The Longitudinal Study of Australian Children

Annual statistical report 2015

Australian Institute of Family Studies

Growing Up in Australia: The Longitudinal Study of Australian Children is conducted in partnership between the Australian Government Department of Social Services, the Australian Institute of Family Studies (AIFS) and the Australian Bureau of Statistics (ABS), with advice provided by a consortium of leading researchers from research institutions and universities throughout Australia.

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Foreword

I am delighted to present the sixth volume of the Annual Statistical Report series for *Growing Up in Australia*: The Longitudinal Study of Australian Children (LSAC). This report, which has been produced by the Australian Institute of Family Studies, aims to provide valuable insights into family functioning and child development for researchers, policy-makers, and those who provide services and support, as well as the community at large.

Using five waves of LSAC data, this report covers a variety of aspects of the ways in which Australian children's experiences and environments affect their prospects and progress, from birth to 13 years old.

This report casts light on diversity and change in children's family structures, and how the experience of household complexity changes as children grow. The report also examines the association between pubertal status and children's emotional functioning, school functioning and their relationships with peers. Rates of full, partial, and non-immunisation of Australian children are presented in a chapter exploring how these rates vary with different demographic, psychosocial and attitudinal factors. Another section of the report investigate the different ways grandparents are part of children's lives, looking at grandparents who are co-resident or who provide child care, and looking at the amount of contact that children have with their grandparents. The factors associated with parents' choice of primary school for their children are also examined. Patterns of screen time among Australian children are also explored, looking at how much time boys and girls at different ages spend watching television, using the computer or playing electronic games.

We hope that results of our research will prove useful to interested readers. We further hope that the wealth of information provided here will encourage others to use the LSAC data, both now and in the future.

Anne Hollonds
Director
Australian Institute of Family Studies

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We also gratefully acknowledge the enormous contribution of the families and teachers who participated in the study.

For more information about the study, see <www.aifs.gov.au/growingup>.

This report uses unit record data from *Growing Up in Australia*: The Longitudinal Study of Australian Children. The study is being undertaken in partnership with the Australian Institute of Family Studies, with advice being provided by a consortium of leading researchers at research institutions and universities throughout Australia. The Australian Bureau of Statistics (ABS) conducts the data collection.

The views expressed in this report are those of the individual authors and should not reflect those of DSS, AIFS or the ABS.

1 Introduction

Growing Up in Australia: The Longitudinal Study of Australian Children (LSAC) is Australia's first nationally representative longitudinal study of child development. The purpose of the study is to provide data that enable a comprehensive understanding of development and life-course trajectories within Australia's current social, economic and cultural environment. The longitudinal nature of the study enables researchers to examine the dynamics of change through the life course as children develop, and to go beyond the static pictures provided by cross-sectional statistics. The study thereby gives policy-makers and researchers access to quality data about children's development in the contemporary Australian environment.

The study was initiated and is funded by the Australian Government Department of Social Services, and is conducted 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 provide advice to the study.

This is the sixth volume in the LSAC Annual Statistical Report series, which uses data from the first five waves of the study. The purpose of these reports is to provide a snapshot of some of the data from the study and to address policy-relevant questions about aspects of Australian children's lives and development. The report makes use of the longitudinal nature of LSAC data to describe the dynamics of change as children develop, and how their families and lives change as they grow older.

The first section of this introductory chapter provides a brief overview of LSAC, the second describes the analytical approaches used throughout the main chapters of the report, and the third section introduces the subpopulation groups that are used for comparisons in some chapters. The chapter ends with summary tables comprising a glossary of LSAC terms, statistical indicators, and the scales and measures used throughout the report.

1.1 About the study

Study design

The LSAC study has an accelerated cross-sequential design, with two cohorts of children of differing ages at the start of the study. One of the advantages of this type of design is that it provides data on later developmental pathways and outcomes before the younger cohort of the two matures. From Wave 3 there is data on children of the same age from both cohorts at different time points.

The B ("baby") cohort was aged 0–1 years at the beginning of the study (born between March 2003 and February 2004); and the K ("kindergarten") cohort was aged 4–5 years at the beginning of the study (born between March 1999 and February 2000).

The first wave of data collection took place in 2004, with subsequent main waves every two years. In 2005 (Wave 1.5), 2007 (Wave 2.5) and 2009 (Wave 3.5), parents were also asked to complete a between-waves mail survey. In 2011 (Wave 4.5), the between-wave data collection changed from a paper-based questionnaire to an Internet-based form for respondents to report changes in contact details to aid tracking. Table 1.1 summarises the ages and sample sizes for the two cohorts across the first five main waves of the study.

As mentioned, this design means that from the third wave of the study, the children's ages overlap; that is, children were aged 4–5 years both in the first wave for the K cohort and in the third wave

for the B cohort. In covering the first five waves of the study, this report includes data on children between the ages of 0 and 13 years.

Table 1.1: Age ranges and numbers of children, B and K cohorts, Waves 1–5

	Wave 1 (2004)	Wave 2 (2006)	Wave 3 (2008)	Wave 4 (2010)	Wave 5 (2012)
B cohort	0–1 year 5,107	2–3 years 4,606	4–5 years 4,386	6–7 years 4,242	8–9 years 4,085
K cohort	4–5 years 4,983	6–7 years 4,464	8–9 years 4,331	10–11 years 4,169	12–13 years 3,956

Notes: This table presents the numbers of children who responded at each wave.

Respondents and collection methods

The use of multiple respondents in LSAC provides a rich picture of children's lives and development in various contexts. Across the first five waves of the study, data were collected from:

- parents of the study child:[1]
  - Parent 1 (P1)—defined as the parent who knows the most about the child (not necessarily a biological parent);[2]
  - Parent 2 (P2), if there is one—defined as another person in the household with a parental relationship to the child, or the partner of Parent 1 (not necessarily a biological parent); and
  - a parent living elsewhere (PLE), if there is one—a parent who lives apart from Parent 1 but who has contact with the child;
- the study child;
- carers/teachers (depending on the child's age); and
- interviewers.

In earlier waves of the study, the primary respondent was the child's Parent 1. In the majority of cases, this was the child's biological mother, but in a small number of families this was someone else who knew the most about the child. Since Wave 2, the K cohort children have answered age-appropriate interview questions, and from Wave 4 they have also answered a series of self-complete questions. The B cohort children answered a short set of interview questions in Wave 4 for the first time. As children grow older, they are progressively becoming the primary respondents of the study.

A variety of data collection methods are used in the study, including:

- conducting face-to-face interviews:
  - on paper; and
  - by computer-assisted interview (CAI);
- filling in self-complete questionnaires:
  - during interview (paper forms, computer-assisted self-interviews (CASI) and audio computer-assisted self-interviews (ACASI);
  - on leave-behind paper forms;
  - on mailout paper forms; and
  - on Internet-based forms;
- physically measuring the child, including height, weight, girth, body fat and blood pressure;
- directly assessing the child's vocabulary and cognition;
- completing time use diaries;
- conducting computer-assisted telephone interviews (CATI); and
- linking to administrative or outcome data (e.g. Medicare, MySchool).

[1] The terms "Parent 1" and "Parent 2" are used for consistency and are not intended to suggest that one parent's relationship with their child is more important than the other parent's relationship.

[2] For separated families in which both parents provided care for the child, the interviewer in Wave 1 worked with the family to identify who the child's Parent 1 was for the purposes of data collection. Where possible, the same parent has been kept as P1 in subsequent waves.

The interviews and questionnaires include validated scales appropriate to the children's ages (see section 1.4 for a list of some of the scales used in this report).

Sampling and survey design

The sampling unit for LSAC is the study child. The sampling frame for the study was the Medicare Australia (formerly Health Insurance Commission) enrolments database, which is the most comprehensive database of Australia's population, particularly of young children. In 2004, approximately 18,800 children (aged 0–1 or 4–5 years) were sampled from this database, using a two-stage clustered design. In the first stage, 311 postcodes were randomly selected (very remote postcodes were excluded due to the high cost of collecting data from these areas). In the second stage, children were randomly selected within each postcode, with the two cohorts being sampled from the same postcodes. A process of stratification was used to ensure that the numbers of children selected were roughly proportionate to the total numbers of children within each state/territory, and within the capital city statistical districts and the rest of each state. 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).[3]

Response rates

The 18,800 families selected were then invited to participate in the study. Of these, 54% of families agreed to take part in the study (57% of B cohort families and 50% of K cohort families). About 35% of families declined to participate (33% of B cohort families and 38% of K cohort families), and 11% of families could not be contacted (e.g. because the address was out-of-date or only a post office box address was provided) (10% of B cohort families and 12% of K cohort families).

This resulted in a nationally representative sample of 5,107 0–1 year olds and 4,983 4–5 year olds who were Australian citizens or permanent residents. Table 1.2 presents the response rates for each of the five main waves.

Table 1.2: Response rates, main waves, B and K cohorts, Waves 1–5

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5
B cohort					
Number of responses	5,107	4,606	4,386	4,242	4,077 [b]
Response rates of Wave 1 (%)	100.0	90.2	85.9	83.0	80.0
Response rates of available sample (%) [a]	–	91.2	88.2	86.0	83.5
K cohort					
Number of responses	4,983	4,464	4,332 [c]	4,164 [c]	3,952 [c]
Response rates of Wave 1 (%)	100.0	89.6	86.9	83.6	79.4
Response rates of available sample (%) [a]	–	90.9	89.7	87.2	83.5
Total					
Number of responses	10,090	9,070	8,718	8,406	8,029
Response rates of Wave 1 (%)	100.0	89.9	86.4	83.3	79.7
Response rates of available sample (%) [a]	–	91.1	89.0	86.6	83.5

Notes: This table refers to the numbers of parents who responded at each wave. Percentages based on weighted data. [a] The available sample excludes those families who opted out of the study between waves. [b] B cohort: different numbers of parents and their children responded at Wave 5. (There were eight cases where a child interview was completed and the main interview with the parents was not.) [c] K cohort: different numbers of parents and their children responded at Wave 3 (in one case a parent interview was completed and the interview with the study child was not), Wave 4 (in five cases a child interview was completed and the main interview with the parents was not) and Wave 5 (in four cases a child interview was completed and the main interview with the parents was not).

[3] See Soloff, Lawrence, and Johnstone (2005) for more information about the study design.

1.2 Analyses presented in this report

This report includes data from the first five main waves of the study, though given the breadth and depth of topics included in the study, chapters in this report do not necessarily use data from all five waves and/or both cohorts.

Each chapter addresses a series of policy-relevant questions using descriptive statistical analyses. In answering these questions, chapters generally take one or more of the following approaches:

- *comparisons between subpopulation groups* (summarised in section 1.3) on the various aspects of children's environments and development; and
- examinations of *trends across waves* as children get older.

Weighting and survey analysis

Sample weights (for the study children) have been produced for the study dataset in order to reduce the effect of bias in sample selection and participant non-response (Cusack & Defina, 2014; Daraganova & Sipthorp, 2011; Misson & Sipthorp, 2007; Sipthorp & Misson, 2009; Soloff, Lawrence, & Johnstone, 2005; Soloff, Lawrence, Misson, & Johnstone, 2006). When these weights are used in the analysis, greater weight is given to population groups that are under-represented in the sample, and less weight to groups that are over-represented in the sample. Weighting therefore ensures that the study sample more accurately represents the sampled population.

These sample weights have been used in analyses presented throughout this report. Cross-sectional or longitudinal weights have been used when examining data from more than one wave. Analyses have also been conducted using Stata® *svy* (survey) commands, which take into account the clusters and strata used in the study design when producing measures of the reliability of estimates.

Key points to be noted

Parent 1 is defined as the child's primary caregiver or the parent who knows the child best. The majority of Parent 1 respondents were mothers (i.e. at all waves, more than 95% of Parent 1 respondents have been women and the majority of Parent 2 respondents have been men).

Parent 1 for each study child was defined by the family at Wave 1. At subsequent waves, the preference, where possible, has been to retain the same person as Parent 1 to maintain the longitudinal consistency of the data. However, if Parent 1 no longer resides with the child or is temporarily away, Parent 2 of the previous wave becomes Parent 1. If both Parent 1 and Parent 2 do not reside with the child or are temporarily away, then a new Parent 1 (the best person to ask about the child's health, development and care) is assigned. Thus, Parent 1 and Parent 2 are sometimes not the same person in each wave, with different parents or guardians potentially occupying different roles at each wave.

Unless specifically noted, all references to the child's "household" or "family" are to those of Parent 1, and do not include any other household or family the child may have with a parent living elsewhere. Similarly, unless specified in the chapter, any reference to "parents" is to Parent 1 and Parent 2, not to parents living elsewhere. In some chapters, data are reported for mothers and fathers rather than for Parent 1 and Parent 2.

Some chapters compare responses to particular questions across waves. In some cases, these questions were collected using different methods in different waves (e.g. by interview in one wave and by self-complete questionnaire in another).

1.3 Subpopulation groups

This section introduces the subpopulation groups that are used in some of the chapters in this report. Most of these subpopulation groups were introduced in detail in the LSAC *Annual Statistical Report 2010* (AIFS, 2011), and are summarised in Table 1.3 (child characteristics) and Table 1.4 (parent and family characteristics). The percentages shown in these three tables are based on weighted data (as described in section 1.2).

Child characteristics

The child characteristics at the first five waves are summarised in Table 1.3.

