

Culture, housing, remoteness and Aboriginal and Torres Strait Islander child development: Evidence from the Longitudinal Study of Indigenous Children

Alfred Michael Dockery

Working paper

CW028

2017



Australian Government
Department of Industry and Science

Business
Cooperative Research
Centres Programme



Cooperative Research Centre for Remote Economic Participation Working Paper CW028

ISBN: 978-1-74158-275-8

Citation

Dockery AM. 2017. *Culture, housing, remoteness and Aboriginal and Torres Strait Islander child development: Evidence from the Longitudinal Study of Indigenous Children*. CRC-REP Working Paper CW028. Ninti One Limited, Alice Springs.

Acknowledgement

The Cooperative Research Centre for Remote Economic Participation receives funding through the Australian Government Cooperative Research Centres Program. The views expressed herein do not necessarily represent the views of CRC-REP or its Participants.

About the author

Based in Perth, Alfred Michael Dockery is the Principal Research Leader of the Population Mobility and Labour Markets project for the CRC-REP and Associate Professor at the Bankwest Curtin Economics Centre at Curtin University. Mike's research interests are in applied labour economics, subjective wellbeing and Aboriginal and Torres Strait Islander socio-economic outcomes.

For additional information please contact

Ninti One Limited
Communications Manager
PO Box 3971
Alice Springs NT 0871
Australia

Telephone +61 8 8959 6000 Fax +61 8 8959 6048 Email: communications@nintione.com.au

www.nintione.com.au

The CRC-REP produces two series of reports: working papers and research reports. Working papers describe work in progress for the purposes of reporting back to stakeholders and for generating discussion. Research reports describe the final results of completed research projects.

© Ninti One Limited 2017. Information contained in this publication may be copied or reproduced for study, research, information or educational purposes, subject to inclusion of an acknowledgement of the source.

**Culture, housing, remoteness and Aboriginal and
Torres Strait Islander child development:
Evidence from the Longitudinal Study of Indigenous Children**

Alfred Michael Dockery



Australian Government
Department of Industry and Science

Business
Cooperative Research
Centres Programme



Contents

| | |
|---|-----|
| Executive summary | iii |
| 1. Introduction..... | 4 |
| 2. Background..... | 5 |
| 2.1 Wellbeing of Aboriginal and Torres Strait Islander children..... | 7 |
| 3. Data and modelling approach | 9 |
| 3.1 Outcome measures | 11 |
| 3.2 Remoteness and the housing of Aboriginal and Torres Strait Islander children..... | 12 |
| 3.3 Measuring culture | 13 |
| 3.4 Control variables..... | 16 |
| 4. Multivariate results | 19 |
| 4.1 Culture | 19 |
| 4.2 Housing..... | 24 |
| 4.3 Remoteness | 25 |
| 4.4 Other controls..... | 25 |
| 5. Discussion and conclusion..... | 26 |
| 6. Limitations and future research..... | 28 |
| References..... | 30 |

Tables

| | |
|---|----|
| Table 1: Cohort ages and retention | 10 |
| Table 2: Factor analysis of LSIC culture-related variables..... | 16 |
| Table 3: Variable means by remoteness (pooled observations across waves)..... | 18 |
| Table 4: Multivariate results – child health and social/emotional wellbeing..... | 21 |
| Table 5: Multivariate results – cognitive achievement and school attendance | 22 |
| Table 6: Estimates for cultural factors scores; models estimated separately by remoteness | 23 |

Executive summary

The limited empirical evidence available in Australia points to beneficial effects of Aboriginal and Torres Strait Islander peoples' identification with their culture across a range of outcome domains. Living in remote communities, with limited mainstream economic opportunity, services and infrastructure – notably inadequate housing – and the associated mobility that maintains connection to country and kinship networks have been highlighted as cultural aspects that contribute to lower outcomes for Aboriginal and Torres Strait Islander Australians, relative to other Australians, on many mainstream indicators of socio-economic wellbeing. This paper uses data from Waves 1–7 of the Longitudinal Study of Indigenous Children (LSIC) to explore the interrelationships between families' housing, culture and remoteness and their children's outcomes across domains covering physical health, social and emotional wellbeing and cognitive development. Exploratory factor analysis of parents' responses to questions on culture in Waves 1–4 of the LSIC identifies three key elements of parental attitudes and practices with respect to passing on Aboriginal and Torres Strait Islander culture to their child: Connection to Country, Connection to Kin and Traditional Knowledge. The Connection to Country and Kin factors are interpreted as reflecting parental aspirations to promote the child's sense of Aboriginal and Torres Strait Islander identity. The paper addresses an important weakness in the existing empirical literature, since the research design eliminates the possibility of (the child's) outcomes 'causing' greater cultural identity or engagement.

Parents fostering a strong kinship connection is found to contribute to positive child development across the domains investigated. Desire to pass on traditional knowledge appears to be complementary to better cognitive outcomes, but it is correlated with lower school attendance. These findings support arguments that schooling in remote areas should be more culturally appropriate. Greater remoteness is associated with inferior aspects of housing, notably more crowding and a high incidence of government and community housing, but there is little evidence that this has a substantial impact on child outcomes. Parental education, having at least one parent in work and adequate family financial resources are found to be associated with positive child development.

1. Introduction

There are significant contested spaces when it comes to policy promoting the wellbeing of Aboriginal and Torres Strait Islander Australians, and central among these are the intertwined roles of culture, mobility and life in remote communities. Improved access to and participation in education, employment opportunities and stable, quality housing have been identified as important to the socio-economic advancement of Aboriginal and Torres Strait Islander peoples, but each of these is typically more limited in remote Australia when compared to the major capital cities and inner regional population centres. Identification and engagement with traditional culture has been linked with positive outcomes for Aboriginal and Torres Strait Islander Australians (Campbell et al. 2011; Dockery 2010, 2012) and for other Indigenous peoples (Chandler et al. 2003; see Colquhoun & Dockery 2012a for a review), while others view Aboriginal and Torres Strait Islander culture as impeding outcomes (Johns 2008). For many Aboriginal and Torres Strait Islander Australians, maintenance of culture is closely linked with attachment or access to traditional lands, participation in ceremony and cultural business, kinship networks and participation in traditional hunting and gathering activities. Maintaining these cultural connections is often achieved through residing in remote communities combined with temporary mobility that facilitates both cultural obligations and accessing services and other necessary engagements with the mainstream economy (Dockery 2016, Dockery & Lovell, forthcoming).

In an attempt to unravel the way these various factors shape developmental trajectories for Aboriginal and Torres Strait Islander children, this paper uses data from seven waves of the Longitudinal Study of Indigenous Children (LSIC) to analyse interrelationships between families' housing, culture and remoteness and their children's outcomes across domains covering physical health, social and emotional wellbeing and cognitive development. Across a range of important measures of life's outcomes, Aboriginal and Torres Strait Islander Australians fare markedly worse than their non-Aboriginal and Torres Strait Islander counterparts. The Council of Australian Government's National Indigenous Reform Agenda sets out targets to reduce the well-known disparity in key statistical indicators. This 'Closing the Gap' approach has been criticised for taking a deficit view that emphasises negative perceptions of Aboriginality and for the assimilationist objective implicit in the pursuit of statistical sameness. Others have called for a greater focus on positives of Aboriginality, such as Chris Sarra's 'strengths-based approach' (Sarra 2011). From either perspective, identifying those factors that shape outcomes for upcoming generations of Aboriginal and Torres Strait Islander people is clearly critical to improving social and economic wellbeing into the future.

An important motivation of the study is linking parental or family cultural background to children's outcomes. Previous empirical studies have found Aboriginal and Torres Strait Islander identification with and participation in their traditional culture to have beneficial associations with their own outcomes on a range of indicators. A limitation of the existing empirical work is the possibility of endogeneity (or reverse causality), whereby those with better outcomes are more likely to engage with their culture. Relating children's development trajectories to aspects of their parents' cultural engagement during the child's early years largely addresses this limitation.

The next section provides a discussion of issues giving rise to the motivation for the empirical analyses. Section 3 sets out the modelling strategy, including a description of the utilised data items available through the LSIC. This includes a discussion of the approach to measuring 'culture', which is contained in Section 3.3 and is integral to the research. The modelling approach is set out in Section 4, followed by a detailed discussion of the results and implications for policy (Section 5) and concluding observations on the limitations of the current analysis and priorities for further research (Section 6).

2. Background

As best can be inferred from 2011 Census data, around 15% of Aboriginal and Torres Strait Islander Australians live in areas of the country classified as ‘very remote’, and 9% in remote areas. In contrast, just 1.7% of the non-Aboriginal and Torres Strait Islander population lives in remote and very remote Australia. Many Aboriginal and Torres Strait Islander people residing in remote Australia live in some 1,112 discreet Aboriginal communities, of which 90% (1,008) were very remote, and three-quarters of those have estimated populations of less than 50 people (ABS 2007). Non-Aboriginal and Torres Strait Islander Australians, on the other hand, are one of the most urbanised populations in the world, with around 70% living in major cities. With this stark contrast in geography come substantial differences in the lives of Aboriginal and Torres Strait Islander people and those of other Australians that materialise in complex and interrelated ways across a range of dimensions.

A particular challenge is that policies designed to improve livelihoods of Aboriginal and Torres Strait Islander Australians tend to focus on outcomes that signify mainstream socio-economic success, such as employment, education, income and wealth. With Aboriginal and Torres Strait Islander people making up just 3.0% of the population, their unique aspirations are given less weight, and there is a misalignment between the pursuit of those aspirations and models for the achievement of mainstream outcomes which often depend upon agglomeration economies, dense markets and responsiveness to private financial incentives in the broader economy and in the delivery of particular services. For example, the National Indigenous Reform Agreement developed under the Council of Australian Governments, self-proclaimed as a ‘National Integrated Strategy for Closing the Gap in Indigenous Disadvantage’ (COAG 2008, p. 3), and the current centrepiece of Australia’s policy relating to Aboriginal and Torres Strait Islander affairs, sets targets for achieving greater statistical equity on measures relating to life expectancy and health, education and employment, but no targets relating to culture, languages or attachment to country.

A range of frameworks seeking to set out the foundations underpinning wellbeing for Aboriginal and Torres Strait Islander Australians are now emerging, and these emphasise components less applicable to non-Aboriginal and Torres Strait Islander Australians, such as access to traditional lands, traditional knowledge, language and engagement in cultural activities. The *Overcoming Indigenous Disadvantage: Key Indicators* publication, first published in 2003, is the regular scorecard collated by the Steering Committee for the Review of Government Service Provision (SCRGSP) to assess progress against the Closing the Gap targets. While the initial framework lists ‘Safe, healthy and supportive family environments with strong communities and cultural identity’ as one of three areas of priority outcomes, no culture-based measures were included in the 2003 volume. Ongoing feedback to the reports called for incorporation of culture into the framework and for assessments to ‘focus on strengths-based reporting with a reframing from “overcoming disadvantage” to “improving wellbeing”’ (SCRGSP 2014, p. 2.12). Gradually these calls have been heeded, with measures relating to access to traditional lands, Aboriginal and Torres Strait Islander cultural studies and participation in cultural activities included in the 2005 report; and to the valuing of Aboriginal and Torres Strait Islander Australians and their cultures and Aboriginal and Torres Strait Islander language revitalisation and maintenance in the 2014 report.

In developing a framework ‘that attempts to provide an holistic approach to the mapping of statistics about the wellbeing of Indigenous Australians’, the Australian Bureau of Statistics identifies nine domains operating at both the individual level and within the ‘social, cultural and economic environment’ to contribute to wellbeing. In addition to this acknowledgement of the importance of the overarching cultural environment, a number of the nine domains relate to culture, notably ‘culture, heritage and leisure’ and

‘family, kinship and community’, and a sense of identity is seen as an important component that transcends the whole framework rather than as a separate domain (ABS 2010).

