships between housing conditions and health outcomes.

This study used random-effects logistic statistical models to exploit the potential of the *Footprints in Time* longitudinal datasets. Four years of observations were pooled to produce samples several times larger than a single year's observations would amount to. Sample sizes varied slightly amongst the many models used in this study but were generally around 1,750 children for bivariate models and around 1,380 children for multivariate models, with multiple observations for a large majority of the children. The larger samples increased the likelihood that the models would produce statistically significant results. The random-effects logistic models accounted for and exploited the fact that the longitudinal datasets contain repeated observations about the same children, which would have otherwise violated the assumptions behind the logistic models that are used for non-longitudinal data.

The dependent variables used in the models were: a 'global health measure' of the study child (assessed by the primary carer and categorised as either 'excellent or very good' or 'good, fair or poor'); common health conditions in the 12 months prior to interview (any ear problem, any eye problem, eczema, skin infections, asthma, chest infections, cold or hay fever, diarrhoea, colitis or intestinal problems, any other health problem[17] and no health problem) and hospitalisation of the study child in the 12 months prior to interview (yes or no).

Despite a general focus on negative health outcomes in this article, it should be noted that a large majority of *Footprints in Time* children enjoyed good health. For example, in wave 4, 39 per cent of the children enjoyed excellent health, a further 59 per cent enjoyed very good or good health, and only 2 per cent had fair or poor health. However, some specific health conditions were fairly common. For example, 11 per cent of the children in wave 4 had had an ear problem in the 12 months prior to interview.

The independent variables of interest in the models were: housing problems or events in the past year[18], overcrowding[19], and home needs major repairs. The first two variables were available for all four waves; however 'home needs major repairs' was only asked in waves 1 and 2. Overcrowding was derived from the number of household residents and bedrooms (as described in the endnote) and was coded into yes or no categories. The other two variables were already in the form of yes or no responses. Most *Footprints in Time* children lived in good housing conditions. For example, in wave 2, 64 per cent of the children lived in homes that did not need any major repairs, and 82 per cent lived in homes that had less than two residents per bedroom.

Only one independent variable of interest at a time was included in the models, for two reasons:

1 'Housing problems or events in the past year' was responded to by participants in accordance with their own subjective assessments of their recent housing experiences and includes perceptions of overcrowding. The overcrowding variable was objectively derived as described. Thus the two variables were each measuring overcrowding but in different ways. Hence it was not appropriate to include both in a single analysis.

2 'Home needs major repairs' was collected only in waves 1 and 2.

Other independent variables were included in the models as controls, and their estimated coefficients and significance are not reported on in this article. These control variables were: age of study child (in months) when interviewed; gender of study child; hours worked by the primary carer in all jobs; main source of income is wages or salary; level of relative isolation (LORI); Index of Relative Indigenous Socioeconomic Outcomes (IRISEO); diabetes or sugar problems during pregnancy, high blood pressure during pregnancy, low iron levels/anaemia during pregnancy; problem with the baby/foetus during pregnancy; other problems during pregnancy[20]; birth weight; study child still being breastfed; and attendance at early childhood education or care.

17 These were health problems that were not otherwise listed in the *Footprints in Time* questionnaires, which had a larger list of health conditions than those used as dependent variables in this study.

18 Primary carers were asked, 'In the last year have you felt too crowded where you live, moved house, or had housing problems?'

19 'Overcrowded' as defined by more than two persons per bedroom, therefore failing the first criterion of the Canadian National Occupancy Standard. Overcrowding—as derived by the author—took no account of the age and sex of the household residents, nor their relationships, and as such it would underestimate the prevalence of overcrowding.

20 These were pregnancy problems that were not otherwise listed in the *Footprints in Time* questionnaires, which had a larger list of pregnancy problems than those used as independent variables in this study.

Results

Table 30 presents the odds ratios estimated by the 24 random-effects logistic models using the independent variable 'housing problems or events in the past year'. Each odds ratio was estimated by a separate logistic model, with 12 models being bivariate and the other 12 models being multivariate (with the full set of control variables). Each row of the table is for a different health outcome.

The bivariate models in Table 30 indicated statistically significant odds ratios for any ear problem, skin infections, diarrhoea, colitis or intestinal problems, any other health problem and no health problem (with the last being less likely to occur if there were housing problems or events in the past year). However, most odds ratios were not significant once other variables were controlled for in the multivariate models. The significant odds ratios estimated by the multivariate models were for any ear problem (odds ratio 1.21) and skin infections (odds ratio 1.36). This indicates, for example, that the odds of a child having experienced an ear problem in the past year were 1.21 times greater if their family had experienced a housing problem or event in the past year.

Table 31 presents the odds ratios in the 24 random-effects logistic models using overcrowding as the independent variable. The bivariate models showed statistically significant odds ratios for global health, skin infections, eczema and asthma (with the last two being less likely to occur if there was overcrowding). However, none of these odds ratios were significant once other variables were controlled for in the multivariate models. For any ear problem, the non-significant odds ratio of 1.14 in the bivariate model became significant at 1.24 in the multivariate model.

The Table 31 results for eczema and asthma are perhaps counterintuitive, being significantly less likely to have occurred amongst children living in overcrowded households. However, further analysis indicated that this trend was more closely related to geographic isolation than overcrowding. This was established by including the LORI of the participants into the multivariate model. With LORI included in the analysis, the relationship between overcrowded households and either eczema or asthma was reduced to being not significant.

Table 30: Odds ratios estimated by random-effects logistic models for housing problems or events in the past year

	Housing problems or events in past year (Wave 1-Wave 4)			
	Bivariate models		Multivariate models	
	Odds Ratio	95% confidence interval	Odds Ratio	95% confidence interval
Global health measure — excellent or very good health	0.95	0.81–1.11	0.93	0.75–1.13
Common health conditions				
Any ear problem	1.14*	1.02–1.27	1.21**	1.05–1.39
Any eye problem	1.11	0.99–1.24	1.16	1.00–1.35
Eczema	1.00	0.76–1.33	1.03	0.73–1.46
Skin infections	1.38*	1.10–1.73	1.36*	1.02–1.82
Asthma	1.11	0.84–1.48	0.97	0.68–1.38
Chest infections	1.11	0.94–1.32	0.95	0.76–1.17
Cold or hayfever[1]	0.96	0.78–1.19	0.83	0.66–1.05
Diarrhoea, colitis or intestinal problems	1.24*	1.00–1.53	1.21	0.95–1.53
Any other health problem	1.32*	1.05–1.66	1.19	0.91–1.57
No health problem	0.82**	0.71–0.94	0.97	0.82–1.15
Hospitalisation of study child over past 12 months	1.22*	1.03–1.44	1.11	0.89–1.39

[1] Wave 3-Wave 4
Notes: * p<0.05, ** p<0.01, *** p<0.001
Source: LSIC 2008-2011 & preliminary wave 4 data

The analysis using LORI further indicated that participants in more isolated areas were less likely to exhibit either asthma or eczema. This is in line with the 'hygiene hypothesis', which states that allergic disorders may be prevented by exposure to infections in early childhood (Strachan 2000, Zubrick et al. 2004). These allergic disorders include skin conditions such as eczema and immune disorders like asthma. It is reasonable to expect children in more isolated areas to have a greater likelihood of exposure to both infectious agents and helpful microorganisms.