Table 1.3: Child characteristics, B and K cohorts, Waves 1–5

Subpopulation categories	B cohort					K cohort				
	Wave 1 (0–1 year) (%)	Wave 2 (2–3 years) (%)	Wave 3 (4–5 years) (%)	Wave 4 (6–7 years) (%)	Wave 5 (8–9 years) (%)	Wave 1 (4–5 years) (%)	Wave 2 (6–7 years) (%)	Wave 3 (8–9 years) (%)	Wave 4 (10–11 years) (%)	Wave 5 (12–13 years) (%)
Child gender [a]										
Boys	51.2	51.1	51.1	51.1	51.2	51.2	51.3	51.3	51.2	51.8
Girls	48.8	48.9	48.9	48.9	48.8	48.8	48.7	48.7	48.8	48.2
No. of observations	5,107	4,606	4,386	4,242	4,085	4,983	4,464	4,332	4,169	3,956
Child birth order										
Oldest child	0.2	19.6	29.1	31.4	33.2	28.8	31.4	32.9	34.6	36.3
Middle child/Twin	1.8	13.1	19.6	21.7	22.3	18.4	20.5	21.4	21.6	20.5
Youngest child	58.9	47.4	39.9	37.4	35.6	41.4	38.5	37.1	35.2	33.7
Only child	39.1	19.9	11.4	9.5	9.0	11.5	9.6	8.6	8.6	9.5
No. of observations	5,107	4,606	4,386	4,242	4,077	4,983	4,464	4,331	4,169	3,951
Main language spoken at home by child [a]										
English	87.2	87.9	87.0	86.8	89.2	86.0	85.2	86.1	85.9	88.7
Not English	12.8	12.1	13.0	13.2	10.8	14.0	14.8	13.9	14.1	11.3
No. of observations	5,104	4,603	4,384	4,239	4,084	4,983	4,464	4,331	4,164	3,956
Child Indigenous status [a]										
Indigenous	4.9	5.1	4.9	5.2	4.4	3.9	3.7	3.7	3.8	2.9
Non-Indigenous	95.1	94.9	95.1	94.8	95.6	96.1	96.3	96.3	96.2	97.1
No. of observations	5,107	4,606	4,386	4,242	4,085	4,981	4,462	4,329	4,167	3,956
Child has a disability or medical condition [b]										
Yes	–	5.9	8.6	5.4	4.1	–	11.1	7.7	6.2	4.7
No	–	94.1	91.4	94.6	95.9	–	88.9	92.3	93.8	95.3
No. of observations	–	4,606	4,386	4,242	4,047	–	4,464	4,331	4,164	3,913
Child weight status [c]										
Underweight	–	5.3	6.5	5.4	5.1	5.2	5.1	5.5	5.9	6.7
Normal weight	–	71.3	69.7	73.8	71.1	74.2	75.2	69.5	65.6	65.7
Overweight or obese	–	23.4	23.8	20.8	23.9	20.6	19.7	25.0	28.5	27.5
No. of observations	–	4,522	4,324	4,181	3,998	4,934	4,423	4,289	4,018	3,803

Notes: Percentages based on weighted data. [a] Recorded at Wave 1. [b] Questions about whether the study child had a disability or medical condition were asked differently in Wave 1 so these data are not included here. [c] Weight status is based on body mass index. It was not calculated at Wave 1 for the B cohort.

Child gender

Parent 1 reported the child's gender at Wave 1.

Child birth order

At each wave, the birth order of the study child was determined based on the number of younger siblings and older siblings in the household. The birth order of the study child was classified as the oldest child, middle child or twins, youngest child or only child in the household.

Main language spoken at home by child

At Wave 1, Parent 1 respondents were asked whether they mainly spoke English or a language other than English at home. Languages were classified according to the Australian Standard Classification of Languages (ABS, 2005), and these were summarised into English or non-English languages.

Child has a disability or medical condition

At each of Waves 2 to 5, Parent 1 respondents were asked whether each household member had a medical condition or disability that had lasted 6 months or more, while being shown a prompt card with a list of conditions such as sight problems; hearing problems; blackouts, fits or loss of consciousness; difficulty learning or understanding things; and difficulty gripping things.

Child weight status

At each wave (except Wave 1 for the B cohort), interviewers measured the children's weight and height, and these measurements were used to calculate children's body mass index (BMI). The children were then classified as overweight or obese (Cole, Bellizzi, Flegal & Dietz, 2000), underweight (Cole, Flegal, Nicholls, & Jackson, 2007) or of normal weight. Children in the B cohort at Wave 1 were not measured because of the technical difficulties of measuring infants' height and weight.[4]

Child Indigenous status

Parent 1 respondents identified at Wave 1 whether the study child was of Aboriginal and/or Torres Strait Islander background. These results were summarised into a measure of whether the child was Indigenous or non-Indigenous.

Parent and family characteristics

The parent and family characteristics at the first five waves are summarised in Table 1.4.

Table 1.4: Parent and family characteristics, B and K cohorts, Waves 1–5

	B cohort					K cohort				
Subpopulation categories	**Wave 1 (0–1 year) (%)**	**Wave 2 (2–3 years) (%)**	**Wave 3 (4–5 years) (%)**	**Wave 4 (6–7 years) (%)**	**Wave 5 (8–9 years) (%)**	**Wave 1 (4–5 years) (%)**	**Wave 2 (6–7 years) (%)**	**Wave 3 (8–9 years) (%)**	**Wave 4 (10–11 years) (%)**	**Wave 5 (12–13 years) (%)**
Household structure										
Two biological parents	88.9	85.7	82.3	78.6	76.5	81.7	79.0	75.2	72.3	72.0
Single biological parent	10.4	13.1	14.0	15.8	15.9	14.8	16.6	16.7	18.3	17.9
Biological parent and step-parent	0.1	0.5	2.1	3.2	4.7	2.3	2.9	4.5	5.2	6.7
Two non-biological parents	0.2	0.2	0.2	0.3	0.3	0.4	0.5	0.4	0.5	0.4
Biological parent and other parent	0.2	0.3	1.2	2.0	2.4	0.6	0.8	3.0	3.5	2.5
One non-biological parent	0.1	0.1	0.3	0.1	0.1	0.2	0.2	0.2	0.3	0.2
No. of observations	5,107	4,606	4,386	4,238	4,077	4,983	4,464	4,331	4,150	3,952
Family socio-economic position [a]										
Lowest 25%	28.6	31.2	31.5	32.9	–	28.6	30.3	31.5	32.1	–
Middle 50%	48.9	47.9	47.8	46.7	–	50.0	48.8	48.8	48.4	–
Highest 25%	22.5	20.9	20.7	20.4	–	21.4	20.9	19.7	19.6	–
No. of observations	5,092	4,602	4,382	4,215	–	4,965	4,458	4,327	4,124	–
Number of siblings in the household										
None	39.1	19.9	11.4	9.5	9.0	11.5	9.6	8.6	8.6	9.5
One	36.4	47.3	46.3	43.6	42.5	47.5	43.9	42.5	42.5	43.4
Two or more	24.5	32.8	42.3	46.9	48.5	41.0	46.5	48.9	48.9	47.1
No. of observations	5,107	4,606	4,386	4,242	4,077	4,983	4,464	4,331	4,164	3,951

[4] Study child's birth weight and length were recorded.

Table 1.4: Parent and family characteristics, B and K cohorts, Waves 1–5

Subpopulation categories	B cohort					K cohort				
	Wave 1 (0–1 year) (%)	Wave 2 (2–3 years) (%)	Wave 3 (4–5 years) (%)	Wave 4 (6–7 years) (%)	Wave 5 (8–9 years) (%)	Wave 1 (4–5 years) (%)	Wave 2 (6–7 years) (%)	Wave 3 (8–9 years) (%)	Wave 4 (10–11 years) (%)	Wave 5 (12–13 years) (%)
Main language spoken at home by Parent 1										
English	83.1	83.7	83.1	82.8	85.6	82.5	81.6	82.7	82.6	84.8
Not English	16.9	16.3	16.9	17.2	14.4	17.5	18.4	17.3	17.4	15.2
No. of observations	5,107	4,606	4,386	4,238	4,077	4,983	4,464	4,328	4,146	3,952
Parent 1's country of birth										
Overseas	20.0	22.7	23.2	23.4	22.0	23.3	24.2	23.5	23.5	22.5
Australia/NZ	80.0	77.3	76.8	76.6	78.0	76.7	75.8	76.5	76.5	77.5
No. of observations	5,107	4,606	4,386	4,242	4,077	4,982	4,463	4,327	4,159	3,952
Parent 1's education level										
University degree or higher	29.1	28.3	29.6	30.0	33.4	24.1	24.4	25.1	25.8	28.7
Less than university degree	70.9	71.7	70.4	70.0	66.6	75.9	75.6	74.9	74.2	71.3
No. of observations	5,107	4,606	4,386	4,242	4,085	4,983	4,464	4,331	4,164	3,956
Both parents' education level										
At least one parent has a university degree (or higher)	37.5	36.9	38.4	38.9	42.4	33.9	34.3	35.0	35.3	38.8
Neither parent has a university degree	62.5	63.1	61.6	61.1	57.6	66.1	65.7	65.0	64.7	61.2
No. of observations	5,104	4,604	4,385	4,240	4,075	4,979	4,463	4,329	4,163	3,948
Parent 1's employment										
Employed	47.6	55.5	61.0	64.3	71.1	55.3	63.9	70.9	72.3	76.9
Unemployed	3.4	3.3	2.3	3.2	3.1	4.3	3.4	2.9	2.8	2.9
Not in the labour force	49.0	41.3	36.7	32.6	25.8	40.4	32.7	26.1	25.0	20.2
No. of observations	5,096	4,606	4,383	4,233	4,070	4,972	4,463	4,330	4,162	3,948
Jobless family										
No	87.0	87.4	89.0	89.1	90.6	86.7	89.1	91.1	89.9	91.4
Yes	13.0	12.6	11.0	10.9	9.5	13.2	10.9	9.0	10.1	8.6
No. of observations	5,104	4,606	4,383	4,240	4,077	4,977	4,463	4,330	4,166	3,950
Region of residence										
Metropolitan	66.5	62.6	64.9	63.6	62.8	63.7	65.9	62.9	62.4	62.0
Non-metropolitan	33.5	37.4	35.1	36.4	37.2	36.3	34.1	37.1	37.6	38.0
No. of observations	5,107	4,606	4,378	4,231	4,079	4,983	4,464	4,324	4,163	3,952
Neighbourhood disadvantage										
Disadvantaged	27.5	31.1	30.8	30.3	28.7	28.2	31.0	30.8	30.2	30.5
Non-disadvantaged	72.5	68.9	69.2	69.7	71.3	71.8	69.0	69.2	69.8	69.5
No. of observations	5,107	4,606	4,386	4,240	4,077	4,983	4,464	4,331	4,168	3,951

Notes: Percentages based on weighted data. [a] Family socio-economic position is not currently available at Wave 5, it will be developed based on the new occupation codes in the future.

Household structure

The household structure was classified using the demographic information of Parent 1's and Parent 2's gender, relationship to the study child and presence at each wave. The "two-biological parent" households refer to children's primary households that include two biological parents (a mother

and a father). The "single-biological parent" households refer to children's primary households in which the study child lived with one biological parent only (Parent 2 was absent at the wave). Most of the single parents were single mothers (97%). The "one biological and step-parent" households include households where the study child lived with a biological parent and a step, adoptive or foster parent—the vast majority of these children lived in households with a biological mother and a step-father.

The "two non-biological parents" and "one non-biological parent" households include those headed by adoptive parents, grandparents or other relatives, and foster parents. The "biological and other parents" household refer to children's primary household where there was a biological parent and an unrelated adult or a relative to the study child (e.g. grandparent). This "unrelated adult" was usually the cohabiting (e.g. legal spouse, rather than married) partner to the biological parent.

Family socio-economic position

The measure of family socio-economic position (SEP), developed by Blakemore, Strazdins, and Gibbings (2009), uses information about combined annual family income, educational attainment of parents and parents' occupational status to summarise the social and economic resources available to families. The standardised SEP scores have been divided into quartiles and summarised into the lowest 25%, the middle 50% and the highest 25%.

Number of siblings in the household

At each wave, Parent 1 provides details about all household members, including the study child's siblings. Siblings include biological, adopted, foster, step- and half-siblings. Children may also have siblings who do not live in their household, but these siblings are not included here.

Main language spoken at home by Parent 1

The language spoken by Parent 1 is classified using the same approach described for the study children above.

Parent 1's country of birth

Parent 1 is grouped into "Australia or New Zealand born" or "born overseas" based on their country of birth provided at Wave 1.

Parents' education level

At each wave, Parent 1 respondents are asked about the highest qualification held by each of the parents. This information is used to categorise parents into those who have a university degree (or higher) and those who don't. Comparisons are made for Parent 1 respondents only, and for both parents together (families in which at least one parent has a university degree, versus families in which neither parent has a university degree).

Parents' employment status

At each wave, Parent 1 reported their employment status as "employed (includes full-time and part-time employment)", "unemployed" or "not in the labour force". Jobless family was derived using Parent 1 and Parent 2's employment status. Jobless family refers to two-parent families where both parents were unemployed or not in the labour force, and single-parent families where Parent 1 was unemployed or not in the labour force.

