Data Surveys

Growing Up in Australia: The Longitudinal Study of Australian Children: A Valuable New Data Source for Economists

Matthew Gray and Diana Smart*

Australian Institute of Family Studies

1. Introduction

There is a long history of economic research into issues affecting children and families with children in areas, such as equivalence scales (Engel 1895), poverty (Rowntree 1901), and fertility and population growth (for example, Malthus 1826). Adam Smith (1776, p. 213), discussing colonies in North America, provided an early statement of the importance of investments in early childhood:

The children, during the tender years of infancy, are well fed and properly taken care of, and when they are grown up, the value of their labour greatly overpays their maintenance. When arrived at maturity, the high price of labour, and the low price of land, enable them to establish themselves in the same manner as their fathers did before them.

In the 1960s and 1970s, the interest in economic issues related to children and families with children grew rapidly. There were expansions into areas, such as human capital development (Becker 1965), female labour supply (Killingsworth 1983) and internal family dynamics (Manser and Brown 1980). More recently, economists have been using longitudinal studies of child development to address a range of economic questions, particularly

questions at the intersection of economics and developmental psychology (for example, Hill et al. 2005; Waldfogel 2006). There also has been work undertaken on the economics of investment in early childhood (Carneiro and Heckman 2003).

With the release of the data from the second wave of Growing Up in Australia: The Longitudinal Study of Australian Children (LSAC), Australia now joins most other Organisation for Economic Co-operation and Development countries in having a nationally representative longitudinal study of child development.¹ Until the advent of the LSAC, the analysis of these issues for Australian children and families was limited by a lack of suitable data. Prior to the LSAC, Australian longitudinal studies of children's development usually focused on a narrow range of outcomes, were very health-focused and did not have nationally representative samples or had relatively small sample sizes. Generally, limited information was collected on factors, such as the parental labour force status or the economic position of households in which children live.² From the perspective of an economist, these studies often are only of limited use and can be used only for addressing very specific questions.

The LSAC aims to shed light on the development of the current generation of Australian children and to investigate the contribution of the children's social, economic and cultural environments to their adjustment and well-being. More specifically, it seeks to improve the understanding of the complex interplay of factors that foster or impede healthy early childhood development, to identify the opportunities

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for early intervention and prevention in policy areas concerning children and families, and to inform the policy debate in general. The study enables an examination of the impact of children's early experiences on their later development and the mapping of the diverse pathways that children follow as they develop. It also provides the opportunity to identify the long-term consequences of policy for children and their family.

The survey collects information on multiple facets of children's development, health and well-being, including physical health and social, cognitive and emotional development. The study seeks to understand the risks and protective processes underlying children's development, looking at the interaction between children's psychological and physical attributes (such as their temperament and health) and the contexts in which children are raised, particularly their family, child care, school, neighbourhood and community experiences. The study also examines the dynamics within these settings; for example, the parenting practices, the quality of co-parental relationships to which the children are exposed and the quality of care received in differing types of non-parental care.

The LSAC was initiated and is funded by the Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA), Australian Government, and the study is managed in partnership with the Australian Institute of Family Studies (AIFS) and the Australian Bureau of Statistics (ABS). A consortium of leading researchers and experts from universities and research agencies provides advice on design and methodology issues. Wave 1 of the field work was conducted by I-View and the field work from Wave 2 onward is being undertaken by the ABS. The funding for four biennial waves was initially provided, with the first wave conducted in 2004. This funding subsequently has been extended to provide for a further four biennial survey waves.

This review seeks to provide an overview of the LSAC and to highlight features of the data that are likely to be of particular interest to economists.

2. Study Design and Sample Recruitment

The LSAC is following two cohorts of children for 14 years (possibly longer), starting from when the children were aged 0–1 year and 4–5 years. The 0–1 year old cohort is often described as the B (baby) cohort and the 4–5 year old cohort as the K (kindergarten) cohort. Alternatively, they can be identified by the years of their birth: the 1999–2000 birth cohort and the 2003–2004 birth cohort.

Face-to-face interviews are being conducted every 2 years, with the first wave of data collection occurring in 2004 (March to November). The Wave 2 field work commenced in April 2006 and was completed in early 2007 and the Wave 3 field work commenced in April 2008 and was completed in early 2009.