Table 31: Odds ratios estimated by random-effects logistic models for overcrowding

	Overcrowding (Wave 1-Wave 4)			
	Bivariate models		Multivariate models	
	Odds Ratio	95% confidence interval	Odds Ratio	95% confidence interval
Global health measure—excellent or very good health	0.78*	0.62–0.97	0.79	0.58–1.08
Common health conditions				
Any ear problem	1.14	1.00–1.30	1.24*	1.01–1.52
Any eye problem	1.03	0.91–1.16	1.11	0.90–1.38
Eczema	0.36***	0.23–0.58	0.61	0.32–1.13
Skin infections	1.80***	1.37–2.38	1.41	0.94–2.13
Asthma	0.58*	0.36–0.94	0.66	0.36–1.20
Chest infections	0.80	0.63–1.01	0.74	0.53–1.03
Cold or hayfever[1]	1.18	0.89–1.57	1.23	0.85–1.78
Diarrhoea, colitis or intestinal problems	0.96	0.72–1.30	1.10	0.74–1.66
Any other health problem	1.01	0.76–1.36	1.41	0.95–2.08
No health problem	1.00	0.83–1.21	0.91	0.70–1.19
Hospitalisation of study child over past 12 months	0.99	0.78–1.25	0.83	0.58–1.18

1 Wave 3-Wave 4
Notes: * p<0.05, ** p<0.01, *** p<0.001
Source: LSIC 2008-2011 & preliminary wave 4 data

Table 32: Odds ratios estimated by random-effects logistic models for home needs major repairs

	Home needs major repairs (Wave 1-Wave 4)			
	Bivariate models		Multivariate models	
	Odds Ratio	95% confidence interval	Odds Ratio	95% confidence interval
Global health measure—excellent or very good health	1.08	0.86–1.36	1.31	0.94–1.84
Common health conditions				
Any ear problem	1.10	0.87–1.39	1.09	0.78–1.52
Any eye problem	1.20	0.85–1.70	1.51	0.97–2.35
Eczema	0.74	0.53–1.03	0.82	0.50–1.35
Skin infections	1.81**	1.27–2.58	1.70	0.94–3.09
Asthma	0.85	0.57–1.25	0.79	0.46–1.36
Chest infections	1.19	0.95–1.49	1.44*	1.05–1.96
Cold or hayfever[1]	n.a.	n.a.	n.a.	n.a.
Diarrhoea, colitis or intestinal problems	1.24	0.95–1.61	1.55*	1.04–2.29
Any other health problem	1.01	0.75 –1.35	1.09	0.71–1.65
No health problem	0.89	0.74 –1.07	0.88	0.67–1.15
Hospitalisation of study child over past 12 months	1.34**	1.08–1.67	1.28	0.92–1.78

[1] 'Cold or hayfever' responses were not collected in the same years that 'home needs major repairs' responses were collected
Notes: * p<0.05, ** p<0.01, *** p<0.001
Source: LSIC 2008-2011 & preliminary wave 4 data

Table 32 presents the odds ratios estimated by the 22 random-effects logistic models using 'home needs major repairs'. The bivariate models estimated statistically significant odds ratios for skin infections and hospitalisation of study child over past 12 months; however, neither of these odds ratios was significant once other variables were controlled for in the multivariate models. Conversely, the multivariate analysis models chest infections and diarrhoea, colitis or intestinal problems as being significant, with odds ratios of 1.44 and 1.55 respectively, neither of which were found to be significant within the bivariate models.

Discussion and conclusions

Bivariate analyses indicate that children who experienced any housing problems in the previous 12 months were more likely to experience ear problems, skin infections, diarrhoea, colitis or intestinal problems, or other health problems and were less likely to have experienced no health problems. Similarly, overcrowding was associated with children experiencing asthma and eczema, and children living in homes that needed repairs were more prone to skin infections and hospitalisations.

The multivariate models show that there are some negative health outcomes for Indigenous Australian children that appear to be directly associated with poor housing conditions. In particular, ear problems, which could place children at risk of hearing loss, appear to be related to housing problems or events, and also specifically to overcrowding. Skin infections also appear to be related to housing problems or events. Chest infections and diarrhoea, colitis or intestinal problems appear to be related to housing disrepair, and have high estimated odds ratios.

The large number of significant odds ratios estimated by the bivariate models and the relatively few estimated by the multivariate models imply that many of the negative health outcomes associated with poor housing conditions could actually be due to non-housing variables that are correlated with poor housing, rather than with poor housing itself. For example, poorer general health

may be observed with overcrowding, but this may be more closely related to non-housing variables that are associated with overcrowding such as geographic isolation and relatively low levels of socioeconomic outcomes in the local community.

Because some measures of housing conditions were not very precise, the impact of housing on children's health may have been underestimated. For example, housing problems or events in the past year included not only housing problems but having moved home. If the move was to a more suitable home or location, this would be expected to have a neutral or positive effect on a child's health. Overcrowding has also been underestimated because a complete assessment (according to the internationally recognised Canadian National Occupancy Standard) was not possible with the available data. This could be a reason why overcrowding was found to have a significant impact on only one health condition.

Despite these limitations this analysis provides evidence that poor housing conditions do have a negative impact on children's health.

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On the right track: Body mass index of children in *Footprints in Time*

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Weight status is an important measure of a child's wellbeing and serves as an indicator of the risk of developing chronic disease, such as diabetes, cardiovascular disease, and renal disease, in adulthood (Singh et al. 2008; Deckelbaum & Williams 2012; Flynn et al. 2005; Hossain et al. 2007; Gracey & King 2005). The prevalence of chronic disease is elevated among Indigenous, compared to non-Indigenous Australians, and is responsible for two-thirds of the gap in their respective health outcomes (Australian Health Ministers' Advisory Council 2012). Although substantial evidence has linked these deleterious health outcomes in adulthood to being overweight in childhood, no current national data exist on the prevalence of overweight or obesity among Aboriginal and Torres Strait Islander children (Australian Health Ministers' Advisory Council 2012).

This research gap results from the lack of large-scale studies examining the growth of Indigenous children (Grove et al. 2003; Sanson-Fisher et al. 2006; Priest et al. 2009; Lake 1992; Humphery 2000). Although not a representative sample, *Footprints in Time* represents a valuable resource, with longitudinal measurements of the height and weight of Aboriginal and Torres Strait Islander children across the country. This dataset provides the opportunity to examine the distribution of body mass index (BMI) among Indigenous children from a wide range of environments, to explore changes in body composition as children grow, and to identify factors associated with the development of overweight and obesity.

This article addresses the following questions using the first four waves of height and weight measurements recorded in *Footprints in Time*:

1. What is the prevalence of underweight, healthy weight, overweight, and obesity in the *Footprints in Time* sample?
2. How does BMI track throughout childhood among *Footprints in Time* children?
3. How does childhood BMI status vary by demographic factors?

These findings may help guide the development of interventions targeted at healthy weight generally, and in particular decreasing the development of obesity in childhood and therefore the incidence of chronic disease in adulthood.