Based on extensive consultation with Aboriginal and Torres Strait Islander communities and stakeholders in remote Australia, the CRC-REP’s Interplay Wellbeing Framework identifies six domains interconnecting with the overarching concept of wellbeing: culture, community empowerment, education, employment and health (Cairney et al. 2015, Nguyen & Cairney 2013). In the consultation process:

Themes of culture and empowerment emerged consistently as foundational to every aspect of wellbeing discussed. Culture – experienced as connection to country, kinship, language, law and spirituality – was seen to govern everything Aboriginal people do. Experiences of power inequality underpinned almost every scenario discussed and, as a result, the majority of people felt a lack of empowerment. (Cairney et al. 2015, p. 8)

The Australian Government’s National Aboriginal and Torres Strait Islander Health Performance Framework also includes access to traditional lands as one of 22 key determinants of health (AHMAC 2015). The Australian Institute for Aboriginal and Torres Strait Islander Studies is currently undertaking a longitudinal study, *Mayi Kuwayu*, to improve understanding of how connection to country, cultural practices, ritual, spirituality and language use affect health and wellbeing (AIATSIS n.d.). Frameworks recognising the importance of traditional culture can be found for many Indigenous peoples around the world (Nguyen & Cairney 2013, SCRGSP 2016). Their validity is supported by an international literature providing empirical evidence of a link between culture and a range of psychosocial, physical health and other benefits, with a positive sense of identity often seen as playing a key role in the transmission of elements of culture to outcomes (Campbell et al. 2011; Chandler et al. 2003; Colquhoun & Dockery 2012a; Dockery 2010, 2013; Nguyen & Cairney 2013).

Another common theme in such wellbeing frameworks relates to empowerment or self-determination. A sense of autonomy and control over one’s future has been identified as fundamental to wellbeing at both the level of the individual and the community (Chandler et al. 2003, Ryan & Deci 2000). In the *Overcoming Indigenous Disadvantage* framework, this is canvassed within the strategic area for action of ‘Governance, leadership and culture’ and includes measures of participation in decision-making as well as in case study examples of successful programs (‘Things that work’). In an environment where there is uncertainty surrounding exactly what outcomes should be targeted – and where such priorities may be idiosyncratic to specific communities and peoples – an alternative is to focus less on specified outcomes and more on the capacity of people to pursue their individual aspirations, in line with Sen’s capabilities approach (Sen 1999).

These frameworks for Aboriginal and Torres Strait Islander wellbeing also incorporate factors that are well established as mainstream indicators of socio-economic success, such as employment, education, income, service access and housing circumstances. Indeed, cultural factors are given very minor weightings within the SCRGSP’s *Overcoming Indigenous Disadvantage*, the ABS’ (2010) *Framework for Measuring Wellbeing* or the *Health Performance Framework* (AHMAC 2015). The *Interplay Wellbeing Framework*, developed specifically for people living in remote Australia, gives greater precedence to cultural factors, but also stresses education and employment among the six core domains. As a broad generalisation, Aboriginal and Torres Strait Islander residents who live in progressively more remote areas score higher on many of the cultural markers of wellbeing, notably access to traditional lands, language use and participation in traditional or cultural activities, but have poorer outcomes on many of the mainstream indicators, such as educational attainment, employment, income and access to services.

Such a trade-off has long been acknowledged in the Australian literature. Twenty-five years ago, Taylor described the distribution and location of outstations as representing ‘the spatial optimum in a locational trade-off which is aimed at balancing a range of cultural, economic, social and political considerations’ (Taylor 1991: 5). Debate over the merits of remote community life and interrelated tensions between economic development and culture continue unabated to this day (see, for example, Biddle 2009, 2010; Churchin 2015; Dockery & Lovell forthcoming; Hughes 2007). Poorer availability of services and inferior standards of housing in more remote areas are frequently cited as factors hindering outcomes for Aboriginal and Torres Strait Islanders, largely attributable to the greater cost of delivering services, housing and other infrastructure to smaller and more isolated communities (AIHW 2014, Productivity Commission 2016a, Regional Services Reform Unit 2016). Despite the widespread assumption of a trade-off between cultural engagement and economic outcomes, it is worth noting that Dockery (2012) finds that Aboriginal and Torres Strait Islander Australians with stronger cultural identity do in fact have better outcomes on mainstream socio-economic indicators, as well as higher levels of wellbeing.

2.1 Wellbeing of Aboriginal and Torres Strait Islander children

The health and wellbeing of children and their life opportunities must be paramount considerations in social evaluations and in the formulation of social policy. Theories of what promotes the positive development of children emphasise available resources internal to the family (income, time, human capital and psychological capital, including parents’ mental health) and external to the family (childcare settings, schools and wider social contexts) (Brooks-Gunn et al. 1995); interactions between the child and their environment, including the immediate environment (family, school, neighbourhood) and more extended environments (parental workplaces, social structures, etc.) (Bronfenbrenner 1979, 2005); nutrition for physical development; social and cultural interaction with adults and school engagement/environments for cognitive development (Lippman et al. 2011).

Such perspectives reinforce that the interactions between geographical contexts, culture and access to services outlined above will particularly impact upon children. Children are immersed in Aboriginal and Torres Strait Islander culture to varying degrees and face the added challenges associated with forming their cultural identity within the mainstream Australian culture. Housing is a critical factor shaping the immediate physical environment and interactions within households; where inequalities in access to services and the quality of services extend to education, this can be expected to directly affect children’s cognitive development.

A wide range of factors have been identified as contributing to poorer physical health and a greater incidence of emotional and behavioural difficulties among Aboriginal and Torres Strait Islander children relative to non-Aboriginal and Torres Strait Islander children. These include lower physical and mental health of their parents or carers; increased exposure to life stressors (e.g. family deaths, violence); poorer quality parenting and family functioning, as well as higher incidence of sole parent and non-original parent care; residential instability; substance misuse; racism; and intergenerational effects of trauma associated with forced removal (Zubrick et al. 2005).

In addition to residential instability, other aspects of housing have been linked to child health and educational outcomes, notably tenure type, crowding and state of repair. Aboriginal and Torres Strait Islander children are known to live in lower quality housing, with the standard of housing typically lower in more remote areas (AIHW 2014, Biddle 2008, Dockery et al. 2013). Indeed, ‘healthy homes’ is one of the seven identified building blocks supporting the Closing the Gap reforms: ‘A healthy home is a

fundamental precondition of a healthy population ... Children need to live in accommodation with adequate infrastructure conducive to good hygiene and study and free of overcrowding' (COAG 2008, p. 7). Dockery et al. (2013) find the impact of housing variables on various developmental outcomes for Australian children to be small relative to other factors, such as parenting styles. However, in terms of outcomes for Aboriginal and Torres Strait Islander children, they find that it is neighbourhood characteristics rather than the characteristics of individual dwellings that contribute most to the gap in physical health, and it is the higher proportion living in public or community housing that contributes most to inferior emotional wellbeing and learning outcomes.

In education, it is well documented that Aboriginal and Torres Strait Islander children have lower rates of attendance and below average performance on mainstream indicators of achievement, and outcomes by such metrics are lower in more remote areas (e.g. Guenther et al. 2015, Productivity Commission 2016b, SCRGSP 2016). While an extensive literature explores ways to enhance educational outcomes of Aboriginal and Torres Strait Islander children and youth, there is also acknowledgement of a lack of rigorous evidence for what approaches or interventions work best. Broadly speaking, the research focuses on two aspects. One is how best to get Aboriginal and Torres Strait Islander children to 'fit' into the existing schooling system and achieve higher outcomes on mainstream measures of achievement, such as numeracy and English literacy, often with a focus on instruction methods, teacher quality and raising expectations. The other is to question whether the mainstream curriculum, teaching approaches and outcome measures are appropriate for all children, or whether Aboriginal and Torres Strait Islander people might benefit more from education systems tailored separately to their contexts, often with a focus on education for children in remote Australia.

Findings from the CRC-REP's Remote Education Systems project based on extensive consultations in remote communities have emphasised the need for this latter, differentiated approach, as summarised in Guenther et al. (2015). In terms of what the purpose of education should be, Aboriginal people in remote communities emphasise maintaining young people's connection to language, land and culture; building strong identity; helping people to 'become strong in both worlds' and providing pathways to employment (Guenther et al. 2015, p. 201), objectives quite disconnected from the focus on test scores and attendance rates as measures of outcomes. Guenther et al. (2015) argue that engagement in schools by parents and the wider community, and empowerment of the community in decision-making, including in formulating contextually and culturally relevant curricula, are key to successful education systems.

Research seeking to identify best practice in improving school outcomes for Aboriginal and Torres Strait Islander children within the mainstream structures also reveals an important role for culture. The importance of individuals' sense of identity or 'self-concepts' in the motivation of students to succeed is well accepted in the pedagogical literature. Positive identity for Aboriginal and Torres Strait Islander students requires encouraging a sense of pride in their culture, understanding of cultural background and history on the part of teachers and promotion of a sense of belonging in the classroom (Martin 2006). McRae et al.'s review of strategic education initiatives aimed at improving Aboriginal and Torres Strait Islander students' learning outcomes identified three factors generally associated with successful programs: cultural recognition, acknowledgement and support; development of prerequisite skills; and adequate levels of participation (2000, p. 8). McRae et al. (2000, p. 7) interpret the findings across projects as consistent with theory underpinning the National Aboriginal and Torres Strait Islander Education Policy, in that the involvement of Aboriginal and Torres Strait Islander people in education decision-making, equality of access to educational services and equity of participation should improve learning outcomes. As noted, the first of these has been reiterated by Guenther et al. (2015) for students living remote Australia.

It is not possible here to provide a full review of literature relating to how remoteness, culture and housing impact upon outcomes for Aboriginal and Torres Islander children and youth. The discussion above is intended to highlight that these are intricately interwoven, with strongly contested views on how remoteness and culture should be accommodated within policies to promote the positive development of Aboriginal and Torres Strait Islander children. There is an ongoing need for empirical evidence on these relationships to inform those discourses.

3. Data and modelling approach

The LSIC, also known as Footprints in Time, was initiated by the Australian Government with the aim of providing high quality quantitative and qualitative data:

- to provide a better insight into how a child's early years affect their development
- to be drawn upon to help close the gap in life circumstances between Indigenous and non-Indigenous Australians

(Department of Families, Housing, Community Services and Indigenous Affairs [FaHCSIA] 2009, p. 6).

The sample was drawn from 11 different sites around Australia designed to 'cover the range of socio-economic and community environments where Aboriginal and Torres Strait Islander children live' and provide roughly equal representation of urban, regional and remote areas, among other criteria. Wave 1 interviews were conducted from April 2008 to February 2009 for around 150 children from each site, or 1,650 in total. FaHCSIA estimated that this represented around 6% of the total Aboriginal and Torres Strait Islander population in each cohort (2009, p. 12). The availability of such data is important for researchers because Aboriginal and Torres Strait Islander people represent only around 3.0% of the Australian population, meaning that population-representative surveys typically contain too few observations for many statistical purposes. Further, mainstream surveys do not collect many of the variables that are likely to be important for Aboriginal and Torres Strait Islander wellbeing and socio-economic outcomes or use culturally inappropriate constructs.

Interviews were conducted with the parent or carer who knew the child best, and covered details about the household and family circumstances, the study child's gestation and birth details, parental health and wellbeing, plus many indicators on child health, nutrition, childcare, early education activities and so on. It was intended that the LSIC would include children from two cohorts: the Baby cohort, consisting of children aged 6–18 months at the time of the first interview, and the Child cohort, aged 3.5–4.5 years. In practice, a wider spread of ages eventuated due to the need to include all those who wanted to participate in the study following the consultation process (FaHCSIA 2009, p. 13). In total, 1,687 study children and their families participated in the Wave 1 interviews. Data from seven waves of the study were available at the time of writing. Table 1 shows the number of respondents and their age by cohort for each survey wave.

Table 1: Cohort ages and retention

| Year | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---------------------|-------|-------|-------|-------|-------|--------|--------|
| Wave | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Baby cohort | | | | | | | |
| Age (years) | 0.5–2 | 1.5–3 | 2.5–4 | 3.5–5 | 4.5–6 | 5.5–7 | 6.5–8 |
| Responding sample | 954 | 868 | 813 | 749 | 728 | 737 | 734 |
| Child cohort | | | | | | | |
| Age (years) | 3.5–5 | 4.5–6 | 5.5–7 | 6.5–8 | 7.5–9 | 8.5–10 | 9.5–11 |
| Responding sample | 717 | 655 | 591 | 534 | 530 | 502 | 519 |

Notes: Sample numbers based on frequencies for the cohort variable.