The two-cohort design will enable information on children's development over the first 18 years of life to be collected over 14 years. The two cohorts also can be compared at overlapping ages to gauge the effect of growing up in differing social conditions and policy settings. The overlapping of cohorts has occurred for the first time with the completion of Wave 3 (at ages 4–5 and 6–7 years) and will continue to occur for each subsequent wave.

During 2004, the study recruited a nationally representative sample of 5107 infants and 4983 children aged 4–5 years, selected from the Medicare Australia enrolment database. The sampling unit is 'the child'.

A two-stage clustered design was employed, first selecting postcodes then children, allowing an analysis of children within their community and reducing the overall cost of the study. The children in both cohorts were selected from the same postcodes, with about 40 children per postcode usually invited to participate in the study in the larger states and usually about 20 children per postcode in the smaller states and territories.

Stratification was used to ensure proportional geographical representation for the states and territories and capital city statistical division. The method of postcode selection took into account the number of children in the postcode; hence, all the potential participants in the study Australia-wide had an approximately

equal chance of selection (about one in 25). Further information on the sampling is provided by Soloff et al. (2006).

The sample is broadly representative of all Australian children (citizens and permanent residents) in each of two selected age cohorts: children born between March 2003 and February 2004 (B cohort) and children born between March 1999 and February 2000 (K cohort). The children in some remote parts of Australia were excluded because of the extremely high data collection costs in these areas.

Reports from multiple participants are sought in order to obtain information about the child's behaviour across differing contexts and to reduce the effects of respondent bias. Information is being collected from the child (using physical measurement, cognitive testing and interviewing, depending upon the age of the child), the parents who live with the child (biological, adoptive or step-parents), home-based and centre-based carers for preschool children who are regularly in non-parental care and teachers (for school-aged children). From Wave 2, information also is being sought from parents who live apart from their child but who still have contact with the child (in the LSAC terminology, the 'parent living elsewhere'). Table 1 provides a summary of the sources of information of the LSAC.

Face-to-face interviews are conducted with the primary carer of the child (Parent 1). At Wave 1, this was the child's biological mother in 97 per cent of families. In addition, Parent 1 is asked to complete a questionnaire and a time use diary about the child's activities. The other resident parent (biological, adoptive or step-parent) is also asked to complete a leave-behind questionnaire. Consent is sought to send a self-completed questionnaire to the home-based carers, centre-based carers and teachers. Almost all the parents have provided consent. In addition, the interviewer has recorded some observations about the neighbourhood, family and child.

In Wave 1, for the B cohort, physical measurements of the child were taken (weight and head circumference) and, for the K cohort, physical measurement and cognitive testing were carried out. In Waves 2 and 3, the height,

weight and waist measurements were taken for both cohorts and age-appropriate cognitive testing continued. In Wave 3, the B cohort cognitive testing repeated the Wave 1 K cohort assessments. From the age of 6–7 years onwards, the child is interviewed.

Although the focus of the LSAC is the study child, structured with the child as the unit of observation, the LSAC also can be used to conduct an analysis of the parents of the study child.

3. Areas Covered by the Study

As outlined above, the LSAC collects data on a wide range of topics. Information is collected on family demographics, including education, ethnicity and religion. Detailed information about the study child's physical and mental health, learning and cognition, and social and emotional outcomes is collected. How children develop is affected by their experiences in child care and school and the quality of the learning environment, so information is collected about these aspects of the study child's life. Quite detailed labour market information is collected about the parents and about the income and living standards of the family in which the child lives. A novel feature of the LSAC is the provision of time use diaries to collect data on a child's activities throughout two 24 hour periods, divided into 15 minute blocks. A summary of the topics covered by the LSAC and their scope is provided in Table 2.