Definitions and methods

Body mass index

It is rarely possible to directly measure body fat percentage in a large-scale study, so BMI is used as a proxy for level of body fat, classifying children into categories of underweight, healthy weight, overweight, and obese (Cole et al. 2007; De Onis & Lobstein 2010). BMI is calculated by taking a child's weight (in kilograms) and dividing it by the square of their height (in metres). For adults over the age of 19 years old, the interpretation of BMI values is constant; however, for children the meaning of BMI varies with age as body proportions shift, and thus BMI must be interpreted in the context of age (De Onis & Lobstein 2010; World Health Organization (WHO) 1995).

BMI z-score

The World Health Organization (WHO) has created reference values for BMI in the Multicentre Growth Reference Study, using a sample of 8,440 healthy, breastfed infants from six countries (WHO 2006). Individual BMI values can be compared to this reference to provide an indication of how different a child's BMI is from the reference population of children of the same age and gender. This can be quantified using z-scores: the difference between the child's BMI score and the median reference value is divided by the standard deviation of the reference value. These z-scores are useful on a population level and can provide an indication of a child's weight status at the individual level; however, given individual variation in body composition, these z-scores should not be used to make inferences about a child's nutrition or health status without further clinical investigation (World Health Organization (1995).

Defining underweight, healthy weight, overweight, and obesity

Ideally, the BMI z-score values used to identify the boundaries between underweight, healthy weight, overweight, and obesity would be chosen to reflect the BMI z-scores at which weight-related health risks increase. However, it is difficult to determine these values, especially given the time lag before these negative outcomes occur (Cole et al. 2000; Flegal et al. 2006). Thus, cut-off points based on statistical distributions are used. References are based on a normal distribution, with 68.3 per cent of the reference population falling within one standard deviation of the mean (with a z-score between -1 and +1), 95.5 per cent falling within two standard deviations of the mean (with a z-score between -2 and +2), and 99.7 per cent falling within three standard deviations of the mean (with a z-score between -3 and +3). A child with a z-score of +1, +2 or +3 would have a BMI in the highest 15.9 per cent, 2.3 per cent or 0.1 per cent, respectively, of the reference population of children of the same age and gender. Similarly, a child with a z-score of -1, -2 or -3 would have a BMI in the lowest 15.9 per cent, 2.3 per cent or 0.1 per cent, respectively.

Separate standards have been implemented for children under 5 and children over 5 years of age, given the disparate health impact of 'excess' weight during different phases of childhood growth (De Onis & Lobstein 2010).

The International Task Force on Obesity has set z-score cut-off points of -2 for underweight, +1 for overweight and +2 for obese, for children 5 to 19 years of age. For children less than 5 years of age, the cut-off points for overweight and obesity are more conservative; -2 remains the cut-off point for underweight, but +2 is used as the cut-off point for overweight, and +3 is used as the cut-off point for obese (Cole et al. 2007; De Onis & Lobstein 2010).

Validity of the height and weight data

The need for cleaning of height and weight data

Although over 1,000 children participated in the measurement process in each of the first four waves of the study, the height and weight data were not made publicly available until December 2012 with *Footprints in Time* Release 3.1, due to concerns over data quality (Department of Families, Housing, Community Services and Indigenous Affairs 2012). There was a high prevalence of missing and implausible data, as well as implausible variation within sequential measurements of the same child. It was essential to ensure the validity of these data prior to conducting analyses, to ensure that findings correctly reflect the status of the children involved.

Footprints in Time Research Administration Officers (RAOs) have acknowledged the difficulty of accurately measuring height and weight, particularly due to technological and environmental limitations. Using methods based on WHO protocols and incorporating insight gained from conversations with RAOs, implausible measurements were identified for exclusion (Thurber 2012). The proportion of recorded BMI z-scores deemed implausible decreased from 19.3 per cent (n = 238) in wave 1 to 5.1 per cent (n = 63) in wave 4. Across waves, with the improvement of measuring equipment and the formation of a relationship of trust between the participating families and the *Footprints in Time* RAOs, the amount of missing data has reduced and the reliability of data has improved. For further details about the methods for cleaning the data, refer to Thurber, 2012.

Potential biases in missing and implausible measurements

There do not appear to be any systematic differences in the baseline BMI z-scores of children with implausible or missing BMI z-scores at future waves, suggesting that children's BMI did not influence their willingness to be measured or the accuracy of their measurements. There was no significant difference in the prevalence of missing BMI z-scores by gender, reporting of the child's general health, reporting of the family's weekly income, or the highest education qualification obtained by the primary carer.

Several demographic factors were, however, significantly associated with the number of missing BMI z-scores. First, the mean number of waves with missing BMI z-scores per child increased with increasing isolation, from 1.14 in urban areas to 1.40 in areas with low isolation, 1.65 in areas with moderate isolation, and 1.75 in areas with high/extreme isolation. Second, children who identified as Torres Strait Islander (or as Aboriginal and Torres Strait Islander) had a higher mean number of missing BMI z-scores than children who identified as Aboriginal only.

These differences should be considered when drawing conclusions from these data, as the existing BMI z-scores may not fully represent the entire sample of *Footprints in Time* children. The inability of RAOs to transport the heavy measuring equipment to some of the remote, hard-to-reach sites might underlie some of these findings, as these sites have both the highest level of isolation and the highest proportion of Torres Strait Islander children.

Although the prevalence of missing and implausible data is high in *Footprints in Time*, these data do represent a valid and important source of information about the growth of two cohorts of Indigenous Australian children. The proportion of the total sample surveyed with plausible BMI z-scores recorded increased from 59.6 per cent in wave 1 (n = 996) to 79.3 per cent in wave 2 (n = 1,207), 81.8 per cent in wave 3 (n = 1,149), and 91.2 per cent in wave 4 (n = 1,170). Findings based on these data should take into account the improvement in measurement accuracy across waves of the study and the underrepresentation of BMI z-scores for *Footprints in Time* children from areas of high/extreme isolation and Torres Strait Islander children.

The prevalence of underweight, healthy weight, overweight, and obesity

The mean BMI z-score for both cohorts at each wave was greater than 0 (see Table 33), demonstrating that the *Footprints in Time* sample had a higher BMI than the WHO reference group. For the younger cohort, the mean BMI z-score (1.18) was more than a full standard deviation above the mean of the WHO reference population at the first wave; the mean decreased across waves, but remained 0.30 standard deviations above the reference median at the fourth wave. The mean BMI z-score for the older cohort was lower than that of the younger cohort at each wave, at 0.57, 0.23, 0.19 and 0.26 in waves 1, 2, 3 and 4, respectively. The elevated mean BMI z-score demonstrates that the overall sample has a higher mean BMI than the reference population, but the proportion of the sample falling into each weight category should also be examined.

For both cohorts, the majority of children (between 63.3 per cent and 86.0 per cent) fell into the healthy weight range at each wave (see Table 34). The highest prevalence of healthy weight (86.0 per cent) was observed in the younger cohort in wave 4, followed by the younger cohort in wave 3 (83.8 per cent) and the older cohort in wave 1 (81.4 per cent).