Region of residence

Families' postcodes are used to link to ABS Census data, which identifies whether they live in a metropolitan area (capital city statistical divisions) or non-metropolitan area (the rest of the state outside the capital city statistical divisions).

Neighbourhood disadvantage

Neighbourhood disadvantage was measured using the Socio-Economic Indexes for Areas (SEIFA)—Disadvantage. Those families living in areas in the lowest 25% SEIFA index of disadvantage are considered to be living in an area of socio-economic disadvantage.

1.4 Summary tables

Glossary of LSAC terms

Term	Description
B cohort	The younger group ("baby" cohort) of study children, aged: ■ 0–1 year in Wave 1 (2004); ■ 2–3 years in Wave 2 (2006); ■ 4–5 years in Wave 3 (2008); ■ 6–7 years in Wave 4 (2010); and ■ 8–9 years in Wave 5 (2012).
K cohort	The older group ("kindergarten" cohort) of study children, aged: ■ 4–5 years in Wave 1 (2004); ■ 6–7 years in Wave 2 (2006); ■ 8–9 years in Wave 3 (2008); ■ 10–11 years in Wave 4 (2010); and ■ 12–13 years in Wave 5 (2012).
LSAC	*Growing Up in Australia*: The Longitudinal Study of Australian Children. A nationally representative longitudinal birth cohort study that commenced in 2004. Data are being collected from study children and their parents, carers and teachers, and through linkage with other national datasets.
Parent 1	The child's Parent 1 (P1) is defined as the child's primary caregiver, or the parent who knows the child best, as determined. In the majority of cases, this is the child's biological mother, but is sometimes the father or another guardian.
Parent 2	The child's Parent 2 (P2) lives in the same household as Parent 1 and is usually the partner of Parent 1. In most cases, this is the child's biological father, but can be the mother, another partner of Parent 1 or another guardian.
Parent living elsewhere (PLE)/ non-resident parent	The child's parent who lives in a different household to Parent 1.
Study child (or child)	The sampling unit for LSAC is the study child, so "child" refers to the child selected for inclusion in the study. Data collected and reported relate to this child.
Wave	Periods of data collection: ■ Wave 1 in 2004 (B cohort were 0–1 years, K cohort were 4–5 years); ■ Wave 2 in 2006 (B cohort were 2–3 years, K cohort were 6–7 years); ■ Wave 3 in 2008 (B cohort were 4–5 years, K cohort were 8–9 years); ■ Wave 4 in 2010 (B cohort were 6–7 years, K cohort were 10–11 years); and ■ Wave 5 in 2012 (B cohort were 8–9 years, K cohort were 12–13 years).

Statistical indicators in tables and graphs

Indicator	Notes
***	Significance level $p < .001$
**	Significance level $p < .01$
*	Significance level $p < .05$
ns	Not statistically significant
I	Confidence interval

Key measures used in the report

Scale	Range	Notes
Index of Community Socio-Educational Advantage (ICSEA)	500–1300	ICSEA is an index of the socio-economic background of the students at the school, with more advantaged schools having a higher ICSEA and schools with students from more disadvantaged backgrounds having a lower ICSEA (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2013). Every school has an ICSEA value on a scale that has a median of 1000 and a standard deviation of 100. ICSEA values range from around 500 (representing extremely educationally disadvantaged backgrounds) to about 1300 (representing schools with students with very educationally advantaged backgrounds) (ACARA, 2013).
Pubertal Development Scale (PDS)	2–8 (girls) 3–12 (boys)	The PDS, developed by Crockett and Petersen in 1987, assesses the pubertal stage based on a number of typical physical indicators of puberty for boys and girls. Parents rate on a 4-point scale ranging from 1 (have not begun) to 4 (development completed). The scores were summed to create puberty category scores to indicate children's pubertal status: pre-pubertal, early pubertal, mid-pubertal, late pubertal and post-pubertal.
Parenting Style Inventory	1–5	The Parenting Style Inventory assesses three dimensions of parenting style: responsiveness, demandingness and autonomy-granting. Children respond to 14 statements regarding the parenting styles of their parents on a 5-point scale (1 = "strongly agree", 5 = "strongly disagree"). Items were reversely coded and averaged with higher scores indicating higher levels of parental responsiveness, demandingness and autonomy-granting.
Quality of Life (PedsQL)	0–100	Children's emotional functioning, school functioning and peer relationships are measured using the Parent 1-reported Pediatric Quality of Life (PedsQL) inventory (Varni, Burwinkle, & Seid, 2006). Emotional Functioning (five items) assesses the frequency that the child displays negative emotional states such as sadness and anxiety. School Functioning (five items) measures children's school adjustment and performances. Social functioning (five items) assesses children's relationship with their peers. Parents rate each item on a five-point scale, ranging from 1 (Never) to 5 (Almost always). Items are reverse-scored and transformed to a 0 to 100 scale (1 = 100, 2 = 75, 3 = 50, 4 = 25, 5 = 0), so that higher scores indicate a higher level of functioning. Average scores were then calculated for the emotional, school and social functioning subscales.
National Assessment Program—Literacy and Numeracy (NAPLAN)	0–1000	The NAPLAN is designed to assess all Australian students in Years 3, 5, 7 and 9 in reading, writing, language conventions (spelling, grammar and punctuation) and numeracy, using a national test that has been conducted annually since 2008, on the same days each year. The NAPLAN assessment process is performed using a national common reporting format by the test administration authorities. The reporting scales are constructed so that given scale scores can be compared across school year levels and over time.

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Grandparents in their young grandchildren's lives

2

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2.1 Introduction

Grandparents play a vital role in many families, being an important source of support to parents and enriching children's lives through a wider family network. This has been highlighted in research on grandparenting and intergenerational relationships for families in Australia (Brennan et al., 2013; Gray, Misson, & Hayes, 2005; Horsfall & Dempsey, 2011, 2013; Jenkins, 2010; Ochiltree, 2006; Weston & Moloney, 2014; Weston & Qu, 2009) and overseas (e.g., Barnett, Scaramella, Neppl, Ontai, & Conger, 2010; Fergusson, Maughan, & Golding, 2008; Griggs, Tan, Buchanan, Attar-Schwartz, & Flouri, 2010; Mueller & Elder, 2003; Pebley & Rudkin, 1999; Tan, Buchanan, Flouri, Attar-Schwartz, & Griggs, 2010). This chapter uses LSAC to explore different ways that grandparents are involved in the lives of the LSAC children, capturing involvement from ages 0–1 years through to 12–13 years. It extends and updates previous LSAC research about grandparents (Gray et al., 2005).

Grandparent involvement may take different forms, such as grandparents sharing a residence with children, providing child care or otherwise having contact with grandchildren. This chapter describes these different forms of grandparent involvement. Comparisons across different family forms and children of different ages highlight the variable and changing nature of grandparent involvement across children's lives. These analyses are from the perspective of the LSAC children and family, and so report on children's possible involvement with any of the child's grandparents. This is a different perspective than that of grandparents themselves about their involvement with grandchildren.

Firstly, information on the household structure of LSAC children is used to identify the incidence of children having co-resident grandparents, and the characteristics of those grandparents and families. Gray et al. (2005) found that in Wave 1, 7% of the infants and 4% of the 4–5 year olds were living in the same household as a grandparent. While these numbers are quite small, previous research has shown that co-resident grandparents can make significant contributions to family life, especially to the financial circumstances of single-mother families (Mutchler & Baker, 2009). In fact, Gray et al. (2005) reported that in the infant cohort of LSAC in Wave 1, of children who had a parent living elsewhere from their primary parent's residence, almost one in four had a co-resident grandparent.[1] Exploring the characteristics of co-resident grandparents (such as their age and health status), along with family characteristics, can provide some insights on the ways in which family life (in terms of child care arrangements and the amount of contact that children have with their grandparents) is different in these families compared to others. Information on financial wellbeing and sources of support provide some new insights about the functioning of grandparent co-resident families compared to others. The focus is on grandparents who are co-resident as part of a three-generation household, and does not cover grandparents who have primary care for grandchildren, since they are insufficiently represented in LSAC. For more information about these families refer to Brennan et al. (2013) and Weston and Moloney (2014).

This chapter also covers grandparents as child care providers. In Australia, grandparents are a key source of child care, especially when children are very young and when mothers are employed (Baxter, 2013; Jenkins, 2010), just as is the case in other countries such as the United States (Baydar

[1] Chapter 3 in this volume, also includes some analysis of co-residence of grandparents.

& Brooks-Gunn, 1998). Australian research has highlighted the significance of grandparent care (Baxter, 2013, 2014; Baxter, Gray, Alexander, Strazdins, & Bittman, 2007; Gray et al., 2005; Hand & Baxter, 2013; Horsfall & Dempsey, 2011, 2013; Weston & Qu, 2009) and this chapter expands on this, to explore how grandparent care is used in conjunction with other forms of care across different families and as children grow, and to describe the characteristics of grandparent-provided child care.

As noted by Mutchler and Baker (2009) "caring 'from a distance' is characteristic of many grandparents whose roles may be defined in terms of affection and attachment but little day-to-day interaction" (p. 1577). The final aim of this chapter, then, is to include analyses of grandparent contact with grandchildren, to capture this form of grandparenting. Based on grandparents' reports, a significant proportion see their grandchild frequently. Horsfall and Dempsey (2011) reported that about three in four see their grandchild at least once a month. Gray et al. (2005) presented similar figures from children's perspectives, using Wave 1 of LSAC, in reporting on the proportion having at least monthly face-to-face contact with grandparents. Differences in contact are explored for maternal versus paternal grandparents as children grow and across different family forms. Exploring this for children growing up primarily in households headed by a single parent is especially useful as parental separation has previously been shown to potentially alter grandparents' involvement with grandchildren (Gray et al., 2005; Weston & Qu, 2009).

The key research questions explored in this chapter are:

1. What are the characteristics of grandparents living with the LSAC children, and of the families in which they live?
2. What is the nature of grandparent-provided child care, in terms of hours per week, days per week and purpose?
3. How much contact do children have with their grandparents?
4. How does grandparent-provided child care and grandparent-contact change as children grow?
5. What family characteristics explain variations in different aspects of grandparent involvement?

2.2 Data and method

Data from both cohorts and five waves are explored in this chapter, to provide insights on grandparents' presence and involvement as children grow. Throughout these analyses, we have excluded children being raised by grandparents, identified as families in which a grandparent was the child's primary carer. This resulted in the exclusion of between 13 and 19 cases each wave when the B and K cohorts were pooled, and was done because the number of families in this situation is too few to be able to produce reliable estimates of such families' circumstances.

Three key sets of information are used in this chapter: one on grandparent co-residence, another on grandparents as child care providers, and another on children's contact with grandparents.

- Details about children's household structure were used to provide information about the co-residence of grandparents, on grandparents' relationships with resident parents and other characteristics.
- Details about the types of child care used by children were examined to determine to what extent grandparents provide child care, and how that care is contextualised with other forms of care across the ages of children in the B and K cohorts. Most of this information is as reported by the child's primary carer in the main interview.
- Finally, information on the frequency of contact between children and grandparents is analysed. This information is largely sourced from the primary carer's self-completion surveys.

The above data are examined by age of child throughout the chapter with some other comparisons made according to children's family characteristics. A key characteristic is whether children are living with couple parents or a single parent.[2] Most single parents were single mothers (95% across both cohorts and five waves), but single fathers are included also. Because of the small number of single fathers we do not make the distinction between single mothers and fathers even though grandparent involvement (and whether maternal or paternal) is likely to vary depending on whether

[2] Families that comprised a biological parent plus a grandparent that had been classified as a two-parent family were re-classified for these analyses to be a single-parent family, so that the grandparent was not counted as a "parent" as well as a co-resident grandparent (a total of 51 changes across waves and cohorts).

children live with their mother or their father. While this classification, therefore, does not capture the full complexity of family relationships that might affect grandparental involvement, it provides some first insights.[3]

Other data items are introduced within each of the sections. For example, in exploring grandparental child care, parents' employment status is included, given the strong associations between maternal employment and child care use. We report on associations between family characteristics or primary carer characteristics and grandparent involvement. Almost all the primary carers are mothers (95% in single-parent families and 97% in couple families, across both cohorts and all waves), but a focus on primary carer (rather than maternal) characteristics allows father primary-carer families to be included in the analyses.

The analyses explore different roles of grandmothers and grandfathers, and maternal and paternal grandparents where data permit. Specifically:

- In the analyses of grandparents, grandparents could be identified as maternal or paternal grandmothers or grandmothers through their relationship to the study child and their relationship to parents in the household. Even in single-parent households, it was possible to identify whether a co-resident grandparent was maternal or paternal.[4] A very small number of co-resident great-grandparents of study children were counted as if they were grandparents. Grandparents who were visitors or temporary household members were not counted.
- For the analyses of grandparent-provided child care, details were not captured of whether care was specifically provided by grandmothers or by grandfathers, but (from Wave 2) was captured as care provided by maternal or paternal grandparents (or both).
- For the analyses of children's contact with grandparents, from Wave 2, information could be derived about contact with maternal or paternal grandparents, with some limitations that are discussed in that section concerning the incomplete information for single-parent families. Information is not collected separately in respect to grandmothers and grandfathers.