4. Response Rates, Sample Retention and Representativeness

The final Wave 1 sample represented 53 per cent of all families who were sent a letter by Medicare Australia. Refusals were the largest source of sample loss (31 per cent for the B cohort and 35 per cent for the K cohort), followed by 'non-contact'. Non-contact occurred when the address details were out-of-date or if only a post office box address was available. The rates of non-contact were 10 per cent for the B cohort and 14 per cent for the K cohort. The response rates achieved if non-contactable families are excluded is

Table 1 Sources of Information: Waves 1, 2 and 3^a

	Source of information						
		Parent 1 (primary carer)	Parent 2 (if living with the child)	Parent living elsewhere	Home- based carer	Centre- based carer	Teacher
Wave	Child						
Wave 1							
Cognitive and/or physical testing							
B cohort (infants)	✓	–	–	–	–	–	–
K cohort (4–5 years old)	✓	–	–	–	–	–	–
Interview							
B cohort	–	✓ PAPI	–	–	–	–	–
K cohort	–	✓ PAPI	–	–	–	–	–
Self-completed form(s)							
B cohort	–	✓ SCIP and SCMB	✓ SCMB	–	✓ SCMB	✓ SCMB	–
K cohort	–	✓ SCIP and SCMB	✓ SCMB	–	–	✓ SCMB	✓ SCMB
Time use diary ^b							
B cohort	–	✓ SCMB	–	–	–	–	–
K cohort	–	✓ SCMB	–	–	–	–	–
Wave 2							
Cognitive and/or physical testing							
B cohort (2–3 years old)	✓	–	–	–	–	–	–
K cohort (6–7 years old)	✓	–	–	–	–	–	–
Interview							
B cohort	–	✓ CAI	–	–	–	–	–
K cohort	✓ CAI	✓ CAI	–	–	–	–	–
Self-completed form(s)							
B cohort	–	✓ SCIP and SCMB	✓ SCMB	✓ SCMB	✓ SCMB	✓ SCMB	–
K cohort	–	✓ SCIP and SCMB	✓ SCMB	✓ SCMB	–	–	✓ SCMB
Time use diary ^b							
B cohort	–	✓ SCMB	–	–	–	–	–
K cohort	–	✓ SCMB	–	–	–	–	–
Wave 3							
Cognitive and/or physical testing							
B cohort (4–5 years old)	✓ CAI	–	–	–	–	–	–
K cohort (8–9 years old)	✓ CAI	–	–	–	–	–	–
Interview							
B cohort	–	✓ CAI	–	✓ CATI	–	–	–
K cohort	✓ CAI	✓ CAI	–	✓ CATI	–	–	–
Self-completed form(s)							
B cohort	–	✓ SCIP	✓ SCMB	–	–	✓ SCMB	✓ SCMB
K cohort	–	✓ SCIP	✓ SCMB	–	–	–	✓ SCMB
Time use diary ^b							
B cohort	–	✓ SCMB	–	–	–	–	–
K cohort	–	✓ SCMB	–	–	–	–	–

Notes: (a) CAI denotes face-to-face computer-assisted interview, CATI denotes computer-assisted telephone interview, PAPI denotes face-to-face, pen-and-paper interview, SCIP denotes self-completed questionnaire while the interviewer is present and SCMB denotes leave-behind or mailed self-completed questionnaire.

(b) The time use diary was not necessarily completed by Parent 1.

64 per cent for the B cohort and 57 per cent for the K cohort.³

The Wave 2 data collection took place in 2006 (March to November), with 9070 families completing an interview (4606 in the B cohort and 4464 in the K cohort), yielding a response

rate of 90 per cent of the originally recruited sample. Similar numbers of families from each cohort participated. The Wave 3 data collection took place in 2008. The response rate for Wave 3 was 86 per cent of the originally recruited samples, yielding a total of 8711 participants

Table 2 Topics Covered by Growing Up in Australia: The Longitudinal Study of Australian Children: Waves 1, 2 and 3