The empirical approach is to pool the data from both cohorts while controlling for age, in effect providing comparisons of age-specific outcomes. Indicators of outcomes in various domains are then regressed against a set of explanatory variables, including those relating to the child’s cultural background, remoteness, housing circumstances and residential stability. The underlying model used is a random effects panel model of the form:

$$Y_{it} = \alpha_i + \gamma AGE_{it} + \delta COHORT_i + \beta X_{it} + v_i + \epsilon_{it}$$

Where:

- Y_{it} represents the outcome variable (Y) observed for individual i at time t ($t=2008$ to $t=2014$).
- α_i is an individual specific constant term.
- γ and δ are coefficients to be estimated capturing the effect of age and cohort. COHORT is a dummy variable, as there are only two potential states (Baby or Child) and there can be observations on children aged under three only for those from the Baby cohort, and on children aged above 8 years only for the Child cohort (see Table 1).
- X_{it} is a vector of characteristics relating to the child and his or her family with associated vector of coefficients β to be estimated. These include measures relating to cultural background, housing circumstances and residential stability. Some of these will not be time varying, in which case the t subscript is redundant.
- v_i is an individual specific and time-invariant component of the error term distributed with mean 0 across individuals, and ϵ_{it} is the classical component of the error term which is independent and distributed with mean 0 across individuals and time.

The random effects specification is preferred because some of the key variables of interest are not time varying, and the effects of these variables cannot be estimated using fixed effects.

The sample for analysis is restricted to Aboriginal and Torres Strait Islander children for whom the responding ‘parent 1’ also identifies as being Aboriginal or Torres Strait Islander. Many of the questions that contribute to the measures of culture used are asked in Wave 1 for the Child cohort and in Wave 4 for the Baby cohort; that is, they are asked with respect to the child at around the age of 4. To model the effect of cultural immersion on the children’s later outcomes, the strategy is to model outcomes from Wave 2 onwards for the Child cohort and from Wave 5 onwards for the Baby cohort. Some of the items contributing to the measures of culture are collected in Wave 3 for both cohorts; however, these relate to parental attitudes rather than actual activities or engagement with the child and can reasonably be assumed to be exogenous to the child’s outcomes (see Section 3.3 below on measuring culture).

Further, some outcome variables are not available in every wave, and in many cases this is the binding constraint on the period covered in the analysis for individual models.

3.1 Outcome measures

Selected indicators of child outcomes are analysed in the domains of physical health, social and emotional wellbeing and cognitive/educational outcomes. Means for these outcome variables by remoteness and in aggregate are provided in Table 3, along with means for all variables used in the analysis. For each variable, the means are based on pooled observations across all waves for which the variable was collected.

3.1.1 Physical health

This is measured using the parent's assessment of the child's global health. In each wave, and for children from both cohorts, the parent or carer was asked 'Now I'd like to ask some questions about [study child's] health. In general, would you say [study child's] health is excellent, very good, good, fair or poor?' The responses are modelled as a five-point ordered scale with a higher value indicating better health.

3.1.2 Social and emotional wellbeing

To assess social and emotional wellbeing, scores are used from the Strengths and Difficulties Questionnaire (SDQ). The SDQ is a brief instrument to assess psychological adjustment of children and youths aged 3–16. It is designed so that near identical versions of the instrument can be completed by the parents and teachers of children aged 3–16 and by the youth themselves when aged 11–16 (Goodman 2001). The SDQ instruments have been adapted and incorporated into the LSIC in surveys completed by teachers and parents. SDQ results from both the teacher and parent survey are analysed. The SDQ was included in teacher surveys in Waves 2–6 for the Child cohort and Waves 3–6 for the Baby cohort; this provides validation external to the family. Parents completed the SDQ in Wave 6 for the Baby cohort and Waves 3–6 for the Child cohort.

The instrument contains 25 items relating to both positive and negative aspects of psychological adjustment that are grouped into five subscales: emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and pro-social behaviour. The LSIC data contains a derived 'total difficulties score', which is the focus of analysis here. The total difficulties score is derived by summing the values on 20 of the 25 items, where the responses are assigned numerical values of 0, 1 or 2, respectively, where the respondent indicates 'no', 'sometimes' or 'yes' in respect to whether the child displayed particular behaviours in the past six months (Zubrick et al. 2005, pp. 28–29).

The within-sample total difficulties scores range from 0 to 32 from a possible range of 0–40. The distribution of the variable indicates that it is inappropriate to directly model this as a cardinal linear variable, and hence the scores are categorised into three ranges: normal (0–13 on the total difficulties scale), borderline (14–16) and abnormal (17–40) following Zubrick et al. (2005, p. 29). An ordered probit model is used to model progression from the abnormal range to borderline to normal range. This ordering is chosen for ease of interpretation: positive coefficients for a covariate imply better outcomes for the child as that variable increases, consistent with all other models.

3.1.3 Cognitive outcomes and school attendance

Scaled scores for mathematics were obtained from questions completed by the study child in Waves 6 and 7. Scaled scores for reading comprehension are available for the Child cohort for Waves 4–6 and for the Baby cohort for Wave 7. The original test scores achieved by the student are not contained in the data; rather, a scaling of the scores is produced by the Australian Council for Educational Research, which is designed to be comparable within and across waves (DSS 2016, p. 26–27). These are continuous variables;

for the reading scale, they range from 17 to 141, with mean 82; for the maths scale, they range from 57 to 145, with mean 102. These are used as indicators of cognitive development. While the mathematics tests were only intended for completion by those from the Child cohort, there are a small number of scores in the Wave 6 and Wave 7 data for children from the Baby cohort, and these are retained in the analysis.

Two measures of school attendance were also tested. Teachers were asked to indicate the percentage of school days the child had attended since the start of the year, with values to select ranging from 0 to 10, corresponding to 0%, 10%, 20% ... 100% attendance. This rating was collected in Waves 5 and 6 for the Child cohort and in Wave 6 only for the Baby cohort. As shown in Table 3 the mean for this variable is 8.28, with the literal interpretation being that teachers assess the average child as being in attendance for 82.8% of school days. With the scale being cardinal, models using this measure as the dependent variable are estimated using a linear model (generalised least squares). Note, however, that while the observed values do range from 0 to 10, the distribution is highly skewed and strongly clustered at 9.

In Wave 7, teachers of both cohorts were asked to indicate if the study child attends school regularly, with the options of ‘Every day or almost every day’, ‘Most days’, ‘About half of the time’, ‘Very little of the time’ and ‘Hardly ever’. With these responses coded from 1 to 5 with higher values indicating better attendance, the mean is 4.36, lying between ‘most days’ and ‘every day or almost every day’, though in fact more than half responses (56%) were ‘every day or almost every day’. Given this distribution and the fact that the intervals are ordinal, the dependent variable is collapsed into a dummy variable with 1 corresponding to a response of ‘every day or almost every day’ and 0 otherwise. Binary logistic regression is used to model the effect of covariates on the probability of the teacher reporting attendance ‘every day or almost every day’.

3.2 Remoteness and the housing of Aboriginal and Torres Strait Islander children

Inadequate and unstable housing tenure have been flagged as factors that detract from outcomes for Aboriginal and Torres Strait Islander people living in remote communities, with particular concerns regarding crowding. Variables to capture residential instability and crowding are constructed from the LSIC data as follows. Commencing from Wave 2, the LSIC data record whether or not the child’s address is different from where they were living the year before. On average, around one-fifth of children are observed to change address between each wave. Note that this will not capture the full degree of instability for some families, since a change of address may have involved more than one move between interviews. Further, a single move may not really reflect instability, and may reflect a positive development such as a move into a better house or for employment or schooling opportunities. Hence instability is measured as the number of address changes over a number of waves, with the preferred measure being the number of moves in the past three years. However, the number of moves in the past two years is also tested – as this permits more observations to be included (the number of moves in the past three years can only be measured from Wave 4 onwards). It is important to note that residential instability is not the same as temporary mobility. The latter often involves frequent movements and overnight stays away from home, but in a quite stable pattern determined by kinship networks. It does not necessarily involve a change in the places that people can expect to and do receive hospitality (see Colquhoun & Dockery 2012b).

Tenure type refers to whether the family owns their own home (either outright or with a mortgage), rents privately, rents from a government housing provider or rents from a community housing provider. A category of ‘other’ is also included to retain those who could not be assigned a tenure type in the analysis. Measures of crowding are derived from data on the number of bedrooms, with three different

specifications used to test the sensitivity of results to different assumptions. One is the simple ratio of the number of people living in the home to the number of bedrooms. Two other measures relate to estimates of the number of additional bedrooms required under varying assumptions. For both measures, one bedroom is assumed to be required for the parent of a sole parent family, and for the couple where the responding parent is living with their partner, while a further bedroom is assumed to be required for each additional adult resident. The measures differ with respect to the assumed requirements for children: one assumes each child requires a bedroom to themselves, and the other assumes two children can share a bedroom (allocating one required bedroom per two children). The ‘crowding’ measure is calculated as the number of required bedrooms based on occupancy minus the actual number of bedrooms in the house and is set to 0 if no additional bedrooms are required.

3.3 Measuring culture

Across the seven waves of the LSIC, numerous questions have been asked that potentially reflect upon the degree to which the parent (or parents) identify with their Aboriginal and Torres Strait Islander culture and the degree to which they immerse the study child in that culture. Most of these appear in the ‘Participant language, culture and religion’ section of the Socio-demographics module of the Parent 1 questionnaire. Questions relating to culture have not been asked consistently across waves, and there is no established instrument available to measure cultural identity or engagement.

There are also challenges in attempting to interpret cultural indicators in the context of babies and young children. To give an example, the Wave 1, Wave 2 and Wave 4 questionnaires ask the parent how often they teach the child traditional practices such as collecting food or hunting. Responses to such a question are unlikely to convey much information about the enculturation of babies or very young children, but may have significant discriminability for older children. Our key interest is in whether the formation of a strong sense of cultural identity and immersion in traditional culture in a child’s early years has an impact on later outcomes. To this end, ‘cultural indicators’ are developed based on data provided by the parent up to and including Wave 4 for the Baby cohort and Wave 3 for the Child cohort.

These indicators were constructed using factor analysis of selected questions, as shown in Table 2. The set of questions given in items a. to g. in the table were asked of the parents of the Child cohort in Wave 1 and of parents of the Baby cohort in Wave 4, and hence relate to the child at around the age of 4 years. Several of these relate to activities done with the child and to assessable attributes of the child, such as whether the child ‘has connections’ or ‘identifies with’ a group. This raises the possibility that the child’s developmental outcomes may influence these elements of cultural engagement. For example, parents may be less likely to teach their child to hunt or collect bush tucker or to take them to ceremonies if the child is in poorer health or has behavioural difficulties. Hence outcomes are modelled in waves post the collection of this cultural data.

All other questions included in the construction of cultural variables were asked in Wave 3 for both cohorts. This includes a set of questions relating to what it is about Aboriginal or Torres Strait Islander culture that the parent would like to pass on to the study child (items i. to t.); the parent’s knowledge of their family’s history and culture (item h.); whether they identify with a group, tribe or clan (item u.); and the importance to them of being Aboriginal or Torres Strait Islander (item v.). It seems unlikely that these parental attitudes will be shaped by the child’s outcomes to any significant extent.

Table 2 also reports the standardised scoring coefficients from an exploratory factor analysis of these 22 items. Factor analysis can be considered a way of summarising a large number of variables into a smaller

number of key components. It identifies correlations between items, allowing the variance in the variables to be summarised by a smaller number of ‘factors’ which are weighted composites of the original variables. In factor analysis the weights, or scoring coefficients, for the first factor are calculated to maximise the total portion of variance that can be accounted for. The second factor is then calculated to maximise the residual variance, and so on. Ideally, factors will correlate on items that are thematically related, providing the analyst with a guide to the underlying construct being measured or captured. However, attaching a practical meaning to factors – assessing what it is they are actually capturing – can be highly subjective and open to differing interpretations.