It was not possible to determine whether children actually had, at the times of data collection, living maternal or paternal grandmothers or grandfathers. It would of course be expected that as children grow older they would be less likely to have grandparents still living, and those living may be less accessible to grandchildren due to heightened frailty or health problems. Changes in grandparent involvement by child age may be a consequence of such changes. But also, given that fathers are on average older than mothers, such age differences might translate into children having older (or not living) paternal grandparents compared to maternal grandparents, and having older (or not living) grandfathers compared to grandmothers. These differences are likely to in part explain any observed differences between these grandparents' involvement with children. For example, for mothers in couple families in Wave 5 of the K cohort, the median birth years of their mothers was 1942 and of their fathers was 1939. For fathers, the median birth years of their mothers was 1939 and of their fathers was 1936. Within these families at Wave 5, when asked about children's contact with grandparents, it was reported that 7% of children had no maternal grandparents and 10% had no paternal grandparents, and the birth year of grandparents in these families was earlier than that reported for other families. In analysing children's contact with grandparents in section 1.5, we report how these figures changed over the waves of LSAC.

More detailed information about the data used is presented within each of the sections that follow.

[3] Having a parent living elsewhere may be especially relevant in considering children's involvement with the grandparents related through the parent who lives elsewhere, and while this is most likely to apply in single-parent families, it is also the situation for some children in couple families. Various factors are likely to make a difference to grandparent involvement, including the level of involvement the child has with the parent living elsewhere, which in itself may also depend on whether the child's primary carer has re-partnered. Grandparent involvement may be different again for children who have only one living (biological) parent. This is more often the case in single parent rather than couple parent families, although within LSAC the numbers affected are small.

[4] From the LSAC household data, maternal relationships could only be directly identified if there was a mother in the family and likewise paternal relationships could only be identified if there was a father in the family. To derive grandparental relationships for other families if the grandparent was said to be "other relative, in law" to the primary carer, and grandparent to study child, then it was assumed this was a paternal grandparent if the resident LSAC parent was female and a maternal grandparent if the resident LSAC parent was male.

2.3 Co-resident grandparents—incidence and characteristics

This section looks at co-resident grandparents; that is, grandparents who reside with the LSAC study child and either one or both parents of this child. These families are also sometimes described as three-generation families (Dunifon, Ziol-Guest, & Kopko, 2014; Pilkauskas & Martinson, 2014), and are distinct from custodial or "skipped generation" grandparent families, in which the children's parent/s are not resident within the household.[5]

In Wave 1 of LSAC, 7% of the infants and 4% of the 4–5 year olds were living with a grandparent. Table 2.1 shows the percentage of children who had a co-resident grandparent remained at around these levels across the five waves of the study for the B and K cohorts. Across all waves and the two cohorts combined, this equates to an overall average of 5% living with a grandparent. This is somewhat lower than the 8% of children reported to be living with grandparents in three-generation households in the US in 2012 (Dunifon et al., 2014).

Table 2.1: Grandmother and grandfather presence, child age and cohort

Grandparental presence	0–1 year (%)	2–3 years (%)	4–5 years (%)	6–7 years (%)	8–9 years (%)	10–11 years (%)	12–13 years (%)
B cohort							
Grandparent present	6.6	6.0	5.0	5.1	4.4		
Grandmother only present	2.4	2.2	2.0	2.4	2.1		
Grandfather only present	0.6	0.8	0.5	0.8	0.6		
Grandmother and grandfather present	3.6	3.0	2.5	1.9	1.7		
Grandmother present [a]	6.0	5.2	4.5	4.2	3.8		
Maternal grandmother	4.1	3.9	3.1	3.0	2.6		
Paternal grandmother	1.8	1.4	1.3	1.2	1.3		
Grandfather present [a]	4.2	3.8	3.0	2.7	2.3		
Maternal grandfather	2.8	3.0	2.2	1.8	1.6		
Paternal grandfather	1.4	0.9	0.7	0.7	0.7		
No. of observations	5,101	4,600	4,331	4,239	4,071		
K cohort							
Grandparent present			4.3	4.7	5.4	4.6	4.6
Grandmother only present			2.2	2.1	2.5	2.2	2.6
Grandfather only present			0.5	0.5	0.9	0.9	0.7
Grandmother and grandfather present			1.6	2.0	2.0	1.6	1.4
Grandmother present [a]			3.8	4.1	4.5	3.8	4.1
Maternal grandmother			2.7	3.0	3.5	2.9	3.0
Paternal grandmother			1.2	1.1	1.1	0.9	1.2
Grandfather present [a]			2.1	2.5	2.9	2.5	2.1
Maternal grandfather			1.5	1.9	2.2	1.8	1.6
Paternal grandfather			0.6	0.7	0.7	0.4 [#]	0.5 [#]
No. of observations			4,971	4,451	4,284	4,159	3,940

Notes: Percentages in the maternal and paternal rows do not totally add up to the total grandparent present row, as a very small number of grandparents were not identified as either maternal or paternal grandparents (< 1%). [a] These percentages include those with grandmother present as well as grandfather present. [#] Relative Standard Error > 25%. Percentages may not sum exactly to the subtotals due to rounding.

Source: B and K cohorts, Waves 1 to 5

[5] Grandparents who are visitors or temporary household members are not included. A very small number with co-resident great-grandparents were included in the estimated proportion with grandparents.

Other information about co-resident grandparents is summarised in Table 2.1:

- The percentage of LSAC children who lived with a grandparent was higher at younger ages, with the percentage living with a grandparent highest at age 0–1 year (7%) and 2–3 years (6%) compared to older ages (varying between 4% and 5%).
- Children were more likely to be living with a grandmother than with a grandfather across all ages, although the patterns by child age were consistent for grandmother and grandfather co-residence.
- When children lived with a grandfather, they usually also had a grandmother co-resident, such that children lived with both grandparents. It was rare for children to be living with a grandfather without a grandmother also present, when compared to living with only a grandmother.

Analyses of these data longitudinally show that the presence of a co-resident grandparent is not very stable, a finding that has been observed elsewhere (Pilkauskas & Martinson, 2014). Overall, across five waves of LSAC, 13% of children in the B cohort (covering 0–1 year through to 8–9 years) and 10% in the K cohort (covering 4–5 years through to 12–13 years) had a grandparent present for at least one of the five waves. In the B cohort, this included 9% with a grandparent co-resident at one or two waves only, 3% for three or four waves and 1% for five waves. In the K cohort, this included 7% with a grandparent co-resident at one or two waves only, 2% for three or four waves and 2% for five waves.

Information about grandparent co-presence is disaggregated in Table 2.1 to show how children's grandparents were related to the children's mother or father. That is, if the grandparents were the parents of the child's mother they were classified as maternal grandparents, and if parents of the child's father, they were classified as paternal grandparents. Overall, it was more likely that co-resident grandparents were maternal grandparents rather than paternal grandparents. This applied to grandmothers as well as grandfathers.

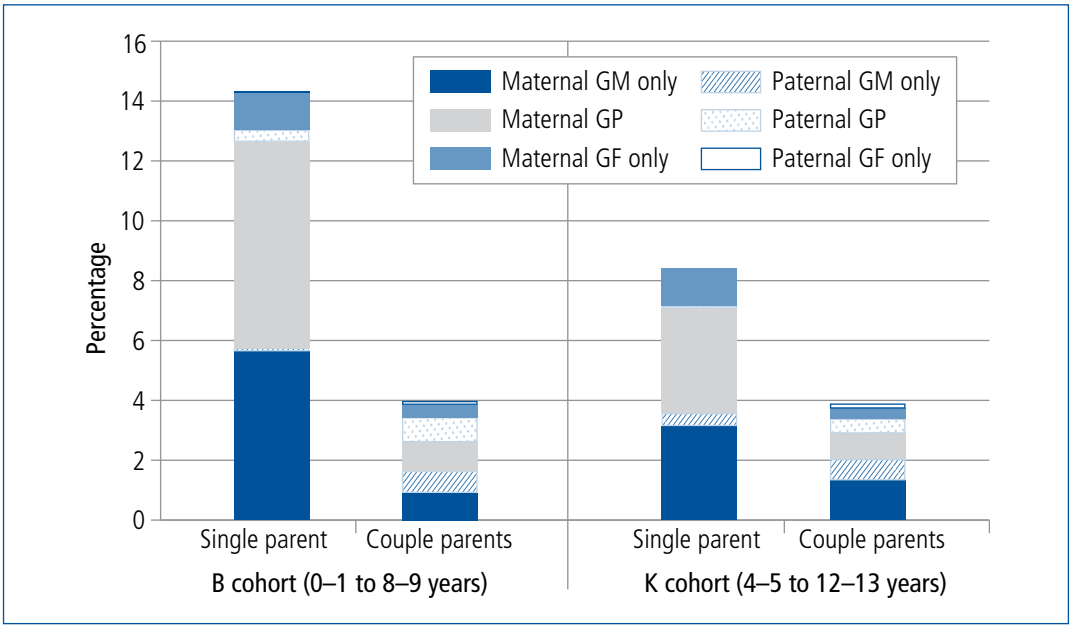
The higher incidence of the co-presence of maternal, rather than paternal, grandparents largely reflected that in single-parent households, the majority of grandparental co-residence involved maternal grandparents, either as the maternal grandmother alone or both maternal grandparents (Figure 2.1 on page 18). Within two-parent families there was more diversity of co-resident grandparental relationship types.

Table 2.1 shows that among 0–1 year olds (Wave 1 of the B cohort) one in four children living in a single-parent household had a co-resident grandparent. This percentage declined over later waves for this cohort, as seen in the percentage of children in single-parent households who have a co-resident grandparent in Chapter 3 of this volume (see page 55, the percentage declined from 24% to 8% over the five waves). However, even averaged over five waves (from 0–1 through to 8–9 years), the percentage living with a grandparent was higher in single-parent households than in other household forms. This is indicated in Figure 2.1, with the height of the bars being the percentage of children living with a grandparent within each household type.

The difference between single-parent and couple-parent households was also apparent among somewhat older children (in the K cohort), although was less marked than at the younger ages of children in the B cohort.

While it was uncommon for children to have a co-resident grandparent, selection into this household form may be more likely when parents have a greater need for help or support (financial or otherwise) (Dunifon et al., 2014; Pebley & Rudkin, 1999; Pilkauskas & Martinson, 2014). Parents' age, educational attainment and employment status are included here to explore this, as they capture different aspects of socio-economic status. Also, as families from certain cultures are more likely than others to live in extended family forms, parents' language spoken at home is explored as an indicator of cultural differences. To capture possible regional variation in grandparent co-residence, we explore differences according to remoteness. Table 2.2 (page 19) shows that at Wave 1, some parental characteristics were associated with a higher likelihood of having a co-resident grandparent: [6]

[6] If the likelihood of having a co-resident grandparent is examined across all waves of LSAC, with the above characteristics examined together with the age of the youngest child, all significant findings described above except those relating to parental education remained statistically significant. This is based on a logistic regression model in which the repeated observations across waves are taken into account with a random effects model.



Notes: GM = grandmother: GF= grandfather; GP = grandparents, i.e., both grandmother and grandfather. Most single parents are single mothers (95% across the sample). Two-parent families include two–biological parent families as well as those with one or two non-biological parents.
Source: B and K cohorts, pooled Waves 1 to 5

Figure 2.1: Co-resident maternal and paternal grandmothers and grandfathers by household type

- Consistent with the earlier analyses, having a co-resident grandparent was significantly more likely in single-parent households.
- When the child's primary carer was relatively young, families were significantly more likely to have a co-resident grandparent, and this was especially marked in the younger cohort.
- Differences according to the primary carer's educational attainment were less marked, although those with lower educational attainment were more likely to have a co-resident grandparent than those with higher educational attainment.
- A family-level variable that identified whether or not both (or single) parents were employed was not significantly associated with grandparent co-residence for 4–5 year olds (K cohort, Wave 1), but for 0–1 year olds (B cohort, Wave 1) grandparent co-residence was less likely when all parents in the household (whether one or two) were employed.
- Having a co-resident grandparent was more likely when one of the parents mainly spoke a language other than English at home. (Other analyses of grandparent characteristics (not shown) reveal that in many of these families, the grandparent mainly spoke a language other than English also.)
- Only small differences were apparent according to an area-level classification of the remoteness of residence (only 4–5 year olds).

As noted previously, grandparental co-residence may be explained by a number of circumstances. It may be to provide some support or assistance to the grandparent. It may simply be to allow for family members to spend time together and develop relationships. It may also be to allow grandparents to provide some support to the children and parents, especially to provide assistance with housing or financial support for a time. Existing research reveals that the formation of multigenerational households, such as is formed through grandparent co-residence, is usually done to address the needs of the younger generation, as reflected in the last of these reasons (see Mutchler & Baker, 2009 for related literature). Not surprisingly, research has shown that single parents are particularly advantaged when living in a multigenerational household, such that single parents living with grandparents have significantly better financial circumstances compared to those living alone (Mutchler & Baker, 2009). This reflects that pooling living costs, or pooling or access to the grandparents' resources (housing and other) may improve the economic circumstances of families who would otherwise be faced with difficult financial circumstances.