<i>Topic</i>	<i>Scope</i>
Family demographics	Demographic information relating to the family, such as education, ethnicity and religion
Income and living standards	Gross income (pre-tax salary sacrifice or anything else is taken out), sources of income and main source of income, which government pensions, allowances or other sources of financial assistance are received, income, the experience of financial hardship, the ability to raise \$2000 in 1 week for an emergency and perceived prosperity
Health behaviours and risk factors	The behaviours and risk factors that potentially impinge upon or promote the health of the study child or the family, including behaviours such as parental smoking and drinking, the child's physical activity and diet, as well as risk factors such as maternal diabetes during pregnancy
Health status	Information about the physical and mental health status of the study child or the family, such as the Body Mass Index, diagnosis with various conditions and the number of hospital stays
Home education environment	Information on the factors likely to promote or hinder the child's learning while at home, such as parental support of education, the number of books in the home and television use, as well as information on parents' interaction with teachers, such as parent-teacher interviews, with parents' and teachers' perspectives being obtained
Housing	Information on housing, such as the number of bedrooms, tenure type and payments
Learning and cognition outcomes	Information on the child's development in the areas of learning and cognition, including language, literacy and numeracy
Out-of-home learning environment	Characteristics of the child-care or school environment, including the practices employed by the teachers and child-care workers, such as time use, use of resources and general philosophies
Paid work	Information on parents' labour force status, number of jobs held, self-employment status, type of employment (permanent ongoing, fixed-term contract, casual), paid leave, occupation, working hours, days of the week that are worked, job searching, reason not currently in paid employment, length of time not employed, use of maternity leave, occupation and work-family interactions
Parent living elsewhere	Details of the child's other parent, such as the relationship to the study child, interactions with the resident parent(s) and child support
Parenting	Information on parenting styles and other aspects of parenting, such as self-efficacy
Child-care and school characteristics	Characteristics of the school, preschool or child-care program, such as the type of program, number of days or hours that the child attends and staff satisfaction
Relationships	Information on the quality of relationships, primarily focused on the relationship between Parent 1 and Parent 2, but also on broader family harmony
Social and emotional development	Information relevant to the social and emotional development of the child, such as temperament, behaviour, peer interactions and emotional states
Social capital	Information on social capital, such as interactions with neighbours, neighbourhood characteristics and the use of services
Time use	Based on the time use of the children for two 24 hour periods, information is provided on what the child was doing, where the child was, who was in the same room or nearby if outside, whether someone was being paid for this activity to take place (in Wave 2, for the K cohort, this is replaced by whether the activity was part of the child's homework) and information on the daily diet also is collected in Waves 2 and 3

(4381 in the B cohort and 4330 in the K cohort).

By the end of the Wave 3 data collection period, 460 families had withdrawn permanently from the study. A further 256 families elected not to participate in the third wave but remained members of the study. Ninety-three families were away for the entire fieldwork

period and six children died since the start of the study. The remainder of the families could not be contacted. Thus, the largest cause of non-response was an inability to locate families. These families are still considered to be study members.⁴

This retention rate compares favourably with those achieved by comparable international

studies. For example, the Millennium Cohort Study, a longitudinal study of approximately 19 000 families and babies in the United Kingdom, had a sample retention rate of 79 per cent between waves 1 and 2 over a similar time period to the LSAC ('Sweep 1 and 2' in the terminology used by the Millennium Cohort Study) (Hansen and Joshi 2007).

The LSAC sample is broadly representative of the population, although there are some differences from the Census data of the ABS in relation to several family characteristics at Wave 1. Thus, the children with mothers or fathers who completed Year 12 are over-represented in the sample for both cohorts (differences of 8–10 percentage points). The infants with no siblings are under-represented (by 3 percentage points), while the 4–5 year olds in couple families are over-represented and those in sole-parent families are under-represented (each by 4 percentage points). The mothers who speak a language other than English at home are under-represented in both cohorts (by 2 percentage points). The AIFS (2008) provides a detailed comparison of the LSAC data with the census data.

Weights are provided with the data to reduce the impact of biases in the sample selection process and survey non-responses. The clustered, stratified nature of the sampling needs to be taken into account when using the data. These issues are discussed in detail in Soloff et al. (2006).

In Wave 2 of the LSAC, there was some variation in the participation rates of selected subgroups. Of single-parent families, 81 per cent took part, as did 80 per cent of Aboriginal and Torres Strait Islander families, 85 per cent of families in which the mother spoke English as a second language and 87 per cent of families in which the mother had not completed Year 12. The higher non-participation rate of these subgroups was primarily related to difficulties in making contact with the families, rather than their refusal to participate.