With this in mind, the two factors with the strongest explanatory power, as shown in Table 2, are interpreted as reflecting two distinct dimensions of cultural identity: Connection to Country and Connection to Kin. Previous literature has identified the centrality of family and the extended kinship system and the role of connection to land and to the past in people’s sense of identity as distinguishing characteristics of Aboriginal and Torres Strait Islander culture (Thompson et al. 2000, p. 728). The first factor is most strongly correlated with the child at age 4 having a connection to country, living near homelands and identifying with a mob (tribe, language group or clan). At least the first two of these items imply a physical connection to country which for many, notably those in more remote areas, is likely to reflect actually living on country. In the CRC-REP Mobility project’s survey of Aboriginal and Torres Strait Islander people living in remote communities in the Northern Territory, over 90% of respondents reported living on their homelands (Dockery and Hampton 2015, p. 6). The factor is also correlated with how often the child is taught traditional practices and arts and taken to cultural events and with the parent’s understanding of their family history and culture. This is interpreted as relating to the child’s identification with their Aboriginal and Torres Strait Islander culture, and in particular with the connection to country element of cultural identity. Here it is referred to as ‘Connection to Country’, or ‘Country’ for short.

The second factor correlates strongly with the items relating to what aspects of culture the parent would like to pass on to the child, including, in descending order, pride in identity, knowing country, family networks, showing respect and family history. It also positively correlates with parental identification with a mob. This is interpreted as capturing the parents’ desire to pass on that element of cultural identity derived from a strong sense of kinship. In contrast to Western society’s focus on the nuclear family, Aboriginal and Torres Strait Islander people place greater importance on maintaining extended kinship networks. Reciprocity is a critical component of maintaining these networks, and this creates cultural obligations to other family members. In turn, traditional country is pivotal to Aboriginal and Torres Strait Islander people’s sense of who they and where they are from, and hence defines their place in a kinship network. The elements of pride and showing respect capture the reciprocity element necessary for maintaining that network in accordance with cultural obligations. The factor score derived from this factor is hence referred to as ‘Connection to Kin’ or just ‘Kinship’, and is taken to measure the value placed on such networks as a component of the child’s cultural identity.

The final factor correlates strongly with parental desires to pass on traditional knowledge: ceremony, bush tucker, hunting and fishing, speaking language and, to a lesser degree, singing, music and dance; as well as to how often the child is taught such activities. The factor is in fact strongly negatively correlated with the parent wanting to pass on family networks, and to a lesser extent, negatively with the child having a connection to country, living near homelands or identifying with a mob. This should not be taken to imply that there is a particular subset of Aboriginal or Torres Strait Islanders, or an element of their cultural psyche that rejects family networks, attachment to country or prefers not to identify with a mob. It must be recalled that the correlations for each factor are calculated to explain as much as possible of the residual variance in the data: in this case to explain variance given individuals’ Connection to Country and

Connection to Kin factor scores. This factor is referred to as 'Traditional Knowledge' and is taken to capture a parental desire for the child to learn about traditional Aboriginal and Torres Strait Islander culture and to teach them about those traditions. The negative correlations with Connection to Country and Connection to Kin suggest this applies particularly among families who have become detached from their traditional country and kin, perhaps because of their geographical location. For some, past policies of removal are likely to have contributed to the loss of connection to family and country. Passing on knowledge about cultural traditions may be seen as an active strategy for promoting or maintaining the child's cultural identity and knowledge to compensate for the loss of direct, physical links to culture and kin that would normally provide this cultural grounding.

These three factors – Country, Kinship and Traditional Knowledge – are used in the multivariate modelling below to capture key elements of the immersion of the study children in Aboriginal and Torres Strait Islander culture. The initial Country factor accounts for 18% of the variance in the variables set out in Table 2. The Kinship and Traditional Knowledge factors accounted for 12% and 8%, respectively. A common rule of thumb in factor analysis is to retain factors with an Eigen value of greater than 1. Here a cut-off value of 1.5 has been imposed. While the factor analysis generates four further factors with Eigen values greater than one and ranging from 1.31 to 1.04, these other elements of family cultural background are not investigated in the current paper. Variables to capture the Country, Kinship and Traditional Knowledge elements of children's cultural background are generated for each child from the scoring coefficients reported in Table 2, and in turn these are standardised to have a mean of 0 and standard deviation of 1.

It is important to note that the cultural factor scores vary markedly and systematically according to the family's level of relative isolation. As shown in Table 3, the Connection to Country factor scores increase steadily across the four remoteness levels, from -0.39 for those in non-remote areas to +0.66 for those in very remote areas. This is consistent with our interpretation that this, in part, reflects a physical connection to country. The average of the Traditional Knowledge factor score also rises with remoteness. In contrast, the Kinship factor score declines with remoteness, suggesting that parents in less remote areas place greater emphasis on their child's identification through connection to kinship networks.

Table 2: Factor analysis of LSIC culture-related variables

| | Variable | Factor 1 Connection to Country | Factor 2 Connection to Kin | Factor 3 Traditional Knowledge |
|----|---|--------------------------------------|----------------------------------|--------------------------------------|
| | <i>Study child at age 4</i> | | | |
| a. | Has connection to country or place | 0.266 | 0.019 | -0.139 |
| b. | Identifies with tribe, language group or clan | 0.221 | 0.015 | -0.116 |
| c. | Lives near homelands | 0.233 | 0.036 | -0.137 |
| d. | How often taught traditional practices like collecting food or hunting? ^a | 0.187 | -0.069 | 0.157 |
| e. | How often taken to an Indigenous cultural event, ceremony or sorry business? ^a | 0.187 | -0.025 | 0.027 |
| f. | How often taught traditional arts, painting, dance, etc? ^a | 0.180 | -0.086 | 0.132 |
| g. | Ever visited homelands | 0.069 | -0.022 | -0.025 |
| h. | How much is this like you [parent 1]? You know/ understand a lot about your Aboriginal and/or Torres Strait Islander family history and culture. ^b | 0.137 | -0.028 | -0.037 |
| | <i>What is it about Aboriginal and/or Torres Strait Islander culture that you would like to pass on to study child at this age?</i> | | | |
| i. | Pride in identity | -0.031 | 0.275 | -0.078 |
| j. | Showing respect | -0.049 | 0.234 | -0.004 |
| k. | Knowing country | -0.014 | 0.246 | -0.010 |
| l. | Family history | -0.057 | 0.215 | 0.102 |
| m. | Family networks | 0.036 | 0.242 | -0.288 |
| n. | Traditions and ceremony | -0.052 | -0.005 | 0.387 |
| o. | Bush tucker, hunting, fishing | 0.002 | -0.013 | 0.338 |
| p. | Speaking language | 0.002 | -0.036 | 0.249 |
| q. | Spiritual beliefs | -0.029 | 0.038 | 0.083 |
| r. | Painting or weaving | 0.005 | -0.096 | -0.036 |
| s. | Storytelling and yarning | 0.018 | 0.013 | -0.135 |
| t. | Singing, music, dance | -0.025 | -0.067 | 0.132 |
| u. | Parent 1 identifies with Aboriginal and/or Torres Strait Islander group, tribe, or clan | 0.026 | 0.173 | 0.119 |
| v. | Parent 1 – importance of being Aboriginal or Torres Strait Islander ^c | -0.013 | -0.194 | -0.101 |
| | Eigen value | 3.97 | 2.65 | 1.66 |

Note: Response scales a. 1 (never), 2 (occasionally), 3 (often), 4 (very often); b. 1 (not much), 2 (little bit), 3 (fair bit); 4 (lots); c. indicated either the most important thing or important.

3.4 Control variables

In modelling child outcomes, a number of control variables are included in addition to those relating to housing circumstances and family cultural background. These are the study cohort (Baby or Child); the child's gender, age and remoteness; the parent's marital status, education and health status; the decile of socio-index of advantage of the child's neighbourhood; and a measure of financial stress.

The study child's age in months at the time of the interview is available in the LSIC data. Two specifications were used to test for differences in outcomes by age. First, age in months was entered directly as a continuous variable. Second, the child's age relative to the mean for the cohort in each wave was calculated, also in months. Note that this varies for individuals as well as across individuals: in some waves, a child may be the subject of one of the first interviews and be relatively young within their cohort, and in another wave be the subject of one of the latter interviews and hence be relatively older. While the Wave 1 interviews were conducted from April 2008 through to February 2009, subsequent waves were completed between February/March and December of their respective calendar years (DSS 2016, p. 11).

Parent's marital status is based on an item available from Wave 3 onwards indicating whether or not the responding parent has a partner living in the house. From this a dummy variable is generated indicating whether the parent is a sole parent. Parent's health is self-assessed using the same 5-point scale for global health as described above for the child health outcome variable. Two specifications were tested to capture parental health. First, the parent's health at Wave 1 was included as a time-invariant variable. Second, the current rating for the parent's health in each wave was included. Parental education is based on the highest level of education attained as reported in Wave 2. Very few respondents indicated holding any post-school qualifications. The categories were coded as a series of four mutually exclusive dummy variables indicating whether or not the parent had completed less than the equivalent of Year 10; had completed Year 10 or 11; had completed Year 12 or gained a Certificate Level I or II; had completed a Certificate Level III or IV, diploma, degree or higher degree. A simple dummy variable was also included indicating whether the responding parent was employed. A further variable for parental employment status was specified based on whether any parent held a job, thus incorporating partner employment status where applicable.

The socio-economic status (SES) of the neighbourhood in which the family lives is based on the Australian Bureau of Statistics' Socio-Economic Index For Areas (SEIFA) for socio-economic advantage and disadvantage as derived from 2006 Census data. The index used is generated from the profile of people living in the neighbourhood on a range of variables such as the average income, level of education, occupational status, and the proportion unemployed. The decile of the SEIFA for the child's address is available as a derived variable in the LSIC data, with higher values indicating more advantaged neighbourhoods.

A measure of financial stress was derived from a set of questions included in Waves 3–7. The underlying question was whether, due to shortness of money, any of the following things had happened in the previous 12 months: could not pay bills on time; could not pay mortgage or rent on time; went without meals; could not heat or cool the home; pawned or sold something; sought assistance from a welfare or community organisation. If any one of these was selected, the family was considered to have been in financial stress for that wave. Overall, the family was in family stress for 30% of the pooled observations (mean =0.43) and, interestingly, the incidence of financial stress drops with remoteness.

Finally, a variable was included indicating whether or not the responding parent or any of their relatives were taken away from their natural family. Where applicable, the question applied also to the respondent's partner and partner's relatives. Prior to these questions being asked, the interviewer first checked with the respondent if it was alright to ask them questions about the Stolen Generation. A limitation to this variable is that 39% of respondents did not grant permission to be asked those questions. However, rather than exclude those respondents from the modelling, two mutually dummy variables are generated. One takes on a value of 1 for positive identification as a member of the Stolen Generation and 0 otherwise. The second takes on a value of 1 for those who indicated neither they nor family members had been removed and 0 otherwise. The default or 'comparison' category for this set of two variables comprises those who declined to answer questions about the Stolen Generation.