The prevalence of overweight and obesity in the *Footprints in Time* sample was strikingly high in the first wave for the younger cohort, at 32.1 per cent. It decreased across subsequent waves, to 22.3 per cent in the second wave,

Table 33: Mean BMI z-score and 95 per cent confidence interval (CI) for each wave and cohort

	Younger cohort			Older cohort		
Wave	# of children	Mean BMI z-score	95 per cent CI for mean BMI z-score	# of children	Mean BMI z-score	95 per cent CI for mean BMI z-score
1	545	1.18	(1.03, 1.32)	451	0.57	(0.43, 0.71)
2	677	0.63	(0.49, 0.76)	530	0.23	(0.09, 0.38)
3	656	0.49	(0.39, 0.60)	493	0.19	(0.06, 0.32)
4	676	0.30	(0.20, 0.41)	494	0.26	(0.13, 0.39)

Table 34: Distribution of underweight, healthy weight, overweight and obese for each wave and cohort

			Underweight		Healthy weight		Overweight		Obese	
Age (years)	Wave	# of children	n	Per cent	n	Per cent	n	Per cent	n	Per cent
Younger cohort										
0.5-1.5	1	545	25	4.6	345	63.3	101	18.5	74	13.6
1.5-2.5	2	677	54	8.0	472	69.7	106	15.7	45	6.7
2.5-3.5	3	656	27	4.1	550	83.8	58	8.8	21	3.2
3.5-4.5	4	676	29	4.3	581	86.0	42	6.2	24	3.6
Older cohort										
3.5-4.5	1	451	17	3.8	367	81.4	32	7.1	35	7.8
4.5-5.5	2	530	53	10.0	360	67.9	74	14.0	43	8.1
5.5-6.5	3	493	26	5.3	346	70.2	76	15.4	45	9.1
6.5-7.5	4	494	23	4.7	342	69.2	70	14.2	59	11.9

12.0 per cent in the third wave, and 9.8 per cent in the fourth wave. The older cohort demonstrated the opposite pattern: the prevalence of overweight and obesity was low in the first wave of the study at 14.9 per cent, increasing to 22.1 per cent in wave 2, 24.6 per cent in wave 3 and 26.1 per cent in wave 4. The inconsistent prevalence of overweight and obesity for both cohorts in the first wave of the study, compared to later waves, may be attributable to the decreased accuracy of height measurements in the first wave, resulting from the measuring equipment used. The trends across the later waves show more consistency, suggesting greater reliability.

Examining each cohort at age 3½ to 4½ years (the older cohort in wave 1 and the younger cohort in wave 4), there was a decrease in the prevalence of overweight and obesity between the older cohort in 2008-09 (at 7.1 per cent and 7.8 per cent, respectively) and the younger cohort in 2011 (at 6.2 per cent and 3.6 per cent, respectively). It is unclear whether this reflects a secular trend towards a decreasing prevalence of overweight and obesity in children aged 3½ to 4½ years across Australia, as has been described in Victoria by Nichols and colleagues (Nichols et al. 2011), whether it results from the selection of the two *Footprints in Time* cohorts, or whether it is an artefact of the lower reliability of height measurements at the first wave of the study. These findings contrast those observed in the Longitudinal Study of Australian Children (LSAC), a similarly-designed survey of two cohorts of predominantly non-Indigenous children aged 2 to 9 years. In this survey, Wake and Maguire observed an increase in the prevalence of overweight and obesity between the two cohorts of 4- to 5-year-olds, from 20.6 per cent among the older cohort in 2004 to 23.6 per cent among the younger cohort in 2008 (Wake & Maguire 2011). This trend can be monitored in *Footprints in Time* as further waves of data are collected.

The change in the cut-off point for overweight and obesity at age 5 years needs to be considered in the interpretation of trends across waves and cohorts: the categorisation of a child may change as they move to the older age group, despite maintaining the same BMI z-score. Twenty four children (3.6 per cent) from the younger cohort were older than 5 years at the fourth wave of the study, and thus were subject to the less conservative cut-off points. Similarly, 25 children in the older cohort were over 5 years of age at the first wave of the study (5.5 per cent of the cohort), increasing to 265 children (50.0 per cent of the cohort) in the second wave, 483 children (98.0 per cent of the cohort) in the third wave, and 494 children (100.0 per cent of the cohort) in the fourth wave. As might be expected, given the lower cut-off points, the prevalence of overweight and obesity increased parallel to the increasing proportion of the cohort that is over the age of 5 years. Although the disjuncture in the cut-off points is not ideal for interpreting longitudinal results, it is the best way to reflect the changing relationship between BMI and age throughout childhood (De Onis & Lobstein 2010).

Overall, the prevalence of underweight was low in *Footprints in Time*. For the younger cohort, the prevalence of low BMI ranged from 4.6 per cent in wave 1 to 8.0 per cent in wave 2, 4.1 per cent in wave 3, and 4.2 per cent in wave 4. A similar trend was observed within the older cohort, with a 3.8 per cent prevalence of low BMI in wave 1, 10.0 per cent in wave 2, 5.3 per cent in wave 3, and 4.7 per cent in wave 4. The elevated prevalence of underweight for both cohorts of children in wave 2, compared to previous and subsequent waves, should be interpreted with caution, as these inconsistent findings may represent a systematic bias in measurement (such as the underestimation of weight or the overestimation of height) in this wave. In the other three waves, the prevalence of underweight among the *Footprints in Time* children ranged from 3.8 to 5.3 per cent; this is similar to LSAC, in which the prevalence of underweight fell between 5.1 and 6.6 per cent in each cohort across waves. The expected prevalence of underweight in a population is 2.3 per cent, given the definition of the cut-off point for underweight; although higher than expected for a population, the prevalence in *Footprints in Time* is lower than previously described in the literature, particularly in remote areas (Gracey & King 2009; McDonald et al. 2008).

The similarity between the *Footprints in Time* and LSAC cohorts varied with age (Wake & Maguire 2011). Among younger children (aged 1½ to 3½ years in *Footprints in Time* and 2 to 3 years in LSAC), the prevalence of overweight was higher in the LSAC sample. Among older children (aged 5½ to 7½ years in *Footprints in Time* and 6 to 7 years in LSAC), however, the prevalence of overweight was higher in the *Footprints in Time* sample. The prevalence of obesity was similar among younger children in *Footprints in Time* and LSAC (at 5.0 and 4.8 per cent, respectively), but for older children the prevalence of obesity was much higher in the *Footprints in Time*, versus LSAC, sample (at 10.5 and 5.9 per cent, respectively). This elevated prevalence of overweight and obesity among the older children in *Footprints in Time* is reason for concern. Although the prevalence of obesity in the older cohort increased across waves in both studies, the initial prevalence was much higher for the *Footprints in Time* sample, and it remained higher across subsequent waves, nearly approaching the prevalence of overweight. Studies have consistently shown that childhood overweight tracks into adulthood; this effect strengthens with increasing magnitude of overweight, suggesting that obese children, compared to overweight children, face an even higher risk of maintaining their weight status through adulthood (Singh et al. 2008).