Table 2.2: Grandparent co-residence by cohort and selected characteristics, Wave 1

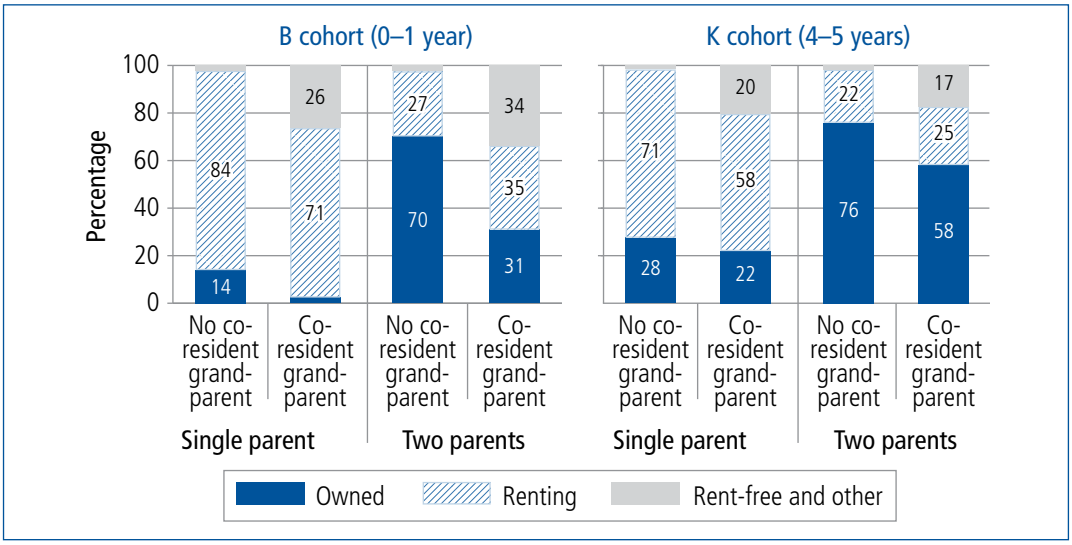
Selected characteristics	Children aged 0–1 year (B cohort)			Children aged 4–5 years (K cohort)		
	Has co-resident grandparent (%)	No co-resident grandparent (%)	Total (%)	Has co-resident grandparent (%)	No co-resident grandparent (%)	Total (%)
Family composition						
Single parent	24.2	75.8	100.0 ***	8.6	91.4	100.0 ***
Couple parents	4.6	95.5	100.0	3.5	96.5	100.0
Primary carer age at child's birth (years) [a]						
15 to 24	19.8	80.2	100.0 ***	6.6	93.4	100.0 **
25 to 34	5.1	94.9	100.0	4.3	95.7	100.0
35 and over	2.7	97.3	100.0	2.9	97.1	100.0
Primary carer education						
Incomplete secondary only	12.6	87.4	100.0 ***	6.8	93.2	100.0 ***
Secondary, certificate or diploma	7.6	92.4	100.0	4.2	95.8	100.0
Bachelor degree or higher	3.7	96.3	100.0	3.3	96.7	100.0
Employment status						
Both parents (or single parent) employed	5.1	94.9	100.0 **	4.3	95.7	100.0
One (or both) parents not employed	7.9	92.1	100.0	4.2	95.8	100.0
Main language spoken at home						
Both (or single parent) mainly speaks English	5.5	94.5	100.0 ***	3.2	96.8	100.0 ***
One (or both) parents mainly speaks a language other than English at home	12.2	87.8	100.0	9.3	90.7	100.0
Region						
Major city area	7.2	92.8	100.0	4.8	95.2	100.0 *
Inner regional	5.2	94.8	100.0	3.3	96.7	100.0
Outer regional or remote [b]	5.7	94.3	100.0	3.1	96.9	100.0
All families	6.6	93.4	100.0	4.3	95.7	100.0

Notes: Significance (chi-square) tests used to compare proportions with, without co-resident grandparents. [a] This is derived from parent age and child age at Wave 1. [b] Some LSAC families live in remote areas but LSAC is not representative of families living in remote areas. *** $p < .001$; ** $p < .01$; * $p < .05$. Percentages may not total exactly 100.0% due to rounding.

Source: B and K cohorts, Wave 1

Reasons for co-residence of grandparents are not collected in LSAC, and so we cannot determine whether co-residence is primarily for the benefit of the grandparent/s or for the rest of the family. However, information about *parents'* housing tenure provides insights, especially in the identification of parents who are living rent-free, who are likely to be living in the grandparents' home.

Figure 2.2 (page 20) shows the parent-reported housing tenure at Wave 1 for families with and without a co-resident grandparent, also classifying families by cohort and parental relationship status. The category of most interest is that of "living rent-free or other", which captured a significantly larger proportion in the grandparent co-resident households. The findings suggest that within families who are co-resident with grandparents, approximately one fifth to one third (varying across groups) were possibly living in the grandparents' home, with no or very low housing costs. Parents in these grandparent co-resident households were also less likely to be home owners or purchasers compared to those who were not, suggesting a degree of socio-economic disadvantage associated with the incidence of grandparent co-residence, at least for some families. However, within two-parent households of 4–5 year olds a large proportion with co-resident grandparents owned or were purchasing their own home. Together, this information suggests considerable heterogeneity in the grandparent co-residence group.



Notes: Owned includes "being paid off by you and/or your partner" or "owned outright by you and/or your partner". Renting is "rented or boarded at by you and/or your partner" plus small numbers who reported tenure of "being purchased under a rent/buy scheme" and "occupied under a life tenure scheme". Rent-free and other includes "live here rent free" (86% of cases) and "none of these" (14%).

Source: B and K cohorts, Wave 1

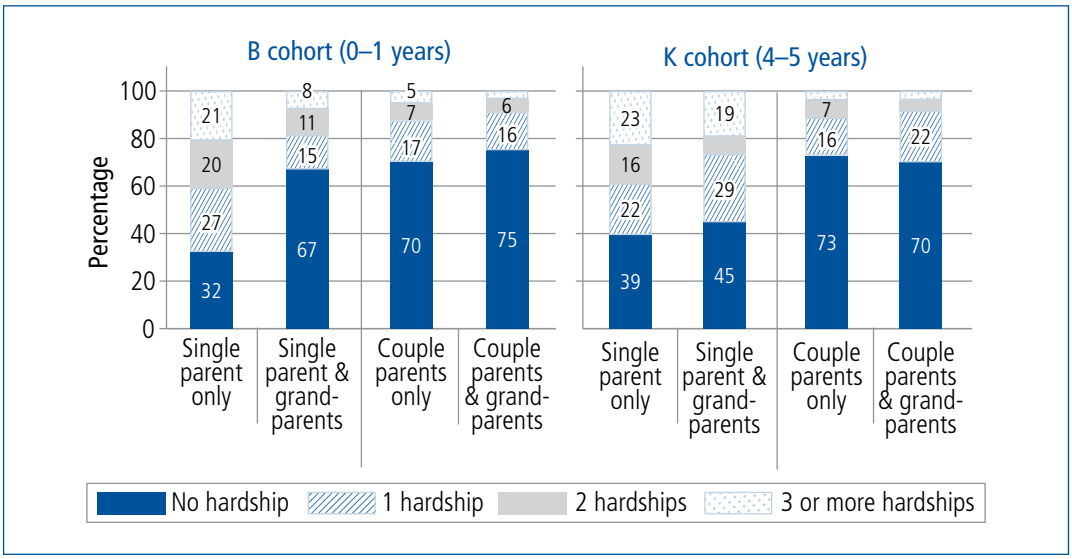
Figure 2.2: Housing tenure of LSAC children's parents, by grandparental co-residence, household type and cohort, Wave 1

Without also having information about co-resident *grandparents'* own housing tenure, we are somewhat limited in our being able to explain the housing circumstances within co-resident grandparent families. Nevertheless, in future analyses of these data it may be useful to consider how tenure intersects with grandparent co-residence in different regional areas (such as remoteness or socio-economic disadvantage) and in families with different characteristics (such as parental education or employment).

As noted above, a consequence of, and perhaps a motivation for, grandparental co-residence may be that parents are able to avoid certain financial hardships, through sharing of resources or being able to draw upon the resources of the grandparent. This was explored, using LSAC, by counting how many of a list of financial hardships each family reported experiencing in the previous year. These hardships were having gone without meals, been unable to heat or cool their home, having had to pawn or sell something, being unable to pay the mortgage or rent on time, having sought assistance from a welfare or community organisation, having been unable to pay bills on time.[7] Figure 2.3 (page 21) shows the distribution of number of hardships by family structure and grandparent co-residence as at Wave 1.

- In families of 0–1 year olds (the B cohort), single parents without a co-resident grandparent were the most likely to have experienced some hardships, with 21% having experienced three or more hardships, 20% experiencing two hardships and 27% experiencing one hardship. In contrast, single parents with a co-resident grandparent were much more like couple parent families, although with slightly more experiencing one or more hardships. The number of financial hardships varied little for households of two parents according to whether or not grandparents were present.
- In the families of the 4–5 year old children (in the K cohort), single-parent households with no co-resident grandparent were similar to those of the 0–1 year olds in the B cohort with respect to the number of hardships reported. As for the younger children, the single parents with no co-resident grandparent were the most likely to have experienced hardships. The single parents with grandparents, however, were less like the two-parent families in the families of 4–5 year olds, having a higher likelihood of experiencing hardships than two-parent families.

[7] These are the hardships asked about at each wave. Parents were asked whether they had experienced any of these due to a shortage of money.



Source: B and K cohorts, Wave 1

Figure 2.3: Number of financial hardships experienced by grandparental co-residence, household type and cohort, Wave 1

For both cohorts, two parents with co-resident grandparents were less likely to experience hardships than single parents with co-resident grandparents. These findings are consistent with analyses for the US, in which Dunifon et al. (2014) explained that these differences have to do with differences in home ownership within these two groups, with housing of two parents more often owned by those parents, and single parents more often living in homes owned by the grandparents. This is also consistent with what is suggested by the housing tenure information presented above.

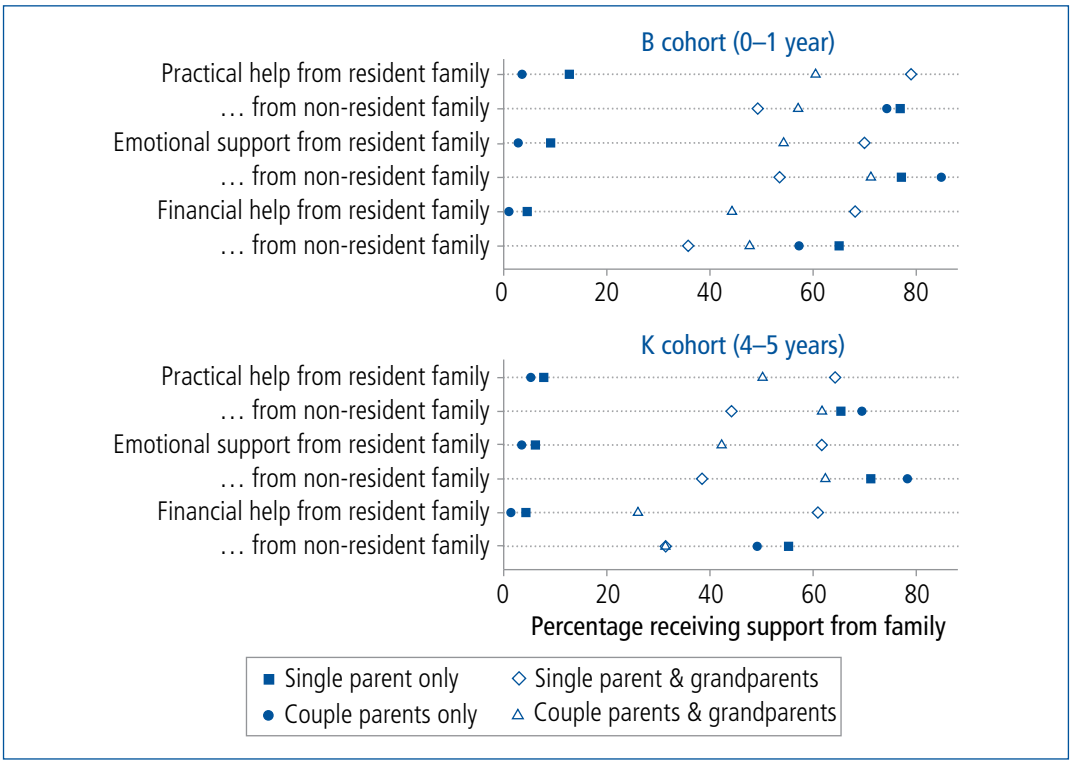
The provision of help and support by co-resident grandparents to parents is also apparent in Figure 2.4 (page 22), which shows (using Wave 1) the percentage of parents reporting that they received practical help, emotional support or financial help from resident family or from non-resident family. Parents with co-resident grandparents, and especially single parents, said very often that they received any of these forms of help or support from resident family, which we would assume includes grandparents in many cases. Note, though, that not all parents with co-resident grandparents report that they receive these forms of help or support from resident family. The figure also shows that those parents who do not live with a grandparent were more likely to receive help or support from *non-resident* family, compared to those with a co-resident grandparent, although the differences were not always very marked.

What we do not know is to what extent LSAC parents (or indeed children) provide some degree of help or support to the co-resident grandparents. It seems likely that this would occur, especially when co-resident grandparents are older or need help managing a medical condition.