Table 3: Variable means by remoteness (pooled observations across waves)

| Variable (variable range) | Level of relative isolation | | | | All | n. obs pooled ^a |
|---|-----------------------------|--------|----------|-------|--------|----------------------------|
| | None | Low | Moderate | High | | |
| Outcome variables | | | | | | |
| Study child health (1–5) | 4.18 | 4.14 | 3.93 | 4.02 | 4.11 | 7697 |
| SDQ Total difficulties | | | | | | |
| Teacher-assessed (0–32) | 8.01 | 8.48 | 8.74 | 7.61 | 8.34 | 1434 |
| Parent-assessed (0–31) | 11.49 | 11.95 | 12.58 | 11.11 | 11.85 | 1398 |
| Reading test scale (17–141) | 87.64 | 81.52 | 74.14 | 77.91 | 81.73 | 1650 |
| Maths test scale (57–145) | 105.56 | 102.37 | 97.53 | 96.33 | 101.98 | 780 |
| School days attended (0–10) | 8.75 | 8.44 | 6.91 | 7.58 | 8.28 | 537 |
| Attendance rating (1–5) | 4.60 | 4.42 | 3.80 | 4.15 | 0.56 | 418 |
| Culture factor scores | | | | | | |
| Country (mean=0, sd.=1) [#] | -0.39 | -0.04 | 0.55 | 0.66 | 0.03 | 7706 |
| Kinship (mean=0, sd.=1) [#] | 0.33 | 0.25 | -0.06 | -0.38 | 0.16 | 7706 |
| Trad. Knowledge (mean=0, sd.=1) [#] | -0.14 | -0.16 | 0.55 | 0.96 | 0.06 | 7706 |
| Housing/residential stability variables | | | | | | |
| Housing tenure (0/1): | | | | | | |
| Rents, community housing | 0.07 | 0.15 | 0.37 | 0.50 | 0.20 | 7184 |
| Rents, government housing | 0.32 | 0.43 | 0.47 | 0.41 | 0.41 | 7184 |
| Rents, private | 0.30 | 0.24 | 0.06 | 0.03 | 0.21 | 7184 |
| Home owner/purchaser | 0.25 | 0.12 | 0.03 | 0.02 | 0.13 | 7184 |
| Other tenure | 0.05 | 0.06 | 0.07 | 0.05 | 0.06 | 7184 |
| Number of bedrooms (1–8) | 3.37 | 3.28 | 3.15 | 3.13 | 3.27 | 7438 |
| People living in house (2–22) | 4.84 | 5.12 | 5.78 | 6.18 | 5.26 | 7706 |
| Crowding measures: | | | | | | |
| People per bedroom (0.3–11) | 1.47 | 1.61 | 1.88 | 2.13 | 1.66 | 7438 |
| Extra bedrooms needed: | | | | | | |
| 1 per couple/person (0–17) | 1.13 | 1.48 | 2.21 | 2.56 | 1.59 | 4830 |
| 1/adult+1 per two kids (0–11) | 0.25 | 0.38 | 0.90 | 1.16 | 0.49 | 4830 |
| Moves in last 3 years (0–3) | 0.57 | 0.70 | 0.52 | 0.38 | 0.61 | 3077 |
| Moves in last 2 years (0–2) | 0.40 | 0.49 | 0.38 | 0.27 | 0.43 | 4434 |
| Other control variables | | | | | | |
| Study child is male (0/1) [#] | 0.52 | 0.49 | 0.53 | 0.49 | 0.51 | 7706 |
| Study child age (months) | 61.65 | 61.22 | 62.10 | 60.92 | 61.72 | 7706 |
| Child cohort (0/1) [#] | 0.41 | 0.43 | 0.40 | 0.44 | 0.42 | 7706 |
| Sole parent (0/1) | 0.41 | 0.47 | 0.36 | 0.28 | 0.42 | 5085 |
| Level of relative isolation (0/1) | | | | | | |
| None | 1.00 | 0.00 | 0.00 | 0.00 | 0.24 | 7706 |
| Low | 0.00 | 1.00 | 0.00 | 0.00 | 0.50 | 7706 |
| Moderate | 0.00 | 0.00 | 1.00 | 0.00 | 0.16 | 7706 |
| High | 0.00 | 0.00 | 0.00 | 1.00 | 0.09 | 7706 |
| Neighbourhood socio-economic status (deciles: 1–10) | 3.72 | 3.26 | 2.18 | 1.16 | 3.02 | 7414 |
| Parent health in Wave 1 (1–5) [#] | 3.49 | 3.41 | 3.84 | 3.54 | 3.51 | 7602 |
| Parent health (1–5) | 3.40 | 3.37 | 3.54 | 3.46 | 3.41 | 7676 |
| Stolen Generation [#] | | | | | | |
| Declined to discuss | 0.18 | 0.43 | 0.52 | 0.61 | 0.39 | 7706 |
| Willing to discuss and: | | | | | | |
| Relatives taken away (0/1) | 0.38 | 0.35 | 0.30 | 0.10 | 0.33 | 7706 |
| Relatives not taken away (0/1) | 0.44 | 0.22 | 0.18 | 0.29 | 0.28 | 7706 |
| Household in financial stress | 0.52 | 0.43 | 0.38 | 0.23 | 0.43 | 5085 |
| Parent works | 0.37 | 0.30 | 0.34 | 0.43 | 0.33 | 7691 |
| Parent or partner works | 0.51 | 0.40 | 0.47 | 0.56 | 0.45 | 7706 |
| Parent's highest level of education (Wave 1)(0/1) | | | | | | |
| Less than Year 10 [#] | 0.13 | 0.23 | 0.13 | 0.07 | 0.17 | 7680 |
| Year 10/11 or equiv. [#] | 0.33 | 0.40 | 0.48 | 0.40 | 0.39 | 7680 |
| Year 12/Certificate I/II [#] | 0.22 | 0.17 | 0.20 | 0.24 | 0.19 | 7680 |
| Cert III/IV or Uni degree [#] | 0.27 | 0.14 | 0.09 | 0.12 | 0.16 | 7680 |

Notes: [#] indicates that the variable is fixed (i.e. time-invariant).

a. number of observations for the variable pooled across all waves in which the variable is available.

4. Multivariate results

The results for selected multivariate models are presented in Table 4 (health, social and emotional development) and Table 5 (achievement scores and school attendance). Different models are estimated in accordance with the distribution of the dependent variable. The model for the study child's general health and for the categorisation of the number of socio-emotional difficulties are estimated using ordered probit models; the model for the teacher rating of regularity of school attendance is a logit model; while the others are modelled using generalised least squares in which the dependent variable is treated as a continuous, linear variable. Recall that all the outcome measures have been coded such that a positive coefficient for an independent variable indicates that a higher value of the variable is associated with a more preferable child outcome. Note, however, that for the model of the teacher rating of attendance in Table 5, it is not the coefficients but the odds ratios that are reported. Here the interpretation is that an odds ratio of greater than 1 indicates a positive effect, and an odds ratio less than 1 a negative effect. For example, the odds ratio of 1.160 associated with the child being male indicates that male children are estimated to be 16.0% more likely than girls to be assessed by the teacher as 'attending every day or almost every day' (Table 5).

The child's gender, cohort and the cultural factors scores are retained as controls in all models. The inclusion or exclusion of other independent variables depends mostly on the time periods covered; also, insignificant variables were dropped in the standard process of iterative model building. The variables for sole parent status and financial stress are particularly limiting here, as they are only available from Wave 3 onwards. For the variables capturing parental health, crowding and residential instability, two or more alternative specifications were tested. In these cases only the specification that returns the most robust result is retained in the model. Where no coefficient is reported for a variable, it was omitted, either due to low significance or because an alternative measure was preferred. A dash in the table indicates that the variable is the default or omitted category for a set of variables.

In these tables the asterisks signify the level of statistical significance of the estimated coefficient. Three asterisks (***) indicate a significance level of 0.01 or lower, meaning that there is a 1% or lower probability that an association of this size would be observed by chance. In this case, the estimated coefficient is said to be highly significant. Two asterisks and one asterisk denote 5% and 10% levels of significance, respectively. It is important to note that substantial variation in the sample available for estimation, due to the availability and timing for key variables, will affect the likelihood of identifying statistically significant effects. The samples vary from 3,237 observations for 1,073 individual children in the case of health, down to 1 observation on each of 295 children in the case of the rating of attendance, which was collected only in Wave 7.

The results are discussed below, focusing first on the effects of the culture variables, then housing variables, then remoteness variables and then other controls across all the various domains.

4.1 Culture

The three culture factor scores were retained in all models irrespective of their significance levels. A finding that is immediately apparent across these variables and models is the association between higher scores on the Kinship factor and better outcomes for the study child. This includes better child health as rated by the parent (significant at the 5% level or $p < 0.05$), fewer teacher-assessed difficulties ($p < 0.01$) and improved attendance as rated by the teacher ($p < 0.05$). For the attendance rating, the odds ratio of 1.399

(Table 5) indicates that a one standard deviation increase in the Kinship factor score is associated with a 40% higher probability of the teacher indicating that the child attends school 'every day or almost every day'. A positive association of the Kinship factor with reading test scores is close to attaining weak significance ($p < 0.14$).

The Kinship factor correlates most strongly with the parent wanting to pass on pride, knowledge of country, family networks, respect and family history, as well as with the parent themselves identifying with a mob (see Table 2). The regression results suggest that this parental desire to foster strong identification with the child's Aboriginal and Torres Strait Islander family and culture has wide-ranging beneficial effects on their children's wellbeing and cognitive outcomes – at least up until around the age of 11. No significant results are observed across the seven models for the factor relating the child's Connection to Country, which relates to the child at age 4 having connection to country, living near homelands and identifying with a mob.

For the Traditional Knowledge factor relating to the emphasis the parent places on passing on traditions, ceremony, bush tucker and hunting and language to the child, no relationship is observed with either the child's health or socio-emotional development. Effects do materialise in terms of schooling related outcomes. The Traditional Knowledge factor is associated with higher reading test scores ($\beta = 2.49$, $p < 0.01$) and maths test scores ($\beta = 1.32$, $p < 0.10$). Somewhat paradoxically, it is also associated with lower school attendance. A literal interpretation of the coefficients is that a one standard deviation increase in the factor score is associated with around 2% fewer days attended (weakly significant) or a 32% lower probability of the teacher indicating the child attends school 'every day or almost every day' (moderately significant).

As noted, the factor scores vary markedly and systematically by remoteness (see Table 3). Average scores for the Connection to Country and Traditional Knowledge factors are far higher the more remote the area in which the child lives. For the Connection to Country factor this is to be expected, since it correlates strongly with having connection to country and living near homelands. In contrast, the Kinship factor is much lower in more remote areas. These patterns raise the possibility that values of the factor scores have different effects depending upon the family's geographical context. For example, a score of 0 for the Kinship factor (the population mean) would indicate the parent places relatively low importance on passing on family background if they lived in an urban area (relative to others), but that same score would indicate a relatively high importance placed on passing on family background in a remote context.

To deal with this issue, the factor scores were recalibrated to be region-specific: standardised to have a mean of 0 and standard deviation of 1 within each of the four levels of relative isolation. Using these more nuanced scores in the models in place of the original scores makes no substantive difference to the results. While this adjusts the factor scores by region, it still imposes the estimated effects of each element of culture to be the same across regions, since only one coefficient is estimated. To allow the effects of culture to vary by remoteness, the models reported in Tables 4 and 5 were estimated separately for the samples from non-remote areas, from low-remote areas and from moderately/highly remote areas. The moderately remote and highly remote areas are grouped together due to their smaller sample numbers. Even here, sample numbers were too small to be considered reliable in some models, and results are reported only for models in which there were observations for a minimum of 100 individuals available for estimation.

Table 4: Multivariate results – child health and social/emotional wellbeing

| Dependent variable | Study child's health | | SDQ: Social/emotional adjustment | | | |
|--------------------------------|----------------------|-----|----------------------------------|-----|----------------|-----|
| | | | Teacher rated | | Parent rated | |
| Model type | Ordered probit | | Ordered probit | | Ordered probit | |
| Waves included | W5–W7 | | W5, W6 | | W6 | |
| Baby cohort | W3–W7 | | W2–W6 | | W3, W4, W6 | |
| Child cohort | Coef. | | Coef. | | Coef. | |
| Study child is male | -0.144 | ** | -0.837 | *** | -0.541 | *** |
| Age at interview (months) | 0.004 | *** | -0.020 | *** | 0.007 | |
| Child cohort | -0.145 | ** | 0.216 | | -0.243 | |
| Culture factor scores | | | | | | |
| Connection to country | -0.031 | | 0.103 | | -0.001 | |
| Connection to kin | 0.082 | ** | 0.320 | *** | -0.023 | |
| Traditional knowledge | 0.006 | | 0.093 | | 0.038 | |
| Parent is sole parent | 0.081 | | | | | |
| Level of relative isolation | | | | | | |
| None | — | | — | | — | |
| Low | 0.046 | | -0.023 | | 0.072 | |
| Moderate | -0.448 | *** | 0.035 | | -0.240 | |
| High/extreme | -0.436 | *** | 0.732 | | 0.230 | |
| Neighbourhood SES (decile) | -0.022 | | 0.049 | | | |
| Housing variables | | | | | | |
| Tenure type | | | | | | |
| Rents, community housing | 0.019 | | 0.100 | | 0.084 | |
| Rents, government housing | — | | — | | — | |
| Rents, private | 0.137 | * | 0.137 | | 0.349 | * |
| Home owner/purchaser | 0.200 | * | 0.319 | | 0.594 | ** |
| Other tenure | -0.067 | | -0.488 | | -0.182 | |
| Crowding measures | | | | | | |
| People per bedroom | | | | | | |
| Extra bdrms needed (1/child) | 0.020 | | | | | |
| Extra bdrms needed (2/child) | | | 0.162 | | | |
| Residential instability | | | | | | |
| No. moves, past three waves | | | | | -0.255 | *** |
| No. moves, past two waves | | | | | | |
| Parent's current health | 0.442 | *** | | | 0.169 | *** |
| Parent's health rating, Wave 1 | | | 0.182 | ** | | |
| Parent/relative removed: | | | | | | |
| Declined to answer questions | — | | | | | |
| Answered: not removed | 0.137 | * | | | | |
| Answered: yes removed | 0.196 | ** | | | | |
| Household in financial stress | | | | | -0.568 | *** |
| Parent works | | | | | 0.158 | |
| Parent or partner works | | | | | | |
| Parent's highest qualification | | | | | | |
| Did not complete Year 10 | 0.182 | ** | -0.343 | | | |
| Year 10/11 or equiv. | — | | — | | | |
| Year 12/Certificate I/II | 0.039 | | 0.155 | | | |
| Cert III/IV or Uni degree | 0.285 | *** | 0.071 | | | |
| Observations | 3237 | | 976 | | 1041 | |
| Individuals | 1073 | | 625 | | 784 | |
| Observations per child | | | | | | |
| Minimum | 1 | | 1 | | 1 | |
| Average | 3 | | 1.6 | | 1.3 | |
| Maximum | 5 | | 4 | | 2 | |
| Wald chi-squared | 327.68 | *** | 80.81 | *** | 56.78 | *** |

Notes: ***, ** and * indicate that the estimated coefficient is statistically different from 0 at the 1%, 5% and 10% levels, respectively.