The tracking of BMI status through childhood

A child's BMI z-score can vary significantly throughout childhood. Although many children move between BMI categories, fluctuation decreases with increasing age. The correlation between a child's BMI z-scores at two successive waves is high in *Footprints in Time*, and becomes stronger in later waves (with a maximum correlation of 0.56 between BMI z-scores at the third and

fourth waves for the older cohort, p<0.001). Thus, if a child is overweight at one wave, he or she faces a high risk of being overweight at the next wave, and this becomes increasingly true as children grow older. For example, within the younger cohort, 50.9 per cent of children classified as overweight or obese in wave 3 moved into the healthy weight category by the next wave; the other 49.1 per cent remained classified as overweight or obese (see Table 35). In contrast, in the older cohort, only 23.6 per cent of children classified as overweight or obese at wave 3 gained a healthy weight status by the fourth wave; 76.4 per cent remained in the overweight or obese category (see Table 36). Although a similar proportion of healthy weight children in each cohort dropped to the underweight category between the third and fourth waves of the study, the proportion moving from healthy weight to overweight or obese was more than twice as high in the older versus younger cohort (at 10.9 per cent and 5.0 per cent, respectively).

These results show that not only are children in *Footprints in Time* more likely to develop overweight or obesity with increasing age, but with increasing age it becomes more difficult to get on track towards a healthy weight. This underlies the importance of implementing preventive measures at early age, to avoid the development of overweight.

The association between BMI status and demographic factors

Indigenous identity, gender and age

BMI z-scores did not vary significantly by the child's identification as Aboriginal, Torres Strait Islander, or Aboriginal and Torres Strait Islander (p>0.05 for each one-way analysis of variance (ANOVA) for either cohort at any wave. There was also no significant difference for males versus females (p>0.05 for each two-sample t-test with equal variance); however, it should be noted that this is largely because the z-scores are adjusted for gender. In both cohorts, the mean BMI z-score decreased with age; however, within the overlapping age range for the two cohorts (3½ to 4½ years), the mean BMI z-score was higher for the older cohort.

Table 35: Stability of BMI category between wave 3 and wave 4 for the younger cohort

Younger cohort	BMI category in wave 4					
BMI category in wave 3	Low BMI-for-age		Healthy BMI-for-age		High BMI-for-age (overweight or obese)	
	n	Per cent	n	Per cent	n	Per cent
Low BMI-for-age	2	15.4	11	84.6	0	0.0
Healthy BMI-for-age	13	3.2	370	91.8	20	5.0
High BMI-for-age (overweight or obese)	0	0.0	29	50.9	28	49.1

Note: Only includes children who are under five years of age at both waves to enable the use of consistent cut-off points.

Table 36: Stability of BMI category between wave 3 and wave 4 for the older cohort

Older cohort	BMI category in wave 4					
BMI category in wave 3	Low BMI-for-age		Healthy BMI-for-age		High BMI-for-age (overweight or obese)	
	n	Per cent	n	Per cent	n	Per cent
Low BMI-for-age	6	31.6	13	68.4	0	0.0
Healthy BMI-for-age	10	3.9	220	85.3	28	10.9
High BMI-for-age (overweight or obese)	0	0.0	21	23.6	68	76.4

Note: Only includes children who are OVER five years of age at both waves to enable the use of consistent cut-off points (excludes 10 children in wave 3).

Level of relative isolation

There was significant variation in BMI z-score by level of relative isolation (LORI); at each wave, BMI z-scores were significantly higher for children from less isolated (urban or low isolation) areas compared with more remote (moderate or high/extreme isolation) areas ($p<0.001$ for each two-sample t-test with equal variances). In the fourth wave of the study, the prevalence of overweight among the younger cohort decreased from 8.2 per cent to 4.4 per cent, and the prevalence of obesity from 5.5 per cent to 0.0 per cent, with increasing isolation (see Table 37).

There was not a clear cut trend in weight status by LORI for the older cohort; the prevalence of overweight exceeded 10.0 per cent in all four LORIs, but the prevalence of obesity in urban areas and areas of highest isolation was around twice as high as that in areas with low or moderate isolation (see Table 38). In areas with moderate and high/extreme isolation, there was a high prevalence of underweight (10.2 and 10.9 per cent, respectively) alongside a high prevalence of overweight (10.2 and 10.9 per cent, respectively), with an additional 6.1 and 15.2 per cent, respectively, of children categorised as obese. Among children living in urban areas or areas with low isolation, the prevalence of underweight was lower, at 3.8 per cent and 2.8 per cent, respectively, but the prevalence of overweight was very high, at 14.5 per cent and 17.3 per cent. Although the prevalence of overweight was lower in urban areas compared with areas with low isolation, the prevalence of obesity was more than double, at 16.0 per cent as opposed to 7.9 per cent.

Specific factors contributing to the elevated rates of obesity among children in the older cohort living in the most urban and the most isolated environments need to be examined. Data from future waves of *Footprints in Time* should be explored to see if the younger cohort demonstrates this same trend. Additionally, further research is needed to investigate factors associated with the elevated prevalence of underweight among *Footprints in Time* children in the more remote areas.

Table 37: Distribution of BMI categories in wave 4 for the younger cohort, by LORI

Younger cohort	BMI category in wave 4							
	Low BMI-for-age		Healthy BMI-for-age		High BMI-for-age: overweight		High BMI-for-age: obese	
LORI	n	Per cent	n	Per cent	n	Per cent	n	Per cent
Urban	3	1.7	154	84.6	15	8.2	10	5.5
Low	9	3.1	252	86.9	20	6.9	9	3.1
Moderate	8	8.3	80	83.3	4	4.2	4	4.2
High / Extreme	2	4.4	41	91.1	2	4.4	0	0.0

Table 38: Distribution of BMI categories in wave 4 for the older cohort, by LORI

Older cohort	BMI category in wave 4							
	Low BMI-for-age		Healthy BMI-for-age		High BMI-for-age: overweight		High BMI-for-age: obese	
LORI	n	Per cent	n	Per cent	n	Per cent	n	Per cent
Urban	5	3.8	86	65.7	19	14.5	21	16.0
Low	6	2.8	154	72.0	37	17.3	17	7.9
Moderate	5	10.2	36	73.5	5	10.2	3	6.1
High / Extreme	5	10.9	29	63.0	5	10.9	7	15.2

Summary

These height and weight data from *Footprints in Time* provide a wealth of information about the growth of Aboriginal and Torres Strait Islander children. Examination of BMI z-scores reveals that the majority of children in *Footprints in Time* fall within the healthy range for BMI and that the overall prevalence of underweight in the sample is low. Within areas of moderate and high/extreme isolation, however, the prevalence of underweight is elevated, particularly in the older cohort, alongside a high prevalence of overweight and obesity. Among *Footprints in Time* children living in the more urban areas, underweight is less common, but there is a large burden of overweight and obesity.

Although the majority of the children participating in *Footprints in Time* have a healthy BMI, the prevalence of both obesity and underweight is a cause for concern. Factors associated with obesity, particularly in the most urban and the most isolated areas, need to be explored. Additionally, further research is needed to examine factors associated with the elevated prevalence of underweight among *Footprints in Time* children in the more remote areas. Underweight and overweight may reflect, among other causes, a diet with insufficient nutritional value to allow optimal development and learning (Browne et al. 2009; Gracey 2000; Han et al. 2010). The psychosocial impacts of overweight and obesity (including negative self-esteem, withdrawal, depression and anxiety) can also be severe and long-lasting. The impact of weight status on health and wellbeing in later childhood and adolescence can be investigated with future surveys of the *Footprints in Time* cohorts.