We can look further at the characteristics of the grandparents themselves, with information available on grandparents' age, main language spoken and medical conditions. This offers some insights on the characteristics of these grandparent co-resident households. (Note that this information cannot be used to identify which grandparents are likely to be co-resident, given we do not have a reference group of non-co-resident grandparents.)

Looking at grandparents co-resident with 0–1 year olds (B cohort, Wave 1):

- The median age of co-resident grandmothers was 53 and of co-resident grandfathers was 55 (5% of grandmothers and 9% of grandfathers were aged over 70 years).
- Thirty-six per cent of co-resident grandmothers and co-resident grandfathers had a long-term health condition (i.e., a medical condition or disability that had lasted or was likely to last for 6 months or more).
- Twenty-one per cent of co-resident grandmothers and 19% of co-resident grandfathers mainly spoke a language other than English at home.



Source: B and K cohorts, Wave 1

Figure 2.4: Receipt of help and support from resident and non-resident family, by cohort, grandparent co-residence and household type, Wave 1

Among grandparents co-resident with 4–5 year olds (K cohort, Wave 1):

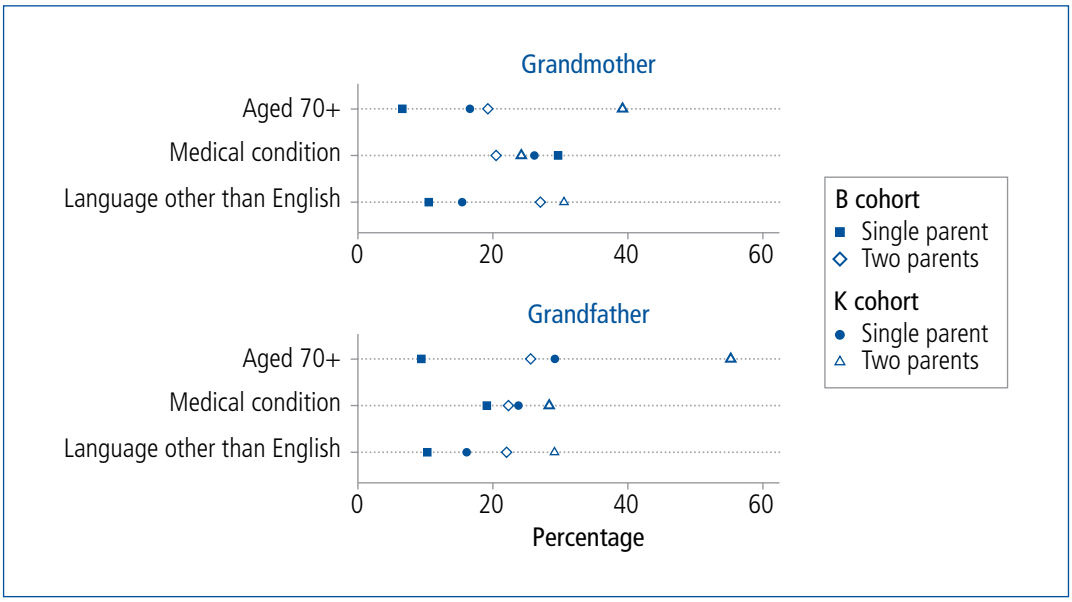
- The median age of co-resident grandmothers was 61 and of co-resident grandfathers was 64 (23% of grandmothers and 34% of grandfathers were aged over 70 years).
- Forty-seven per cent of co-resident grandmothers and 44% of co-resident grandfathers had a long-term health condition.
- Thirty per cent of co-resident grandmothers and 35% of co-resident grandfathers mainly spoke a language other than English at home.

These age differences (across cohorts, and of grandmothers and grandfathers) would be expected (see section 2.2). The higher incidence of health conditions for grandparents of 4–5 year olds might also reflect the age differences between these grandparents and those of the 0–1 year olds. However, within cohorts, health differences did not emerge when comparing grandmothers to grandfathers. When these characteristics were explored across waves, there was considerable variation, such that the only (unsurprising) trend was for grandparents to be older at later waves. Some differences were apparent according to whether grandparents were living with the LSAC children in a single-parent or two-parent household, as shown for data pooled across waves in Figure 2.5 (page 23). Grandparents were older and more likely to be non-English speakers in couple-parent households than in single-parent households. Differences were not apparent for grandparents' likelihood of having a long-term medical condition.

The findings from this section are summarised and discussed further in the final section of this chapter, after the analyses of grandparents as child care providers, and grandparents' contact with children.

2.4 Grandparents as child care providers

This section focuses on grandparents as child care providers. In Australia, grandparents are a key source of child care, especially when children are very young and when mothers are employed (Baxter, 2013; Jenkins, 2010). Australian research has highlighted the significance of grandparent care, including research using LSAC (Baxter, 2014; Baxter et al., 2007; Gray et al., 2005; Hand &



Note: Based on pooled data on co-resident grandparents across waves, and so show average characteristics across waves. For grandmothers, *n* = 1,756 from 923 families with co-resident grandmothers at one or more waves. For grandfathers, *n* = 1,124 from 620 families with co-resident grandfathers at one or more waves. For each, there were fewer observations for a medical condition, which was not available in Wave 4.

Source: B and K cohorts, Waves 1 to 5

Figure 2.5: Grandparent demographics averaged across five waves, by cohort and household type

Baxter, 2013) and other data sources (Baxter, 2013; Horsfall & Dempsey, 2011, 2013; Weston & Qu, 2009). Likewise, international literature has shown that families greatly value grandparent-provided care and often use it as a supplement or alternative to formal care arrangements (Brandon, 2000; Goodfellow & Laverty, 2003; Wheelock & Jones, 2002).

This section extends existing research on grandparent-provided child care in Australia, to provide more detail about the nature of that care, and on the extent to which grandparent care supplements other forms of care. Where possible, we analyse whether care was provided by maternal or paternal grandparents, but we do not have information on whether that care was provided by grandmothers or grandfathers, as has been explored by Horsfall and Dempsey (2013) and Hank and Buber (2009), for example.

First, this section begins with a broad overview of grandparent-provided child care across the ages of children in the two cohorts of LSAC. Then, more detail is provided in two separate subsections, one on care for under-school-aged children and the other on school-aged children.

For children under school age, information about child care was collected in LSAC by asking parents about their regular use of child care over the previous month, *excluding casual or occasional babysitting*.[8] Details of children's participation in formal child care (such as long day care or family day care) or informal care (such as grandparent or other relative care) were collected and, at the appropriate ages, this was captured separately to participation in preschool. When children became school-aged, parents were asked about their current use of care for children before school, after school or at other times. There were some changes to questions used to capture this information

[8] LSAC estimates of the percentages of children in grandparent care are somewhat lower than those reported by the Australian Bureau of Statistics (ABS). This may reflect the instruction to parents in LSAC to exclude casual or occasional babysitting, which could be included in the ABS collection. The LSAC estimates were 18% for 0–1 year and 2–3 years, and 20% for 4–5 years. The ABS reported that in 2011, 23% of under-one year olds, 36% of 1 year olds, 34% of 2 year olds, 29% of 3 year olds and 30% of 4 year olds were *usually* cared for by a grandparent. If the ABS data are instead used to estimate the percentage of children cared for *in the reference week* of the ABS survey, the percentages decline to 17% of under-1 year olds, 27% of 1 year olds, 25% of 2 year olds, 21% of 3 year olds and 20% of 4 year olds. The "usual" figures are as presented in the ABS online tables. The "last week" figures were derived from the ABS CURF.

across the waves.[9] Care for school holidays was also collected for school-aged children but this is not covered in this chapter—see Baxter (2014) for analyses of these data.

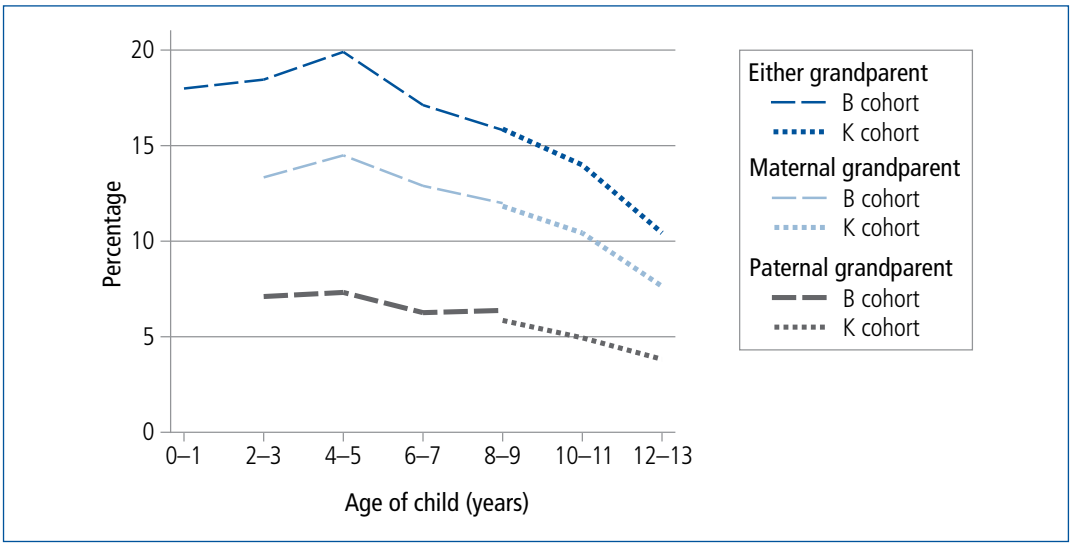
Overview of grandparent-provided child care

To first provide an overview of grandparent-provided child care, Figure 2.6 shows the percentage of children (by age and cohort) who were regularly cared for by grandparents. From Wave 2, this was separately identified as care provided by a maternal grandparent or paternal grandparent, as shown. The percentage of children in some grandparent care was highest when children were under school age, with a decline in the proportion being cared for by grandparents as children progressed through the primary school years.

Figure 2.6 shows that at any age children were more often cared for by maternal grandparents than by paternal grandparents. For example, 18% of children aged 2–3 years were cared for by either grandparent and this included 13% cared for by maternal grandparents (72% of 2–3 year olds cared for by a grandparent) and 7% cared for by paternal grandparents (39% of 2–3 year olds cared for by a grandparent). As is evident in these data, some children were cared for by maternal grandparents as well as paternal grandparents (11% of those sometimes cared for by grandparents at this age).

Among children cared for by a grandparent, those in single-parent households were less often cared for by paternal grandparents and more often cared for by maternal grandparents compared to children in two-parent households. Figure 2.7 (page 25) shows this, for children aged 2–3 years and older.

In addition to child age and parent's relationship status, children's care arrangements are expected to be strongly associated with parents' employment status (Baxter, 2013).[10] This is apparent in Figure 2.8 (page 25), which also contextualises the grandparent child care with other forms of care or preschool. For children with a not-employed parent, there were lower percentages in care or preschool overall, although at ages 2–3 years and 4–5 years, care was often used, which no doubt reflects that formal care or preschool is especially valued as children approach school age, given the opportunities these arrangements provide for social and educational development (Hand, Baxter,

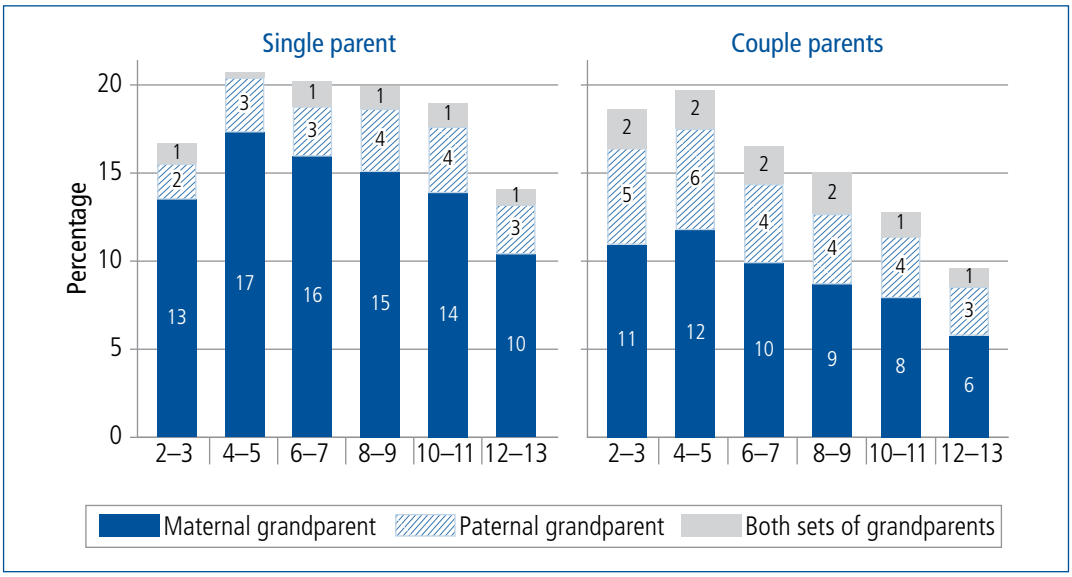


Note: Grandparent care was not collected separately in respect to maternal or paternal grandparents in Wave 1.
Source: B cohort, Waves 1 to 5; K cohort, Waves 3 to 5

Figure 2.6: Percentage of children with some grandparent care (maternal or paternal) by child age and cohort