Table 5: Multivariate results – cognitive achievement and school attendance

| Dependent variable Model type Waves included Baby cohort Child cohort | Achievement test scales | | | | School attendance | | |
|---|-------------------------|-----|-----------------------|-----|------------------------------------|-----|-------------------------|
| | Reading GLS (linear) | | Maths GLS (linear) | | Proportion of days GLS (linear) | | Teacher rating logit |
| | W7 W4–W6 Coef. | | W6, W7 Coef. | | W6 W5, W6 Coef. | | W7 W7 Odds ratio |
| | | | | | | | |
| Study child is male | -6.045 | *** | -1.371 | | -0.074 | | 1.160 |
| Age at interview (months) | 0.762 | *** | 0.490 | *** | 0.010 | | |
| Child cohort | -7.343 | *** | 7.906 | ** | -0.269 | | 1.092 |
| Culture factor scores | | | | | | | |
| Connection to country | 0.259 | | -0.551 | | -0.157 | | 1.000 |
| Connection to kin | 1.103 | | 0.509 | | 0.037 | | 1.399 ** |
| Traditional knowledge | 2.491 | *** | 1.316 | * | -0.162 | * | 0.677 ** |
| Parent is sole parent | | | | | | | |
| Level of relative isolation | | | | | | | |
| None | — | | — | | — | | — |
| Low | -5.018 | *** | -1.781 | | -0.078 | | 0.915 |
| Moderate | -12.939 | *** | -6.579 | ** | -1.461 | *** | 0.805 |
| High/extreme | -11.970 | *** | -7.501 | ** | -0.673 | * | 0.946 |
| Neighbourhood SES (decile) | | | | | | | 1.116 * |
| Housing variables | | | | | | | |
| <i>Tenure type</i> | | | | | | | |
| Rents, community housing | -1.039 | | 0.656 | | -0.015 | | 0.476 * |
| Rents, government housing | — | | — | | — | | — |
| Rents, private | 5.354 | *** | 4.458 | *** | 0.667 | *** | 1.651 |
| Home owner/purchaser | 3.893 | * | 4.827 | ** | 0.253 | | 1.363 |
| Other tenure | 4.944 | * | 4.865 | * | 0.900 | *** | 5.023 * |
| <i>Crowding measures</i> | | | | | | | |
| People per bedroom | | | | | -0.293 | ** | |
| Extra bdrms needed (1/child) | -0.823 | ** | -1.082 | *** | | | |
| Extra bdrms needed (2/child) | | | | | | | 0.811 |
| <i>Residential instability</i> | | | | | | | |
| No. moves, past three waves | | | | | -0.306 | *** | 0.758 |
| No. moves, past two waves | | | 1.329 | | | | |
| <i>Parent's current health</i> | | | | | | | |
| <i>Parent's health rating, Wave 1</i> | | | | | | | |
| <i>Parent/relative removed:</i> | | | | | | | |
| Declined to answer questions | — | | — | | — | | — |
| Answered: not removed | 1.374 | | 2.648 | | -0.207 | | 1.578 |
| Answered: yes removed | -2.811 | * | -0.441 | | -0.495 | ** | 1.142 |
| Household in financial stress | -3.058 | ** | | | -0.344 | ** | |
| Parent works | 4.501 | *** | | | 0.356 | ** | |
| Parent or partner works | | | | | | | 2.758 *** |
| <i>Parent's highest qualification</i> | | | | | | | |
| Did not complete Year 10 | -3.763 | ** | -2.461 | | 0.089 | | 0.528 * |
| Year 10/11 or equiv. | — | | — | | — | | — |
| Year 12/Certificate I/II | 2.436 | | 1.918 | | 0.589 | *** | 0.570 |
| Cert III/IV or uni degree | 3.963 | * | 3.431 | * | 0.693 | *** | 1.071 |
| Constant term | 22.876 | *** | 39.557 | *** | 8.131 | *** | 0.832 |
| Observations | 1418 | | 599 | | 422 | | 295 |
| Individuals | 888 | | 331 | | 370 | | 295 |
| <i>Observations per child</i> | | | | | | | |
| Minimum | 1 | | 1 | | 1 | | 1 |
| Average | 1.6 | | 1.8 | | 1.1 | | 1 |
| Maximum | 3 | | 2 | | 2 | | 1 |
| Wald chi-sq | 453.39 | *** | 158.95 | *** | 153.98 | *** | |
| LR chi-sq | | | | | | | 81.9 *** |
| <i>R-sq: within</i> | | | | | | | |
| Between | 0.22 | | 0.15 | | 0.02 | | |
| Overall | 0.22 | | 0.23 | | 0.31 | | |
| Pseudo R2 | 0.24 | | 0.20 | | 0.30 | | 0.20 |

Notes: ***, ** and * indicate that the estimated coefficient is statistically different from 0 at the 1%, 5% and 10% levels, respectively.

Table 6: Estimates for cultural factors scores; models estimated separately by remoteness

| | Level of relative isolation | | | | | |
|--|-----------------------------|---------|--------------------|---------|-------------------|-----------|
| | None | | Low | | Moderate/high | |
| | Coef. | P>z | Coef. | P>z | Coef. | P>z |
| General health | | | | | | |
| Connection to Country | -0.08 | 0.315 | 0.02 | 0.760 | -0.05 | 0.436 |
| Connection to Kin | 0.08 | 0.337 | 0.09 | * | 0.068 | 0.656 |
| Traditional Knowledge (n. Obs/individuals) | -0.06 (876/295) | 0.513 | 0.00 (1726/598) | 0.977 | 0.05 (635/249) | 0.442 |
| Social/emotional adjustment – teacher rated | | | | | | |
| Connection to Country | 0.07 | 0.636 | 0.17 | 0.216 | -0.13 | 0.374 |
| Connection to Kin | 0.23 | 0.136 | 0.32 | ** | 0.019 | 0.003 |
| Traditional Knowledge (n. Obs/individuals) | 0.05 (286/179) | 0.780 | 0.10 (543/351) | 0.456 | 0.19 (147/101) | 0.187 |
| – parent rated | | | | | | |
| Connection to Country | 0.03 | 0.864 | 0.10 | 0.396 | -0.35 | * 0.053 |
| Connection to Kin | 0.14 | 0.421 | -0.01 | 0.956 | -0.34 | 0.101 |
| Traditional Knowledge (n. Obs/individuals) | -0.34 (283/216) | * 0.083 | 0.12 (550/414) | 0.224 | 0.18 (208/163) | 0.274 |
| Reading achievement | | | | | | |
| Connection to Country | 2.20 | 0.109 | -0.21 | 0.844 | -2.92 | * 0.052 |
| Connection to Kin | 1.64 | 0.226 | 1.07 | 0.292 | -1.75 | 0.356 |
| Traditional Knowledge (n. Obs/individuals) | -0.52 (384/236) | 0.743 | 1.60 (763/473) | 0.108 | 6.91 (271/193) | *** 0.000 |
| Maths achievement | | | | | | |
| Connection to Country | | | -0.06 | 0.945 | | |
| Connection to Kin | | | 0.45 | 0.674 | | |
| Traditional Knowledge (n. Obs/individuals) | | | 0.22 (331/184) | 0.812 | | |
| School Attendance – proportion of days | | | | | | |
| Connection to Country | 0.18 | 0.237 | -0.26 | * 0.057 | | |
| Connection to Kin | 0.08 | 0.577 | 0.05 | 0.735 | | |
| Traditional Knowledge (n. Obs/individuals) | -0.05 (125/106) | 0.761 | -0.11 (233/206) | 0.415 | | |
| – teacher rating | | | Odds ratio | | | |
| Connection to Country | | | 0.92 | 0.735 | | |
| Connection to Kin | | | 1.14 | 0.537 | | |
| Traditional Knowledge (n. Obs/individuals) | | | 0.62 (170/170) | * 0.060 | | |

Notes: ***, ** and * indicate that the estimated coefficient is statistically different from 0 at the 1%, 5% and 10% levels, respectively.

Summarised in Table 6, these results indicate that the beneficial effect of Connection to Kin on children's health is most pronounced in less remote areas, while the positive effect on socio-emotional adjustment based on teacher assessments applies across the board (statistically the result is most robust in areas of moderate/high relative isolation). There is some inconsistency between the results with respect to teacher- versus parent-assessed results on the SDQ in more remote areas. For children living in remote and very remote areas, higher scores on the Country and Kinship factors are associated with more parent-reported difficulties, something that is not apparent from teacher assessments.

The estimates by region highlight some interesting contrasts with respect to school-related outcomes. The Traditional Knowledge factor has a large and robust association with children's reading scores in remote areas, but little effect in non-remote areas. In contrast, the Kinship factor has a positive estimated effect on reading scores primarily in non-remote areas. Moreover, the effects of Connection to Kinship and to Country appear to switch from a positive effect for children in non-remote areas to a negative effect in

remote Australia. The Connection to Country factor, which is interpreted as largely signalling a physical attachment to traditional country, is associated with lower reading scores in remote Australia (weakly significant), and there is weak evidence that it is associated with lower attendance in areas of low isolation. Unfortunately, sample sizes inhibit our ability to say such more about effects on attendance, but these results give an initial indication of a conflict in remote areas between school achievement and engagement for Aboriginal and Torres Strait Islander children who are being raised with a close connection to their traditional country.

4.2 Housing

Housing-related variables include measures of tenure type, crowding and residential instability. A consistent result across the models is that living in private rental accommodation or in an owner-occupied home is associated with better child outcomes when compared to living in government housing. While the estimated effects for these two tenures are similar, note that there are in fact very few families who either rent privately or own their own home in areas of moderate or high isolation, so the result pertains primarily to children living in cities and regional towns. The estimated effects of being in private rental or owner-occupied housing, as opposed to government housing, include better health as assessed by the parent, fewer parent- and teacher-assessed social and emotional difficulties, higher reading and maths test scores, and more regular school attendance. In the case of school attendance, living in the family's own home or in a privately rented home is associated with the teacher being approximately 50% more likely to indicate the child attends school 'every day or almost every day' compared to children living in government housing. Differences in outcomes for those living in community housing are generally not significantly different from outcomes for those living in government-rented housing – commonly referred to as 'public housing'. The one exception is an estimated negative association with one measure of school attendance.