Given the observed tracking of weight status through childhood, and research demonstrating the tracking of childhood obesity into adulthood, it is important to implement interventions to prevent the initial development of overweight and obesity. Interventions aimed at preventing overweight and obesity in young children may promote wellbeing in childhood and assist in reducing the prevalence of obesity in adulthood, thereby reducing the burden of chronic disease. Ensuring that children maintain a healthy weight throughout their youth will improve their health as adults.

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This report has been written by Deborah Kikkawa and Jenefer Tan from the Research and Analysis Branch of FaHCSIA. Feature articles have been contributed by Jason Brandrup, Laura Bennetts Kneebone, Fiona Skelton and Deborah Kikkawa from the Research and Analysis Branch and Katherine Thurber from the National Centre for Epidemiology and Population Health at the Australian National University.

PART C

Appendixes

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Appendix A—Background to the study

Commencing in 2008, *Footprints in Time* data has been collected on an annual basis from around 1,500 Aboriginal and Torres Strait Islander children and their families. The study collects important information about:

- the children—their physical and mental health, how they develop socially and cognitively, their place in their family and community, and significant events in their life
- the children's families and households—their health, work, lifestyle, and family and community connectedness
- the children's communities—facilities, services, and social and community issues
- services—child care, education, health and other services used by the child's family.

Objective

The main objective of the study is to collect high quality quantitative and qualitative data that can be used to provide a better insight into how Indigenous children's early years affect their development. It is hoped that this information can be drawn upon to help close the gap in life circumstances between Indigenous and non-Indigenous Australians.

The *Footprints in Time* study has five key research questions, formulated under the guidance of the Steering Committee, which were designed to achieve this objective. These are:

- What do Indigenous children need to have the best start in life to grow up strong?
- What helps Aboriginal and Torres Strait Islander children to stay on track or get them back on track to become healthier, more positive and strong?
- How are Aboriginal and Torres Strait Islander children raised?
- What is the importance of family, extended family and community in the early years of life and when growing up?
- How can services and other types of support make a difference to the lives of Aboriginal and Torres Strait Islander children?

The study provides information for individuals, families, communities, service providers, researchers and governments. It aims to improve the understanding of, and policy response to, the diverse circumstances faced by Aboriginal and Torres Strait Islander children, their families and communities.

Survey methodology

Footprints in Time employs an accelerated cross-sequential design, involving two cohorts of Indigenous children aged from 6 months to 2 years (the younger cohort also previously known as the Baby cohort, or B cohort) and from 3½ to 5 years (the older cohort also previously known as the Child cohort, or K cohort) in wave 1. The design allows data covering the first nine or 10 years of Aboriginal and Torres Strait Islander children's lives to be collected in six years. The two-cohort design also facilitates the comparison of the cohorts from wave 4 onwards when their ages overlap, allowing the detection of changes due to different social conditions and policy initiatives.

Footprints in Time uses a non-random purposive sampling design from which eligible families were approached and voluntary consent obtained. The study focuses on 11 sites chosen, in part, to cover the range of socioeconomic and community environments where Aboriginal and Torres Strait Islander children live. The sample is not nationally representative; however, it reflects the distribution of Aboriginal and Torres Strait Islander children aged between 0 and 5 years across Australia in 2008 (except the Australian Capital Territory and Tasmania) and among urban, regional and remote areas.

Study informants

Wave 4 interviews collected data from:

- Primary carer—the parent or carer who knows the study child best. In most cases this is the child's biological mother. Research Administration Officers (RAOs) undertake an extensive interview with the primary carer of every study child, asking questions about the study child, the primary carer and the household. It is a face-to-face interview.
- Dad—the primary carer's male partner or another adult who has a father-like relationship with the study child. In most cases this is the biological father, but stepfathers are also common. In wave 4, Dads Surveys were completed for 213 children.
- Study child—the main focus of the study. Data is collected through direct assessments such as vocabulary assessments, practical exercises (Who am I, the Progressive Achievement Test-Reading and the Matrix Reasoning Test) and child height and weight. The children also answer face-to-face interview questions.
- Teachers and child care workers—complete written or online questionnaires that include their observations of the study children. In wave 4, 442 children had a teacher complete the Teachers Survey.

The survey is designed so that each child in the study is tracked and interviewed during each wave. However, the other informants may change depending on family and situational relationships.

For more detailed information about the study refer to the reports for wave 1 and wave 2 in this series.

Appendix B—Study terminology and definitions

Child (or plural **children**)—the sampling unit of the *Footprints in Time* study. Children are Aboriginal or Torres Strait Islander children. The study follows two cohorts of children: the younger cohort and the older cohort.

Younger cohort—previously known as the B cohort. Most children in this cohort were aged from 6 months to 2 years in wave 1, 1½ to 3 years in wave 2, 2½ to 4 years in wave 3, and 3½ to 5 years in wave 4.

Older cohort—previously known as the K cohort. Most children in this cohort were aged 3½ to 5 years in wave 1, 4½ to 6 years in wave 2, 5½ to 7 years in wave 3, and 6½ to 8 years in wave 4.

Primary carer is defined as the primary caregiver of the child who knows the child best. In most cases, the primary carer is the child's biological mother but in some cases it is the child's father or another guardian.

Wave is the period of data collection. The *Footprints in Time* study has four waves of data publically available for analysis. The waves are conducted approximately one year apart. Wave 1 was collected primarily in 2008, wave 2 in 2009, wave 3 in 2010 and wave 4 in 2011.

Measures used in the report

There are a number of variables available in the *Footprints in Time* data that may be used to measure the development of the children and characteristics of their families and communities. These measures are used throughout the report. The following information provides an explanation of these measures, how they are derived, how they are used and how they should be interpreted.

Child measures

Strengths and Difficulties Questionnaire (SDQ) (Goodman 2012) is used to provide information about children's social and emotional behaviour. The SDQ allows attribution of a score on the child's social and emotional behaviour across five domains or scales: emotional symptoms, conduct problems, hyperactivity, peer problems, and prosocial behaviour. More information about the scoring of the Strengths and Difficulties Questionnaire is available in the Longitudinal Study of Indigenous Children Key Summary Report from Wave 3 (FaHCSIA 2012).

The scores for individual questions are added to create the five subscale scores. For the first four subscales, higher scores indicate a greater risk of problems in each domain. The prosocial scale, on the other hand, provides a score for strengths, so higher scores indicate less risk. Each scale provides a score between zero and ten. The scores for emotional symptoms, conduct problems, hyperactivity and peer problems scales can be added together to provide an overall difficulties score out of 40, where lower scores indicate less risk on emotional and behavioural difficulties. The prosocial scale is analysed separately and provides a score between zero and 10, where higher scores indicate greater levels of prosocial skills.

Renfrew Vocabulary Test (Renfrew 1995) uses picture cards to assess children's expressive vocabulary. The Renfrew Word Finding Vocabulary Test assesses a child's ability to accurately describe images as portrayed in the 50 pictures contained in the assessment. Children can respond in languages other than English. It was administered to the older cohort children in waves 1 to 3 and to the younger cohort children in wave 4.

Who am I? (WAI) (de Lemos & Doig 1999) is a developmental assessment that requires the child to write their name, copy shapes, write letters, numbers and words in a small booklet, with simple instructions and encouragement from the interviewer. Who am I? is not language dependent and is suitable for children with limited English. The assessment takes about 10 minutes to complete and is suitable for preschool children and children in the first two years of school. In wave 4 the short form of the instrument, with a maximum score of 27, was administered to the younger cohort. The booklets are scored by the Australian Council for Educational Research (ACER).