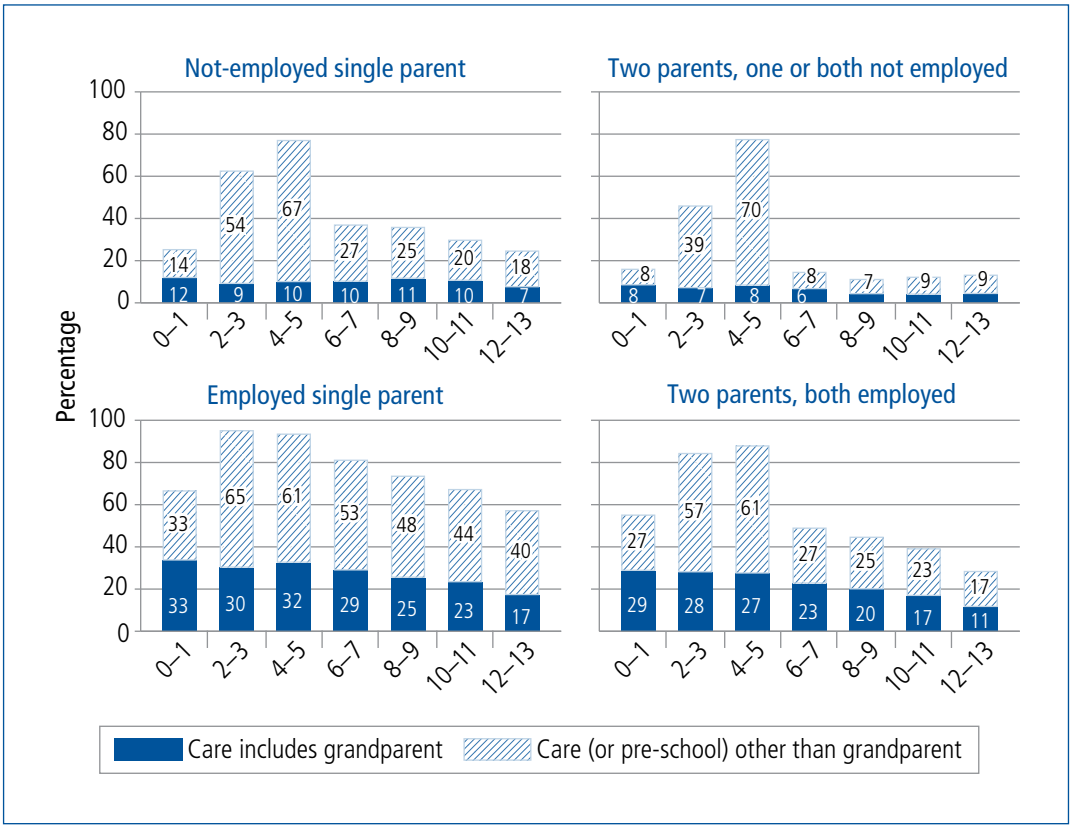
[9] Waves 1 and 2 of the K cohort were not used in these analyses of grandparent child care. The questions used at these waves differed to those used at later waves and, in particular, resulted in considerably lower than expected percentages in grandparent care at Wave 2 when aged 6–7 years (13% cared for by grandparents, compared to 17% from Wave 4 of the B cohort). The Wave 1 K cohort estimate for 4–5 years was 17%, compared to 20% for the B cohort at Wave 3.

[10] This is largely in relation to mothers' employment status, with longer work hours associated with a greater use of child care. Fathers' employment status also matters, in that children are less often in child care when fathers are not employed full-time.



Note: Grandparent care was not separately identified as maternal or paternal at Wave 1.
Source: B cohort, Waves 2 to 5; K cohort, Waves 3 to 5

Figure 2.7: Grandparent care by maternal and paternal grandparents, by child age and household type



Notes: Care other than grandparent includes informal or formal care. Informal care includes friends or neighbours, other relatives, a parent living elsewhere or nannies. Formal care includes long day care, occasional care, family day care, before or after school care or preschool or kindergarten.
Source: B cohort, Waves 1 to 5; K cohort, Waves 3 to 5

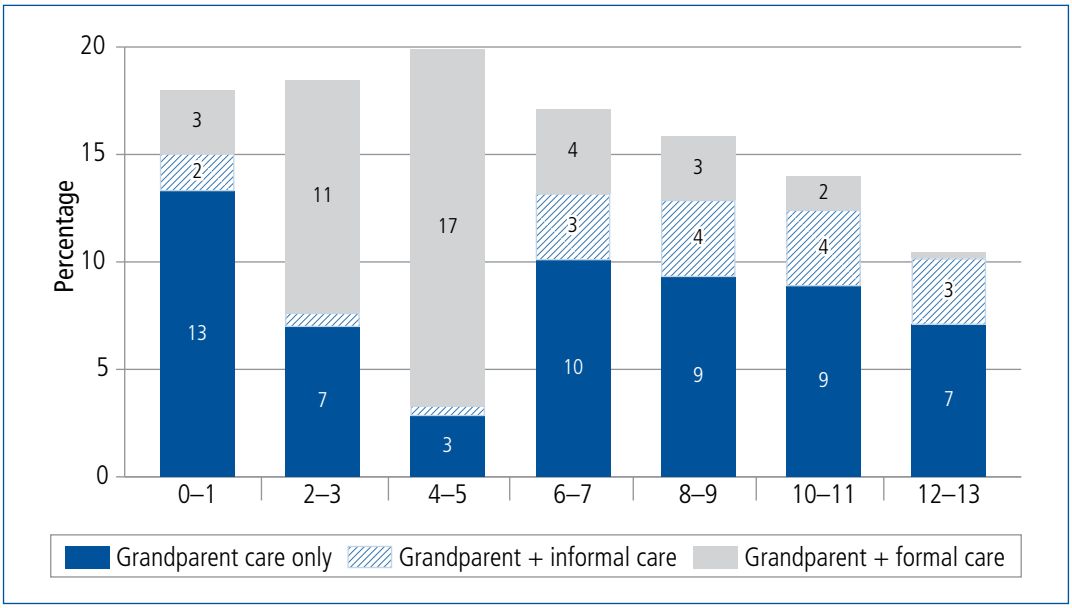
Figure 2.8: Grandparent and other care, by child age and parents' employment status

Sweid, Bluett-Boyd, & Price-Robertson, 2014). Grandparent care, however, did not have the same pattern by child age for these families, with the percentage in grandparent care varying only slightly as children grew.

Among children with employed parents, the percentages in any care were significantly higher than for children with a not-employed parent across all ages, except for at 4–5 years. Across all ages, this was reflected in a higher percentage in grandparent care. Also across all ages, children with employed single parents were more likely to be in some grandparent care, compared to children with two employed parents. The differences were quite small at some ages, though. There were far greater differences between employed single parents and dual-employed couple parents in relation to children's participation in care other than grandparent care. This was most likely in the single-parent households.

Figure 2.9 looks in more detail at the care arrangements of children who have some grandparent child care. Overall, children cared for by a grandparent were often also in other care arrangements; however, this varied considerably by child age. At 0–1 year, 18% of children were in grandparent child care. Of those, 13% were only in grandparent care. By 2–3 years, out of 18% in grandparent care, only 7% were only in grandparent care, and at 4–5 years, 3% were only in grandparent care out of a total of 20% in some grandparent care. Once children were school age, it was more likely that children were only in grandparent care rather than a combination of grandparent and other care.

Parents' employment status and children's age are key characteristics in describing which children are cared for by grandparents, as seen above and as evident in other research (Baxter, 2014; Hand & Baxter, 2013; Silverstein & Marenco, 2001; Vandell, McCartney, Owen, Booth, & Clarke-Stewart, 2003). While it is of interest to examine which other characteristics of families predict greater use of grandparent care, we leave this to further research, as this would require more comprehensive analyses than can be covered here. It is worth noting, however, the connection between the provision of grandparent care and the focus of the previous subsection on grandparent co-residence. Not surprisingly, children were more likely to be cared for by a grandparent when they shared a home with one. Among children with a co-resident grandparent, grandparents provided care to 55% of under-school-aged children and 50% of school-aged children with employed parents; 18% of under-school-aged children and 25% of school-aged children with a not-employed parent. In comparison, among children without a co-resident grandparent, grandparents provided care to



Notes: Informal care includes friends or neighbours, other relatives, a parent living elsewhere or nannies. Formal care includes long day care, occasional care, family day care, before or after school care or preschool or kindergarten.
Source: B cohort, Waves 1 to 5; K cohort, Waves 3 to 5

Figure 2.9: Children in grandparent care, showing grandparent care combinations with other care types, by child age

27% of under-school-aged children and 18% of school-aged children with employed parents; 8% of under-school-aged children and 5% of school-aged children with a not-employed parent.

The longitudinal nature of LSAC allows us to explore to what extent grandparent child care is experienced across the waves of LSAC, to examine the stability of this care arrangement. (This is just done for the B cohort, over ages 0–1 year through to 8–9 years, since we have not used the first two waves of the K cohort to analyse grandparent care.) In this cohort, 44% of children had been cared for by a grandparent at one or more of the five waves. Overall, 19% were in grandparent care at one wave only. Most commonly, this one wave was when the children were aged 0–1 year, although significant proportions were only in grandparent care at each of the other four waves. Another 11% were in grandparent care at two waves, with the grandparent care more often occurring during the under-school ages. The remainder were 7% having been in grandparent care for three waves, 4% for four waves and 2% for five waves. These findings suggest that grandparent care is not a persistent or consistent form of care for many children across their early years. This is likely to reflect that parents' needs for any child care change as parents (usually mothers) move into and out of employment, as children spend more time in formal care or preschool, and as the availability of grandparents changes.

The two following subsections now provide some more detail about care provided to under-school-aged children and school-aged children.

Under-school-aged children

This subsection includes information on grandparent care of under-school-aged children. These analyses use data from the B cohort (Waves 1 to 3) and the K cohort (Wave 1), excluding 4–5 year old children who were already in school.[11]

Looking first at the average amounts of time children are in grandparent care, the LSAC data show that, among children who were in any sort of child care: [12]

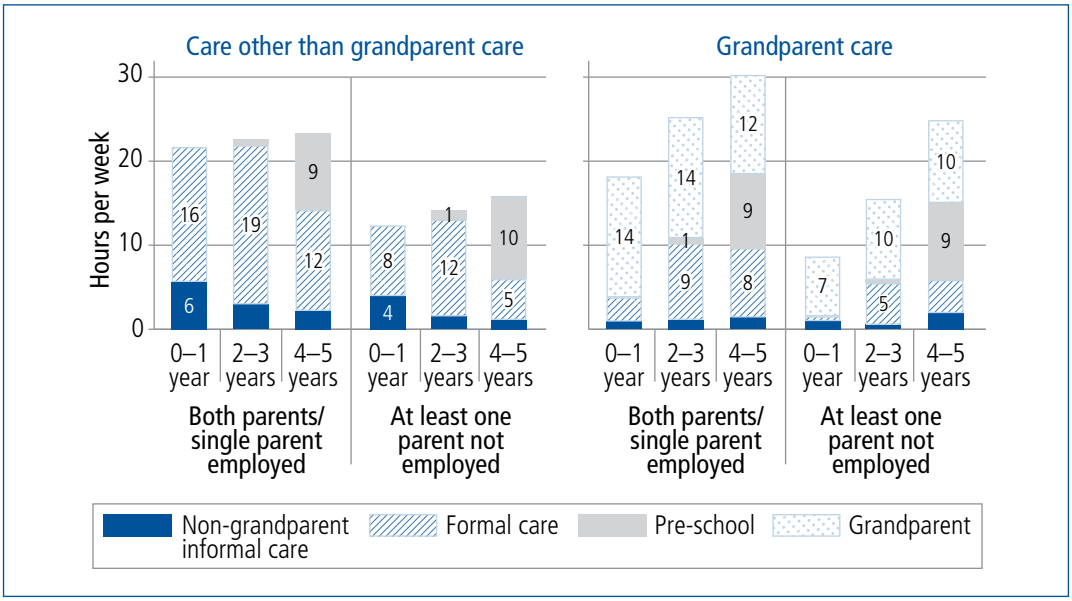
- At 0–1 year, the average duration of care per week was 17.3 hours. This included an average of 6.4 hours cared for by grandparents, 3.0 hours in other informal care and 8.0 hours in formal child care.
- At 2–3 years, the average duration of care (including preschool) per week was 20.5 hours. This included an average of 3.6 hours cared for by grandparents, 2.0 hours in other informal care, 14.0 hours in formal child care and just less than 1.0 hour in preschool.
- At 4–5 years, the average duration of care (including preschool) per week was 21.6 hours. This included an average of 2.3 hours cared for by grandparents, 1.6 hours in other informal care, 8.3 hours in formal child care and 9.3 hours in preschool.
- Across the under-school-aged period, formal care is the most common care arrangement, followed by grandparent care, followed by other informal care.

Figure 2.10 (page 28) presents information on the average weekly hours children were in different forms of care, by parental employment status and child age, and separating those who were in some grandparent care from those who were not.