There is limited evidence of negative effects of either crowding or residential instability, despite the range of measures tested to capture these effects. These results seem at odds with the prominence of these two factors in the discourse on contributions to poorer outcomes for Aboriginal and Torres Strait Islander children, notably in remote communities. Moreover, there are inconsistencies in regards to whether any effect is beneficial or detrimental to child outcomes. In terms of crowding, there is weak evidence that children living in more crowded housing actually display better socio-emotional adjustment as assessed by their teachers, though the effect is not quite significant ($p=0.14$). By one measure, there is a negative association between the number of extra bedrooms required and the child's reading and maths achievement scores. The estimates are small in magnitude, given the estimated coefficients ($\beta=-0.82$ and $\beta=-1.08$ respectively) and a standard deviation of the crowding variable of 1.8. Taking the larger of these estimates as an example, the difference in the average value for the crowding variable for those living in non-remote areas (1.13 extra bedrooms required) and very remote areas (2.56 extra bedrooms required) would translate to only a 1.5 lower score on the maths scale. To put the magnitude of this effect into perspective, the estimated effect of the child living in a very remote area as opposed to a non-remote area is to lower scores for the maths test by 6.2. These inconsistencies in results relating to measures of crowding suggest there may be non-linearity in effects along the distribution of those measures.

The one significant result relating to the effect of crowding on school attendance implies the proportion of days children attend school is about 3 percentage points lower for each additional person per bedroom. Again, this could be considered a relatively minor effect other than for quite extreme cases of crowding. On alternative measures, the estimated effect of crowding on school attendance is also negative (odds ratio=0.811, implying the teacher is 18.9% less likely to indicate the child attends almost always), but the

coefficient is insignificant. In terms of frequency of moves, variables for the number of moves in the past two waves and the number of moves in the past three waves were tested. Significant effects were found for only two of the outcome variables, and in both cases it was the variable based on the number of moves in the past three waves that proved the most robust predictor. More frequent moves are associated with more parent-reported social and emotional difficulties, and with less frequent school attendance on one of the measures of school attendance. These estimated effects are both highly significant. Recall from Table 3 that the means for these measures indicate that children living in more remote areas are in fact observed to experience fewer changes of address.

4.3 Remoteness

Net of the estimated effects of other controls included in the models, there remains a strong association in which remoteness is associated with inferior child health as assessed by the parent. There seems to be no difference in parent-assessed health between children living in non-isolated areas and in low-isolation areas. Compared to those children, however, those living in both moderately remote and highly/extremely remote areas have similarly inferior health assessments by their parents. In contrast, in the case of the teacher report, there are fewer reported social and emotional difficulties for children living in very remote areas, although the estimate is not quite significant ($p=0.12$). There also seems to be a clear relationship in which achievement scores fall with the degree of remoteness, and this is most pronounced in the case of the scale for the reading achievement test score. Estimated effects with regard to school attendance also suggest attendance is lower in moderately remote and highly remote areas.

4.4 Other controls

Cohort and age effects are significant in a number of the models, suggesting that some of the outcome variables do need to be age-standardised. In all models, the variable based directly on the age of the child in months at the time of the interview proved superior to the variable capturing age relative to the wave-specific mean for the cohort. Age and cohort effects seem generally to offset each other, indicating that within cohorts, age differences do matter. Male children are typically assessed by their parents as having inferior health when compared to females and as having more social and emotional difficulties by both parents and teachers. Boys also performed substantially worse on the reading tests, but comparable to girls on maths.

The parental characteristic which appears to influence child outcomes most consistently is the parent's level of education. Scores on both the reading and maths tests increase with the level of qualification obtained by the parent. General health is highest among children whose parents hold post-school qualifications. Parental education also appears to impact upon school attendance. Children whose parents completed the equivalent of Year 12 or held any post-school qualifications were estimated by their teachers to attend around 6% more days of school relative to children of parents who completed Year 11 or below. Children of parents who had not completed Year 10 were around half as likely to be assessed by their teacher as attending school 'every day or almost every day'.

There is evidence that financial stress contributes to poorer child outcomes. The variable derived to indicate the family has experienced financial stress is associated with the parent being less likely to assess their child as being in the normal range for social and emotional difficulties (highly significant), lower child reading scores and a lower proportion of days attended at school (both moderately significant). At least one parent being in employment is associated with quite substantive benefits in the school domain.

This includes higher reading results and higher teacher-assessed attendance. Better health of the responding parent is found to be associated with better child health and fewer teacher- and parent-assessed social and emotional difficulties, but not with the cognitive outcomes or school attendance.

Interpreting the results for the parent or their relatives having been removed from their natural family is complicated by the fact that a substantial proportion of respondents elected not to answer questions about the Stolen Generation. As these non-respondents comprise the largest group, they have been retained in the sample and modelled as the omitted category. Previous research has found that having been removed or having had relatives removed has marked and deleterious effects across a range of outcomes for the respondent themselves (Dockery 2010, 2012). Here the estimated effects suggest that those who declined to answer these questions assessed their child as having lower health. Note that the model controls for variables that may potentially mediate the relationship between Stolen Generation status and child health, notably parental health and education. However, a reduced model including only controls for child gender, age, cohort and remoteness confirms significantly better assessed child health for respondents irrespective of whether they indicated their family had or had not experienced removal relative to those who declined to answer. Children of parents who agreed to answer these questions and indicated that they were part of the Stolen Generation achieved lower scores in reading tests (weakly significant) and a lower proportion of days attended at school (moderately significant).

Finally, several variables are conspicuous by the absence of significant effects where they may have been expected. The child being from a sole parent family was not significant in any model. This contrasts with the typical findings across mainstream Australia of poorer outcomes for children from sole parent families. Possibly this reflects the wider kinship support and involvement that characterises the upbringing of children in Aboriginal and Torres Strait Islander culture, meaning the absence of one parent does not detract from the socio-emotional support and resources available to Aboriginal and Torres Strait Islander children to the same extent that it does in cultures where the nuclear family has that role.

The decile of socio-economic advantage of the neighbourhood was also significant only in the model for teacher rating of attendance, and then only weakly so. Such SEIFA values are commonly robust predictors of positive outcomes, and in part this will be because they capture otherwise unobservable attributes of the family. A reason for the low explanatory power of the variable in this population may be its limited variation and skewed distribution. In the LSIC sample available for estimation, the mean value was 3.02; with 42% of respondents in the lowest (most disadvantaged) decile and two-thirds in the bottom three deciles. For the full Australian population, by definition, the variable has a mean of 5.5 with 10% of the population in every decile.

5. Discussion and conclusion

Moving beyond the Closing the Gap reform agenda, there is growing momentum in efforts to develop frameworks that holistically encapsulate the factors that contribute to wellbeing for Aboriginal and Torres Strait Islander Australians. To improve the livelihoods of those peoples, there is an urgent need for empirical validation of the mechanisms and relationships underpinning those frameworks and, where supported, for the translation of those insights into policy and practice, such as in models of service delivery. Critically, enhancing livelihoods in the future requires identifying the factors that promote positive development of today's Aboriginal and Torres Strait Islander children. It is argued that interrelationships between culture, remoteness and housing are potentially important factors impacting on children's developmental and educational outcomes. The analysis has sought to contribute to the sparse

body of empirical evidence on the nature of those complex relationships, since they ought to be major considerations shaping policy formulation.

A second motivation has been to advance the empirical literature relating culture to wellbeing. Internationally, studies have shown beneficial effects associated with ‘enculturation’ for adults and adolescents from minority groups (e.g. Zimmerman et al. 1994), with a limited number of studies showing positive health and other benefits associated with Aboriginal and Torres Strait Islander peoples’ cultural engagement and sense of identity. In contrast, this study relates elements of parents’ cultural attitudes and practices to outcome variables measured for their children, providing new evidence on whether there is a causal effect flowing from culture to outcomes. This includes drawing on ‘third party’ outcome measures that are generated independently of the responding parent, including standardised reading and maths achievement scores and teacher ratings of school attendance and of social and emotional adjustment using the SDQ.

A key finding from the analysis is that where parents place a high priority on fostering a strong sense of identification with their Aboriginality in their children – pride, respect and knowledge of their family networks and family history – then those children display better outcomes. The factor scores for this Connection to Kinship measure decline steadily with remoteness, signifying that parents place greater emphasis on fostering this aspect of cultural identity in the child when the family lives in major cities and regional towns. This will partly reflect that children living in remote communities are typically already strongly embedded in their kinship networks, meaning parents will see passing this on as less of a priority compared to other aspects of culture, such as traditional knowledge. It also means that it is for Aboriginal and Torres Strait Islander children living within mainstream Australia for whom the development and maintenance of strong identification with their family background is most important.

There is also evidence of a synergy between parents wanting to pass on traditional knowledge, including traditional language, and school achievement. This relationship is most apparent for children living in more remote areas of the country. As a general hypothesis, it could be expected that factors that positively impact upon children’s cognitive outcomes would also be associated with more regular school attendance. This appears to hold in this sample for parental education, living in a non-remote area, living in a family that rents privately or owns their home and having a parent in employment. However, the opposite is observed for parents placing a high emphasis on traditional knowledge: their children’s maths and reading scores are higher, but school attendance lower. These findings strongly suggest that school does not appropriately cater to these children’s learning needs and support arguments by Guenther et al. (2015) and others that education in remote schools will be most effective with local-based curricula designed to combine traditional and mainstream learning, possibly including traditional methods of instruction and the incorporation of assessments that measure achievement in traditional knowledge.

There is little evidence that crowded housing has a substantial negative effect on children’s outcomes. And while there is some evidence that residential instability impedes social and emotional adjustment and leads to lower school attendance, overall the results suggest these do not appear to be as big a problem as is often suggested for Aboriginal and Torres Strait Islander children living in more remote areas. A caveat is that the measures used here may not capture effects of more extreme instances of crowding and residential instability.

The housing-related characteristic found to have the strongest associations with child outcomes is tenure: inferior outcomes are observed across the board for children living in government or community housing as opposed to those who rent privately or own their home. More research is needed to explore this result

and to draw policy implications: is it really a housing factor or does the finding reflect other unobserved characteristics of those families who are privately renting or purchasing their own home? While family income may seem a likely candidate, recall that the models already control for financial stress and for parental education, which is often used as an instrument for income. Since very few families in the moderately remote or highly remote samples are home owners or private renters, the observed results apply to children residing in less remote areas. It is not possible to say whether the same negative effects of community or government housing apply in more remote areas since the low incidence (and sample numbers) of private renting and home ownership precludes obtaining robust estimates from models estimated separately by remoteness.

Consistent with Bronfenbrenner's (1975, 2005) bio-ecological theory and Brooks-Gunn et al.'s (1995) conceptual resource framework, parental education, employment and families' financial situations have substantial influences on child development. After controlling for these and other factors, living in more remote communities does appear to be associated with inferior outcomes in the schooling domain and in lower parent-assessed health, but there is no evidence of lower social and emotional wellbeing. Along with any independent effects of remoteness, other factors must be considered that vary by remoteness to fully assess the implications of geography. For example, children in highly or extremely remote areas live in more crowded houses and are more likely to live in government or community housing, but they experience fewer residential moves, have attachment to country and are more likely to have a parent in employment.

This research has been undertaken as a supplement to ongoing work analysing temporary mobility of Aboriginal and Torres Strait Islander people living in remote Aboriginal communities in central Australia under the CRC-REP's Population Mobility and Labour Markets project. It is to be stressed again that residential instability measured here is not the same as temporary mobility as defined in that project. Under the Mobility project, temporary mobility is seen as a means to access things that promote wellbeing (Dockery 2016) and facilitates coexistence in 'both worlds' for people living in remote communities, such as combining cultural obligations with access to mainstream services. Unfortunately, variables on such temporary mobility are not available in LSIC, but the analysis provides complementary insights into the nature of some of the trade-offs associated with remoteness and the importance of mobility. The LSIC data confirm that living in remote locations facilitates greater attachment to traditional lands and the passing on of traditional knowledge for many Aboriginal and Torres Strait Islander children. It provides an example of the compromise in service provision, in this case evidence of less culturally appropriate schooling. Data from the Mobility project surveys and previous research show that the maintenance of kinship networks – visiting family – is one of the main drivers of temporary mobility among Aboriginal and Torres Strait Islander people (Dockery & Hampton 2015). The evidence presented here of the importance of identity associated with connection to kin in promoting positive child development provides a clear empirical justification for such mobility.