Progressive Achievement Test in Reading (PAT-R) measures the child's achievement in English reading comprehension. *Footprints in Time* uses an adaptation of the ACER test whereby the questions get progressively difficult and children are sequenced out after 3 or 4 incorrect answers. It was completed by 507 children in the older cohort in wave 4. The tests are designed to be administered toward the end of a school year but cover a range of school years and ages. As data is collected for *Footprints in Time* throughout the year, the test for the previous year level is considered most appropriate (that is, for year 2 children a PAT 1 test would be most appropriate). Scores ranged from 17.7 to 122.8 with an average of 71.8.

Matrix Reasoning Test (Wechsler 2003) is a non-verbal intelligence test in which the child is presented with an incomplete set of pictures and asked to select from five options the picture that completes the set. The Matrix Reasoning Test is one of a range of measures from the Wechsler Intelligence Scale for Children–Fourth Edition (WISC-IV). Items are presented in increasing degree of difficulty. It was asked for the first time in wave 4 of the older cohort. Responses are scaled to provide a score between zero and 19. Scores for the *Footprints in Time* children ranged between one and 18, with an average of 8.3.

Adult measures

Social and Emotional Wellbeing (SEWB) score is a measure created from the number of positive responses primary carers gave to a series of seven questions asking about how they have been feeling in the previous three months.

> Have you stopped liking things that used to be fun?
>
> Have you felt like everything is hard work (even little jobs are too much)? Felt too lazy to do anything?
>
> Have you ever felt so worried that your stomach has got upset?

Have you ever felt so worried it was hard to breathe?

Do you get angry or wild real quick?

Have you felt so sad that nothing could cheer you up? Not even your friends make you feel better?

Do you do silly things without thinking that you feel ashamed about the next day?

Possible responses to these questions were 'lots', 'fair bit', 'little bit' and 'never'. The first two responses are assigned a score of one to the question and the second two assigned a score of zero. The responses are then added to provide a score between zero (no mental health problems) and seven (high level of mental health problems).

These questions came from the Strong Souls questionnaire developed to assess the emotional wellbeing of participants in the Aboriginal Birth Cohort Study during the wave 3 follow-up. (Thomas, Cairney, Gunthorpe, Paradies, Sayers 2010)

Resilience scale is a measure created from the responses of primary carers to 12 statements about what helps them to get through hard times. They were asked on a four point scale how often the statements applied to them.

The statements are based on those in the Strong Souls measure developed by the Menzies School of Health Research to assess the SEWB of Indigenous youth participating in the Aboriginal Birth Cohort (ABC) Study (Thomas, Carney, Gunthorpe, Paradies, Sayers 2010). They include:

When you get sad or upset, you are able to find something that cheers you up.

You have a strong family who help each other.

You get use to big changes in your life quickly.

You know someone who is a really good person.

You laugh and make lots of jokes.

You are really into something.

You are a good son or daughter to your family.

You know a lot about (your) Aboriginal or Torres Strait Islander family history and culture.

People say you are really good at something.

You got an older person looking out for you.

You got lots of friends.

When you are sad or upset you have a person you can talk to.

Response categories were allocated a score of between one and three and the scores for each respondent then summed to give a total score between zero and 36. Higher scores indicate greater levels of personal, social and cultural resilience. Analysis of scale properties were undertaken with advice from Professor Stephen Zubrick. A technical paper detailing the work can be obtained by emailing FaHCSIA at Isicdata@fahcsia.gov.au

Physical Health is measured with a global health measure in which primary carers were asked to rate their own health on a five-point scale from excellent to poor. This question can be used so that the scale is dichotomised to indicate the presence or absence of poor health. In these cases, responses of 'poor' or 'fair' are taken to indicate the presence of poor health and responses of 'excellent', 'very good' and 'good' are taken to indicate the absence of poor health. Primary carers were also asked to respond to the same question in relation to the child, and the data can be used in a similar way for the children.

Financial Stress Indicator is based on seven questions about whether the family has experienced different types of financial stress such as being unable to pay bills, being unable to heat the home or having to do without meals. The number of yes responses are then added to provide a financial stress indicator. The number of responses can then be divided in different ways to indicate the presence or level of financial stress. When used in comparison with wave 3 the last question has been excluded, as it was asked for the first time in wave 4. This question asked whether for financial reasons the primary carer had not been able to send the child to school or preschool as often as they liked.

Community measures

Index of Relative Indigenous Socioeconomic Outcomes (IRISEO) is a measure of community level socioeconomic advantage based on a principal components analysis of nine variables from the 2006 Census—three related to employment, three related to education, two related to housing and one related to income. Unlike the similar and better known Socioeconomic Indexes for Areas (SEIFA), this measure is calculated specifically for Indigenous Australians (Biddle 2011).

Level of relative isolation (LORI) is a classification of remoteness indicating the relative distance of localities from population centres of various sizes. LORI has five categories: none (urban), low, moderate, high and extreme. In the dataset the last two categories are combined as numbers in these areas are small. This report uses LORI rather than the Accessibility/Remoteness Index of Australia (ARIA), as LORI has been designed to take account of Indigenous language and other culturally specific geographic characteristics. LORI was originally developed for the Western Australian Aboriginal Child Health Survey (Zubrick et al 2004)

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Appendix C—Wave 4 content and demographics

Wave 4 features new questions about children's educational and recreational activities, such as church attendance, camping, and the use of computers and the nternet.

The older cohort also received two new measures this wave: a non-verbal test of Matrix Reasoning and the verbal Progressive Achievement Test in Reading (PAT-R). In the Matrix Reasoning task, children are shown an incomplete set of pictures and asked to select from five options the picture that completes the set. Items progressively get more difficult. The PAT-R is a standardised test of verbal ability that assesses literacy concepts, vocabulary, reading and comprehension.

The younger cohort completed the Renfrew Language Scales Word Finding Test which had been completed by the older cohort in earlier waves. The McArthur-Bates Short Form Vocabulary Checklist previously completed by the younger cohort is no longer age appropriate and is not available from wave 4.

Wave 4 also collected information from fathers or father figures through the Dads Survey. The Dads Survey is based on the Parent 2 Survey from waves 1 and 2 and provides information about the contributions of *Footprints in Time* fathers and the diversity of fathering experiences. It includes information about fathers' time with children and parenting styles, as well as a series of questions about their health, employment and housing arrangements.

Wave 4 response rates and non-response bias

Interviewing for wave 4 was conducted between March and December 2011. The fieldwork was conducted by FaHCSIA's Research Administration Officers (RAOs) who are all Aboriginal or Torres Strait Islanders. Ideally, participants are interviewed at 12-month intervals. The mean and median length of time between wave 3 and wave 4 interviews was 11 months, with nearly half the wave 4 interviews conducted between 10 and 14 months after the wave 3 interview.

The original wave 1 sample included 1,671 families. A further 88 new entrant families were added to the study in wave 2. A total of 1,759 families have participated in one or more waves of *Footprints in Time*. Of this sample, 1,031 families (58.6 per cent) have participated in all four waves of the study; 423 families (24.0 per cent) have participated in three waves; 183 families (10.4 per cent) have participated in two; and 122 families (6.9 per cent) have participated in one wave.