Families can respond to all or only part of the study (with the exception of the face-to-face interview with Parent 1, which all families must complete in order to participate in the wave). Table 3 shows the response rates in

Waves 1 and 2 for the differing data collection components.

5. Between-Wave Surveys

As well as the main data collection waves, between-wave mailed, self-completed surveys are conducted. The aim of these surveys is to gain an update of the child's progress in specific areas and the family's experiences, as well as to maintain the engagement of the study's families. To date, Waves 1.5 and 2.5 have been conducted. Wave 1.5 collected some information on the children's health and development, as well as their family, educational and care experiences. For the B cohort, information was collected on families' service utilisation, parental employment history, maternity and other leave arrangements. Wave 2.5 collected information on work and child care, labour force status, child support and children's media and technology use. Wave 3.5 will occur in mid-2009.

The between-wave mailed surveys have a lower response rate than do the main waves. Wave 1.5 resulted in 7167 useable responses of those who responded to Wave 1 (a response rate of 72 per cent). Wave 2.5 resulted in 6498 useable responses. The response rate of the families who had been interviewed in Wave 2 was 72 per cent, although forms also were received from 20 per cent of the families who had not participated in Wave 2 for whom there was contact information.

6. Administrative Data Supplementation

Data from several administrative databases has been linked to the LSAC. These are the Medicare Australia database to obtain information about the child's medical service use and immunisation history and the National Childcare Accreditation Council data to obtain information on the child care centres attended by the children.

Data from the *Census of Population and Housing* by the ABS on the socioeconomic and demographic profiles of the neighbourhoods and communities in which children live also has been linked to the LSAC data. As

Table 3 Response to the Forms by Cohort: Waves 1 and 2 (%)

<i>Form</i>	<i>Wave 1</i>			
	<i>B cohort (2003–2004 birth cohort)</i>		<i>K cohort (1999–2000 birth cohort)</i>	
	<i>% of Wave 1 eligible interview sample</i>	<i>Response rate of those eligible</i>	<i>% of Wave 1 eligible interview sample</i>	<i>Response rate of those eligible</i>
Parent 1 leave-behind questionnaire	100.0	85.0	100.0	84.9
Parent 2 self-completed questionnaire	90.7	79.8	86.0	79.0
Teacher self-completed questionnaire	–	–	95.5	68.8
Home-based carer self-completed questionnaire	15.4	43.4	–	–
Centre-based carer self-completed questionnaire	8.5	53.4	–	–
Time use diary	100.0	78.9	100.0	77.6
<i>Form</i>	<i>Wave 2</i>			
	<i>B cohort (2003–2004 birth cohort)</i>		<i>K cohort (1999–2000 birth cohort)</i>	
	<i>% of Wave 2 eligible interview sample</i>	<i>Response rate of those eligible</i>	<i>% of Wave 2 eligible interview sample</i>	<i>Response rate of those eligible</i>
Parent 1 interview questionnaire	100.0	97.8	100.0	97.6
Parent 1 leave-behind questionnaire	100.0	76.8	100.0	78.3
Parent 2 self-completed questionnaire	89.0	76.3	85.2	77.5
Parent living elsewhere self-completed questionnaire	8.7	24.0	13.7	32.5
Teacher self-completed questionnaire	–	–	99.6	81.7
Home-based carer self-completed questionnaire	17.2	67.3	–	–
Centre-based carer self-completed questionnaire	36.3	68.4	–	–
Time use diary	100.0	74.3	100.0	77.6
Interview (% of Wave 1 sample)	90.2	100.0	89.6	100.0

Note: Response rate columns are the percentage of those eligible to complete the form.

the study proceeds, it is hoped that further data sources will be linked to the LSAC; for example, the new national literacy and numeracy assessments and geospatial data sources.

7. Access to the Data

The LSAC dataset is publicly available, subject to an application process and the granting of a deed of licence. Data user training workshops are held regularly to assist users to gain familiarity with the complex dataset. The data from Waves 1, 1.5, 2 and 2.5 have been released and it is anticipated that the data from Wave 3 will be released towards the end of 2009. Information about accessing the data and user training is provided by the AIFS (2009).