6. Limitations and future research

The LSIC is a large dataset in terms of the number of observations available on Aboriginal and Torres Strait Islander children, and it is the only such longitudinal survey of that scale. Even so, the robustness of the statistical analysis attempted here is still curtailed by the number of individuals and relatively limited number of repeat observations available in the estimation samples. While there are an average of three observations per child in the model for parent-assessed health, all other models are based on samples with

less than two observations per child. Thus the estimations benefit to only a limited degree from the potential strengths of panel techniques in controlling for unobserved, fixed individual effects and monitoring outcomes over extended periods. Along with normal sample attrition, this is exacerbated by the approach taken in analysing outcomes observed after key elements of the cultural factors scores were measured to limit endogeneity, and also because all but one of the outcomes measures (general health) are available in only a subset of waves. This limitation will be relaxed as future waves of LSIC data become available.

Sample size limitations also exist when it comes to examination of subsets of the sample, as has been done in examining differential effects of the cultural variables using models estimated separately by remoteness. Such geographical contexts appear to be important, and there would be benefit in more detailed, contextual analysis in the future for other variables of interest, including housing circumstances and residential instability. Exploration of alternative specifications of crowding and residential instability measures and for potentially non-linear effects is also warranted. The apparent tension between children's accumulation of traditional knowledge and remote schooling stands out as a priority for more detailed future research relating to outcomes within the education domain. Given the sensitivity of estimates across various models tested, and the sometimes inconsistent results between the two alternative measures, however, caution should be exercised in drawing conclusions based on the results for the school attendance measures. With these available in a very limited number of waves, further validation of a preferred measure may be possible with further waves of data.

In terms of the methodological contribution on the role of culture, to the best of the author's knowledge this paper is unique in relating cultural measures at the parental level to children's outcomes. The analysis adds further support to psychological theory, which views the development of a strong sense of identity as the mechanism through which culture impacts upon outcomes. However, it must be noted that the interpretation of the Connection to Kinship and Connection to Country factors as reflecting elements of cultural identity is a subjective one. It cannot be claimed that the method used here establishes causality between cultural identity and outcomes, but it certainly adds to the growing weight of evidence of a causal positive effect of culture. This approach overcomes the challenge of reverse causality – it is very hard to see how children's outcomes in later years would shape parental actions and attitudes relating to the cultural immersion of their child. However, the possibility of omitted variable bias remains: that there is some other, unobserved factor that both promotes families' engagement in their Aboriginal and Torres Strait Islander heritage and has a positive influence on child development.

The findings reported here – assuming they stand up to future validation – point to a need for further research equating parent's cultural aspirations for their children with actual measures for the child, such as the child's self-reported sense of identity, strength of cultural networks and cultural knowledge, and how these relate to outcomes. Further, culture is not static. The fact that the relationships revealed here, the appropriate measures and even what needs to be measured may all change over time calls for ongoing research to ensure policy and models of service delivery – such as education systems – remain culturally appropriate and responsive. This can best be achieved by promoting the capability and empowerment of Aboriginal and Torres Strait Islander people in both research and the decision-making processes that impact upon them and their children.

References

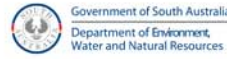
- ABS (Australian Bureau of Statistics). 2007. *Housing and infrastructure in Aboriginal and Torres Strait Islander Communities, Australia, 2006* (re-issue). Catalogue no. 4710.0, ABS. Canberra.
- ABS (Australian Bureau of Statistics). 2010. *Framework for Measuring Wellbeing: Aboriginal and Torres Strait Islander Peoples, 2010*. Catalogue no. 4703.0, ABS. Canberra. Available at <http://www.abs.gov.au/AUSSTATS/abs@.nsf/ProductsbyCatalogue/E8B15412D3BD0B3ACA2576DC001456EF?OpenDocument>.
- AHMAC (Australian Health Ministers' Advisory Council). 2015. *Aboriginal and Torres Strait Islander Health Performance Framework 2014 Report*. AHMAC. Canberra.
- AIATSIS (Australian Institute for Aboriginal and Torres Strait Islander Studies). n.d. *Mayi Kuwayu. Development of the longitudinal study of Aboriginal and Torres Strait Islander wellbeing*. Available at <http://aiatsis.gov.au/mayi-kuwayu>.
- AIHW (Australian Institute for Health and Welfare). 2014. *Housing circumstances of Indigenous households: tenure and overcrowding*, AIHW. Canberra.
- Biddle N. 2008. *The scale and composition of Indigenous housing need: 2001–2006*. CAEPR Working Paper no. 47/2008, Centre for Aboriginal Economic Policy Research, ANU. Canberra.
- Biddle N. 2009. *Ranking regions: Revisiting an index of relative Indigenous socio-economic outcomes*. CAEPR Working Paper no. 50/2009, Centre for Aboriginal Economic Policy Research, ANU. Canberra.
- Biddle N. 2010. Indigenous migration and the labour market: A cautionary tale. *Australian Journal of Labour Economics* 13(3), 313–30.
- Bronfenbrenner U. 1979. *The ecology of human development: Experiments by nature and design*. Harvard University Press. Cambridge, Massachusetts.
- Bronfenbrenner U (Ed). 2005. *Making human beings human: Bioecological perspectives on human development*. Sage Publications, Inc. Thousand Oaks, CA.
- Brooks-Gunn J, Brown B, Duncan GJ and Moore AK. 1995. *Child development in the context of family and community resources: An agenda for national data collections*. The National Academy of Sciences. Washington, DC.
- Cairney S, Abbott T and Yamaguchi J. 2015. *Study protocol: the Interplay Wellbeing Framework and methodology to assess wellbeing in Aboriginal and Torres Strait Islander people in remote Australia*. CRC-REP Working Paper CW024. Ninti One Limited. Alice Springs.
- Campbell D, Burgess C, Garnett S and Wakerman J. 2011. Potential primary health care savings for chronic disease care associated with Australian Aboriginal involvement in land management. *Health Policy* 99, 83–9.
- Chandler MJ, Lalonde C, Sokol B and Hallett D. 2003. Personal persistence, identity development, and suicide: A study of native and non-native North American adolescents, *Monographs of the Society for Research in Child Development*, Serial no. 273, 68(2).
- Churchin K. 2015. Two visions of Indigenous economic development and cultural survival: The 'real economy' and the 'hybrid economy'. *Australian Journal of Political Science* 50(3), 412–426.

- COAG (Council of Australian Governments). 2008. *National Indigenous Reform Agreement (Closing the Gap)*, COAG. Available at <http://www.coag.gov.au/node/145>.
- Colquhoun S and Dockery AM. 2012a. *The link between Indigenous culture and wellbeing: Qualitative evidence for Australian Aboriginal peoples*. CLMR Discussion Paper Series 2012/1, Centre for Labour Market Research, Curtin Business School, January.
- Colquhoun S and Dockery AM. 2012b. *Mobility of Aboriginal and Torres Strait Islander people: A literature review*. CRC-REP Working Paper CW004, Ninti One Ltd. Alice Springs.
- Dockery AM. 2010. Culture and wellbeing: The case of Indigenous Australians. *Social Indicators Research* 99(2), 315–332.
- Dockery AM. 2012. Do traditional culture and identity promote the wellbeing of Indigenous Australians? Evidence from the 2008 NATSISS. In *Survey analysis for Indigenous policy in Australia: Social science perspectives*. Eds. Hunter B and Biddle N. pp. 281–305. Research Monograph No. 32, Centre for Aboriginal Economic Policy Research, Australian National University E Press. Canberra.
- Dockery AM. 2016. A wellbeing approach to mobility and its application to Aboriginal and Torres Strait Islander Australians. *Social Indicators Research* 125(1), 243–255.
- Dockery AM and Hampton K. 2015. *The dynamics of services, housing, jobs and mobility in remote Aboriginal and Torres Strait Islander communities in central Australia*. CRC-REP Working Paper CW023, Ninti One Limited. Alice Springs.
- Dockery AM and Lovell J. (forthcoming). Far removed: an insight into the labour markets of remote communities in central Australia. *Australian Journal of Labour Economics*.
- Dockery AM, Ong R, Colquhoun S, Li J and Kendall G. 2013. *Housing and children's development and wellbeing: Evidence from Australian Data*. AHURI Final Report No. 201, Australian Housing and Urban Research Institute. Melbourne.
- DSS (Department of Social Services). 2016. *Footprints in Time: The Longitudinal Study of Indigenous Children – Data User Guide*, Release 7.0. DSS. Canberra.
- FaHCSIA (Department of Families, Housing, Community Services and Indigenous Affairs). 2009. *Footprints in Time: The Longitudinal Study of Indigenous Children – Key Summary Report from Wave 1*. FaHCSIA. Canberra.
- Goodman R. 2001. Psychometric properties of the Strengths and Difficulties Questionnaire. *Journal of the American Academy of Child & Adolescent Psychiatry* 40(11), 1337–45.
- Guenther J, Disbray S and Osborne S. 2015. Building on 'red dirt' perspectives: What counts as important for remote education? *Australian Journal of Indigenous Education* 44(2), 194–206.
- Hughes H. 2007. *Lands of shame*. Centre for Independent Studies. New South Wales.
- Johns G. 2008. The Northern Territory Intervention in Aboriginal affairs: Wicked problem or wicked policy? *Agenda* 15(2), 65–84.
- Lippman L, Moore K and McIntosh H. 2011. Positive indicators of child well-being: A conceptual framework, measures, and methodological issues. *Applied Research in Quality of Life* 6, 425–449.
- Martin AJ. 2006. A motivational psychology for the education of Indigenous Australian students. *Australian Journal of Indigenous Education* 35, 30–43.

- McRae D, Ainsworth G, Cumming J, Hughes P, Mackay T, Price K, Rowland M, Warhurst J, Woods D and Zbar V. 2000. *What works? Explorations in improving outcomes for Indigenous students*. Australian Curriculum Studies Association and National Curriculum Services. Canberra.
- Nguyen O and Cairney S. 2013. *Literature review of the interplay between education, employment, health and wellbeing for Aboriginal and Torres Strait Islander people in remote areas*. CRC-REP Working Paper CW013. Ninti One Limited. Alice Springs.
- Productivity Commission. 2016a. *Reforms to human services*. Issues paper, Productivity Commission. Melbourne.
- Productivity Commission. 2016b. *Indigenous primary school achievement*. Research Paper, Productivity Commission. Melbourne.
- Regional Services Reform Unit. 2016. *Resilient families, strong communities: a roadmap for regional and remote Aboriginal communities*. Regional Services Reform Unit, Government of Western Australia. Perth.
- Ryan RM and Deci EL. 2000. Self-determination theory and the facilitation of intrinsic motivation, social development and well-being. *American Psychologist* 55(1), 68–78.
- Sarra C. 2011. *Strong and smart – towards a pedagogy for emancipation: Education for first peoples*, Routledge. Oxon.
- SCRGSP (Steering Committee for the Review of Government Service Provision). 2016. *Overcoming Indigenous Disadvantage: Key Indicators 2016*. Productivity Commission. Canberra.
- Sen A. 1999. *Development as freedom*. Oxford University Press. Oxford.
- Taylor J. 1991. *Geographic location and Aboriginal economic status: a census-based analysis of outstations in Australia's Northern Territory*. Centre for Aboriginal Economic Policy Research Discussion Paper No. 8/1991. Australian National University. Canberra.
- Thompson SJ, Gifford SM and Thorpe L. 2000. The social and cultural context of risk and prevention: Food and physical activity in an urban Aboriginal community. *Health Education and Behavior* 27(6), 725–743.
- Zimmerman MA, Ramirez J, Washienko KM, Walter B and Dyer S. 1994. Enculturation hypothesis: Exploring direct and positive effects among native American youth. In *Resiliency in Ethnic Minority Families, Vol I: Native and Immigrant American Families*. Eds. McCubbin HL, Thompson EA, Thompson AL and Fromer JE. pp. 199–220. Centre for Excellence in Family Studies, University of Wisconsin. Maddison Wisconsin.
- Zubrick SR, Silburn SR, Lawrence DM, Mitrou FG, Dalby RB, Blair EM, Griffin J, Milroy H, De Maio JA, Cox A and Li J. 2005. *The Western Australian Aboriginal Child Health Survey: The social and emotional wellbeing of Aboriginal children and young people*. Curtin University of Technology and Telethon Institute for Child Health Research. Perth.

PARTNERS IN THE CRC FOR REMOTE ECONOMIC PARTICIPATION

Principal Partners



Project Partners



Culture First.
Supporting Aboriginal Art Centres of Central Australia