If the characteristics of families who drop out of the study are different from the characteristics of families who continue to participate, attrition (dropout) may become a problem. Table 40 reports the proportions of children whose primary carers participated in all four waves of *Footprints in Time* and proportions of children whose primary carers participated in wave 4, by various wave 1 characteristics. There were 88 families who entered the study in wave 2 and these are excluded from these figures.

As previously noted in the Key Summary Report from Wave 3, the highest reinterview rates occur for children who, in wave 1, lived in urban areas or areas with low relative isolation and were in the younger cohort. Primary carers had higher reinterview rates if they were partnered, non-Indigenous, and either owned their own home or were renting privately.

Nevertheless, there is a relatively high level of participation among all groups. While respondents may not participate every year of the study, they remain relatively well engaged from year to year. For example, while only 45.5 per cent of families living in areas of high or extreme remoteness participated every year, 67.3 per cent participated in wave 4.

Table 39: Footprints in Time sample size and retention

	Sample size				Sample retention (%)	
	P1	P2/Dads	SC	Teacher or carer	Previous wave	Wave 1 sample
Wave 1	1,671	257	1,469	45	-	100.0
Wave 2	1,523	269	1,472	163	85.9	85.9
Wave 3	1,404	-	1,394	329	86.1	79.8
Wave 4	1,283	213	1,269	442	81.9	72.8

Table 40: Percentage of wave 1 respondents reinterviewed by selected sample characteristics

Wave 1 characteristics	All waves	Wave 4
Level of relative isolation (LORI)		
Urban	73.4	81.3
Low	62.0	71.4
Moderate	50.6	66.4
High/Extreme	45.5	67.3
Index of Relative Indigenous Socioeconomic Outcomes (IRISEO) quintile		
1st quintile (most disadvantaged)	54.7	71.6
2nd quintile	53.4	66.8
3rd quintile	63.8	74.0
4th quintile	66.9	73.6
5th quintile (most advantaged)	65.3	76.6
Child's sex		
Male	62.8	73.8
Female	60.5	71.9
Child's Indigenous status		
Aboriginal	63.0	74.0
Torres Strait Islander	53.6	67.3
Both Aboriginal and Torres Strait Islander	50.5	60.8
Child's age group		
Younger cohort	63.7	74.3
Older cohort	59.0	70.9
Primary carer's sex		
Male	73.2	80.5
Female	61.4	72.6
Primary carer's Indigenous status		
Indigenous	59.1	70.6
Non-indigenous	78.8	86.9
Primary carer's partnership status		
Partner in household	65.1	75.1
No partner in household	57.6	70.1
Primary carer's labour force status		
Employed	64.4	75.8
Not employed	60.4	71.5
Home ownership status		
Home owner*	77.0	82.6
Private rental	68.1	78.6
Public or community housing rental	55.8	68.6
Total	61.7	72.8
Number responding	1,031	1,217

*Includes paying off the mortgage and owning outright

Note: LORI, IRISEO and primary carer characteristics are based on the characteristics of wave 1 primary carers. The primary carer might have changed after wave 1, but if the child and his or her family continued to participate in the study they were accounted for in the reinterviewed group. The numbers in the table therefore reflect the proportions of children whose primary carers were interviewed, not the proportions of primary carers who were reinterviewed.

Appendix D—Governance of the study

Steering Committee (wave 4 members)

Professor Mick Dodson AM, National Centre for Indigenous Studies, Australian National University (ANU) (Chair)

Dr Karen Martin, Southern Cross University (Deputy Chair)

Ms Adele Cox, Consultant

Ms Carol Ey and Dr Judy Schneider, Branch Manager, Research and Analysis Branch, FaHCSIA

Ms Sam Faulkner, National Health and Research Council

Dr Jill Guthrie, Australian Institute of Aboriginal and Torres Strait Islander Studies

Ms Jane Harrison, Secretariat of National Aboriginal and Torres Strait Islander Studies

Dr Sarah Holcombe, National Centre for Indigenous Studies (ANU)

Dr Boyd Hunter, Centre for Aboriginal Economic Policy Research (ANU)

Mr Shane Merritt, University of New England

Professor Ann Sanson, University of Melbourne

Professor Sven Silburn, Menzies School of Health Research

Mr Paul Stewart, University of Melbourne

Dr Penny Tripcony, Indigenous Education Consultant

Dr Maggie Walter, University of Tasmania

Dr Margo Weir, Education Consultant and Cross-cultural Researcher

Professor Stephen Zubrick, Curtin University of Technology

Department of Families, Housing, Community Services and Indigenous Affairs Footprints in Time Project Team

Branch Manager, Research and Analysis Branch

Carol Ey & Judy Schneider

***Footprints in Time* section—wave 4 members**

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With additional assistance from

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Research Administration Officers—wave 4

Joshua Atkinson, Michael Barnes, Sharon Barnes, John Blair, Jasmine Deaves, Sandra Hooper, Eileen Kris, Cheryleen O'Loughlin, Cynthia O'Loughlin, Geraldine Saunders, Leah Tratt, Christine Urbanowski, Annie Wacando, Terry Watson, Judy Wright.

Access to the data

The datasets used in this report are available to approved users for their own research. The more data users there are, the more useful the contributions of the families involved in the study will be. This wave 4 report has only skimmed the surface of the *Footprints in Time* datasets. We hope others will be inspired to delve deeper and unlock more of the potential of this unique study.

Existing and new data users can apply for a licence for Release 4[21] data by completing the appropriate deed. Copies of these, together with the *Manual for access and use of FaHCSIA's longitudinal survey datasets* can be downloaded from the *Footprints in Time* website: <www.fahcsia.gov.au/lsic>. Appendix A of the manual provides some information on the protocols to be followed when working with *Footprints in Time* data.

Specific queries concerning *Footprints in Time* can be directed to <LSICdata@fahcsia.gov.au>

General queries concerning *Footprints in Time* should be directed to <LSIC@fahcsia.gov.au>

Queries about access to the *Footprints in Time* datasets should be directed to <longitudinalsurveys@fahcsia.gov.au>

21 Release 4 includes waves 1, 2 and 3 in addition to wave 4.

List of abbreviations

ABS	Australian Bureau of Statistics
ACER	Australian Council for Educational Research
AEDI	Australian Early Development Index
ANOVA	analysis of variance
BMI	Body Mass Index
FaHCSIA, (FaCSIA)	Department of Families, Housing, Community Services and Indigenous Affairs (formerly Department of Families, Housing and Community Services)
IRISEO	Index of Relative Indigenous Socioeconomic Outcomes
LORI	Level of Relative Isolation
LSAC	Longitudinal Study of Australian Children
NATSISS	National Aboriginal and Torres Strait Islander Social Survey
OLS	ordinary least squares
PAT-R	Progressive Achievement Test in Reading
RAO	Research Administration Officer
SEWB	Social and emotional wellbeing
SDQ	Strengths and Difficulties Questionnaire
WAACHS	Western Australian Aboriginal Child Health Survey
WAI	Who Am I
WHO	World Health Organization
WISC-IV	Wechsler Intelligence Scale for Children—Fourth Edition)

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