8. Potential Uses of the Data

One of the strengths of the LSAC is the wide variety of areas of the children's lives about which the data is collected, as well as that of their family. This allows the inter-relationships between many different aspects of child development and family life to be analysed. Examples of issues of interest to economists into which the LSAC can provide insight include:

- The intergenerational linkages between parents and their children (Duncan and Brooks-Gunn 1997; Ermisch and Francesconi 2001). The particular value of the LSAC for addressing this question is that it provides information on the children's family, educational and child care experiences and economic circumstances from when the child is very young.

- The extent to which living in a disadvantaged neighbourhood impacts upon the outcomes for children over and above those of the family. This is a question on which there has been a great deal of international research (for example, Kling, Liebman and Katz 2007; Leventhal and Brooks-Gunn 2000), but little Australian research.
- The occurrence of changes in family structure (fertility, separation and divorce and repartnering) and the impacts of these changes on the short- and longer-term economic well-being of children (and other family members), as well as their developmental trajectories.
- Maternal, paternal and family labour supply decisions and the impacts of different patterns of labour force participation on children's developmental outcomes, as well as family relationships and functioning more broadly. This has been an active area of research internationally, but is yet to be analysed in any detail using Australian data.
- The economics of investment in early childhood.
- Investment in children's human capital and how this impacts upon the development of cognitive and non-cognitive skills.
- Child support and its impact on children's well-being and the economic position of their family.
- The impact of adverse events (for example, drought, unemployment, relationship breakdown, ill health or the death of a family member and housing stress) on the well-being of parents and children and the degree to which the impacts vary between children and families of different backgrounds.

Although the LSAC is still young, it already has been used to analyse economic issues. Some examples are included to illustrate the ways in which the data have been used. Leigh and Gong (2009) have used the LSAC

to estimate the cognitive gaps between indigenous and non-indigenous young Australians. Bradbury (2007) has analysed the relationships between child outcomes and family socioeconomic characteristics. The impact of neighbourhood disadvantage on children's outcomes has been analysed by Edwards (2005) and Edwards and Bromfield (2009).

The data also have been used to analyse a range of labour market issues. The patterns of return to work following childbirth and the impact of maternity leave have been the focus of several papers and articles (Whitehouse, Diamond and Baird 2007; Whitehouse et al. 2007; Baxter 2008; Baxter and Gray 2008). Other articles and a paper have analysed the labour market participation of mothers and fathers with young children and the links to well-being (Baxter et al. 2007; Baxter and Alexander 2008; Gray and Baxter 2008; Renda, Baxter and Alexander 2009).

By the end of 2009, researchers will have access to three waves of data, plus an additional two between-wave mailed survey data. The value of the survey will only increase as additional waves of data are collected. The LSAC data offer exciting possibilities for economic research, which only just have begun to be explored.

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Endnotes

1. For example, the Millennium Cohort Study in the United Kingdom, the ELFE (Growing Up in France), Birth to Twenty in South Africa, the Danish Longitudinal Survey of Children, the Child Development Supplement to the Panel Study of Income Dynamics in the United States, the Danish National Birth Cohort, the National Longitudinal Study of Children in Ireland, the National Longitudinal Survey of Children and Youth in Canada, the European Longitudinal Study of Pregnancy and Childhood (Great Britain, Isle of Man, the Czech Republic, Slovakia, Russia, Ukraine, part of Croatia and Estonia and initially also in Greece and Spain) and the Growing Up in Scotland Study.

2. Examples include the Australian Temperament Project, which provides data for Victorian children from 1983 onwards (<<http://www.aifs.gov.au/atp>>), and the Mater-University of Queensland Study of Pregnancy, which follows Queensland children from 1981 onwards.

3. This response rate calculation assumes that the non-contacts would have responded at the same rate as those who could be contacted by an interviewer, which is probably a reasonable assumption. Nonetheless, the fact that more geographically mobile families are more likely to be non-contacts might introduce some biases into the sample.

4. At the time of writing, a handful of Wave 3 interviews still were to be completed. The final response rates are expected to be slightly higher than those reported in this article. The number of families that are permanent withdrawals, elected not to participate in Wave 3 or could not be contacted might change slightly.

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