- For children with employed parents who did not have grandparent care, the average amount of care changed little as children grew through the under-school ages, remaining at around 21 hours per week. The type changed, such that children spent more time in preschool at 4–5 years than at earlier ages.
- For children with care other than grandparent care who had a not-employed parent, the average hours in care increased, reflecting more time in formal child care at 2–3 years, then more time in preschool (offset by less time in child care) at 4–5 years.
- For children with employed parents who did have grandparent care, the amounts of time in care changed considerably as children grew, although the time spent cared for by grandparents did

[11] In this section, the K cohort, Wave 1 data on grandparent-provided child care have been included. While the overall percentage in grandparent care is lower than in the B cohort at Wave 3 (and so was excluded from the previous analyses), on most characteristics of the grandparent care described here, the findings were very similar for the B cohort and the K cohort at age 4–5 years.

[12] In each of the following, the small discrepancy between the sum of the hours spent in different types of care and the total hours in care given is due to rounding.



Source: Waves 1 to 3 of the B cohort and Wave 1 of the K cohort

Figure 2.10: Mean weekly hours in care types for children in some care, by whether care includes grandparent care, age and mothers' employment status

not change a great deal. These children spent, on average, 14 hours per week being cared for by grandparents at 0–1 year and 2–3 years, and 11 hours per week at 4–5 years. Their time in other forms of care changed over these ages, with more time in formal child care at 2–3 years and more time in preschool at 4–5 years.

- Children who had some grandparent care and a not-employed parent spent an average of 7 hours in grandparent care at 0–1 year, then an average of 10 hours per week at 2–3 years and 4–5 years. Like the other children, their time in formal child care was higher at 2–3 years and in preschool at 4–5 years.

Table 2.3 provides some more information about the grandparent-provided child care.[13]

- Figure 2.9 showed how grandparent care was combined with other forms of child care, by child age. Here this is evident also, with grandparent care reported to be the main form of care for 86% of 0–1 year olds in grandparent care, 63% of 2–3 year olds and 31% of 4–5 year olds.
- Among children in grandparent care, this care was more often provided in the child's home when children were aged 0–1 year (45% were cared for in their own home), compared to 34% at 2–3 years old and 32% at 4–5 years old. Among children who were cared for somewhere else, this was most likely to be in the home of their grandparents.
- Information about the hours spent in grandparent care allow some elaboration beyond the averages shown above. There was considerable variation in the number of hours children were cared for by grandparents. For example, at 0–1 year, 26% spent less than 5 hours per week in grandparent care, 33% spent 5–9 hours per week in grandparent care, 21% spent 10–19 hours per week in grandparent care and 20% spent 20 hours or more in grandparent care. The distribution of hours did not vary greatly from this at 2–3 years or 4–5 years.
- Looking at how many days per week children were in grandparent care, it was most common for children to have been cared for just 1 day a week (about half the children in grandparent care), with about one in four cared for 2 days per week, and the rest distributed over other numbers of days.
- There were often two (or more) adults present when the child was being cared for by grandparents. Presumably this often indicated the presence of both a grandmother and

[13] If children were cared for by more than one grandparent (or sets of grandparents) this information refers to the one with whom children spent more time. This information is reported by the primary carer.

grandfather. This was the case for 40% of 0–1 year olds, 46% of 2–3 year olds and 49% of 4–5 year olds in grandparent care. For the balance, just one adult was usually present.

- The number of months in total that children experienced grandparent care of course varies by age, but even looking at the older children here, there were very diverse experiences. At 4–5 years, 17% of children experienced grandparent care for most of their life (4 years or more) and another 14% had been in grandparent care for 3 years or more.

Table 2.3: Children who are regularly cared for by a grandparent, care characteristics by child age

Selected characteristics	0–1 year (B cohort, Wave 1) (%)	2–3 years (B cohort, Wave 2) (%)	4–5 years (B cohort, Wave 3 K cohort, Wave 1) (%)
Grandparent care is main care			
Yes	86.1	63.2	30.8
No	13.9	36.8	69.2
Total	100.0	100.0	100.0
Care provided in child's home			
Yes	44.5	34.3	32.2
No	55.5	65.7	67.8
Total	100.0	100.0	100.0
Hours in grandparent care			
Less than 5 hours	26.4	19.5	25.0
5–9 hour	33.3	35.2	36.4
10–19 hours	20.7	23.8	22.4
20 hours or more	19.6	21.5	16.3
Total	100.0	100.0	100.0
Days per week in grandparent care			
1	48.3	53.6	55.3
2	26.7	23.3	22.8
3	9.8	10.2	10.7
4	3.8	3.5	2.5
5	9.0	8.1	7.1
6 or 7	2.5	1.2	1.6
Total	100.0	100.0	100.0
Number of adults present			
One	60.3	54.3	51.5
Two or more	39.7	45.8	48.5
Total	100.0	100.0	100.0
How long child has been in this care			
0–5 months	65.4	19.9	22.4
6–11 months	32.3	12.4	13.1
12–23 months	2.3	31.2	17.8
24–35 months	n.a.	34.1	15.5
36–47 months	n.a.	2.4	14.2
48 months or more	n.a.	n.a.	17.1
Total	100.0	100.0	100.0
No. of observations	**926**	**874**	**1,729**

Note: Children aged 4–5 years already attending school are excluded. Percentages may not total exactly 100.0% due to rounding.
Source: Waves 1 to 3 of the B cohort and Wave 1 of the K cohort

In addition, across all these ages under school age (but not shown in Table 2.3):

- Ninety-eight per cent of parents of under-school-aged children reported that when children were in grandparent care, there were usually one to five children present. We can expand on

this from information provided by grandparents who responded, in Waves 1 or 2, to the home-based carer component of LSAC.[14] Almost all grandparents reported that they were caring only for the study child when the child was aged 0–1 year, while 61% said they were caring only for the study child at 2–3 years, and another 37% said they were caring for up to five children.

- Few parents (5–6%) paid the grandparents for the child care they provided. Not surprisingly, then, according to the grandparent respondents, 99% reported that they were not Child Care Benefit registered carers.

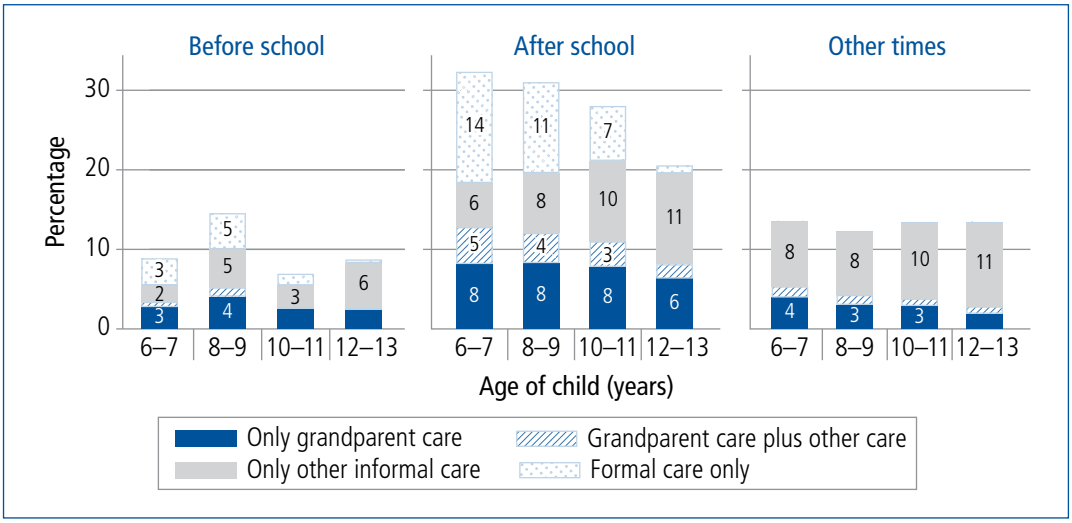
School-aged children

This section presents further information on the care provided to school-aged children by their grandparents. The analyses span the ages 6–7 years (Wave 4 of the B cohort), 8–9 years (Wave 5 of the B cohort and Wave 3 of the K cohort), 10–11 and 12–13 years (Waves 4 and 5 of the K cohort). Prior to Wave 3, the questions about child care for school-aged children differed, and so those data (Wave 2 of the K cohort) were not used.

The additional information provided here relates to the time of day that grandparent and other care is provided to school-aged children. Figure 2.11 shows child care according to whether it was provided before school, after school, or at other times (weekends or evenings). Children in some child care are classified according to whether they only had grandparent care, they had grandparent care plus some other (formal or informal) child care, they only had informal child care other than grandparent care, or they had formal child care (including those who also had non-grandparent informal care).

The peak time for child care for school-aged children was after school:

- Just less than one third of 6–7 year olds were in some after-school care, although this declined considerably as children grew, with 20% of the 12–13 year olds in some after-school care.
- At age 6–7 years 13% of children were cared for by grandparents after school (8% by only grandparents and 5% had grandparent care and some other care). This declined as children grew, with 8% cared for by grandparents after school at age 12–13 years.
- Changes in formal and non-grandparent informal care after school were much more apparent as children grew, with a decline in the proportion in formal child care and an increase in the proportion in informal (non-grandparent) arrangements.



Note: Children may be in grandparent care at more than one of the specified times.
Source: Waves 4 and 5 of the B cohort (age 6–7 and 8–9 years) and Waves 3 to 5 of the K cohort (age 8–9, 10–11 and 12–13 years)

Figure 2.11: Grandparent and other care of school-aged children, by time of day and child age

[14] At Wave 1 there were 210 grandparent-carer responses (12% of families reporting some grandparent care) and at Wave 2 there were 239 grandparent-carer responses (26% of families reporting grandparent care).

Before school hours, the arrangements were more diverse and the patterns by child age more varied. Fewer than 5% of children were cared for by grandparents before school hours.

For care at other times, children were most often in informal arrangements other than grandparent care, with fewer than 5% cared for by grandparents at these times, declining slightly by child age.

The key findings from the above sections, in conjunction with other findings, are discussed after an examination of children's contact with grandparents, below.

2.5 Children's contact with grandparents

The final aim of this chapter is to explore to what extent children have face-to-face contact with their grandparents. Grandparent contact may take different forms, and our focus is on the most direct form of contact in which grandparents share some time together with the children. At one extreme, face-to-face contact will be expected especially when grandparents are co-resident with or regularly care for grandchildren. Some grandparents, however, will not be able to have such direct forms of contact, especially those who live some distance from the family, and for these, phone calls or other means of communication may allow different types of contact that will not be captured with the data available in LSAC. There will be some families, of course, who have no contact with children's grandparents, including those children with no living grandparents and those in which there are strained or distant relationships between children's parents and grandparents. In particular, the latter may be true in the case of some single-parent households, as contact with one set of grandparents may be disrupted by the parents' separation.[15]

This section explores the frequency of children's face-to-face contact with grandparents as children grow and across different family forms. Information about children's contact with grandparents primarily comes from questions on this, asked of the child's primary carer in the self-completion component of LSAC. These questions have changed across the waves of LSAC and, from Wave 2, the frequency of contact with maternal grandparents can be explored separately from contact with paternal grandparents.[16] Given the changes in questions, a challenge has been in correctly taking account of children's contact with paternal grandparents in the case of single-parent families.[17] The data do allow broad estimates of grandparent contact to be derived, though, so we have used these data to compare across different families. The information on children's contact with grandparents cannot be separated into information about contact with grandmothers versus grandfathers.

[15] As noted in Section 2.2, children in couple families may be living with a parent who has re-partnered, also having a parent living elsewhere, so this situation does not exclusively apply to single-parent families. Some children also have a parent who has died, and to what extent grandparent contact is disrupted in these families is unknown.

[16] In Wave 1, the study child's primary carer was asked how much contact the child has with their grandparents (specifically, how often the study child gets together with, sees or spends time with their grandparents). Response categories ranged from 1 (no contact) to 6 (every day). The questions changed in Wave 2. From Waves 2 to 4, the primary carer was asked how often the child gets together with their (the primary carer's) parents and, in a separate question, with the parents of their partner or spouse. If Parent 1 (the child's primary carer) was the child's biological, step, adopted or foster mother, Parent 1's responses about contact with their parents were coded as contact with the child's maternal grandparents, and their responses about contact with their partner's parents were coded as contact with the child's paternal grandparents. For the few cases where Parent 1 was the (biological, step, adopted or foster) father of the study child, Parent 1's responses about contact with their own parents were coded as contact with paternal grandparents; and responses about contact with their partner's parents were coded as contact with maternal grandparents. Cases where Parent 1 was not the child's biological, step, foster or adopted parent were excluded from the analysis. Wave 5 questions were similar, but specifically referred to "Parent 2's" parents, rather than those of the partner or spouse. (This may result in the identification of "step-grandparent" relationships, if the partner/spouse is not the child's parent.) These data, however, do not adequately capture grandparent contact for single-parent families (see the next footnote).

[17] From Wave 2, when children had a parent living elsewhere, the primary carer in LSAC was asked whether the child had any contact with the parents of that parent living elsewhere. This was captured as "yes" or "no", such that the frequency of contact is not collected. For the frequency of contact we referred to information from the parent living elsewhere (PLE), where he (or she) was a participant in LSAC through the parent living elsewhere component of the study. In this questionnaire, in Wave 2, respondents were asked whether the study child sees their parents "often", "occasionally" or "never". In subsequent waves the response categories corresponded to those used in the primary carer's interview. For these analyses, Wave 2 PLE responses are coded as "at least monthly" if the response was "often" and "less than monthly" if the response was "occasionally". In families with a PLE but no PLE respondent, the frequency of contact was based on the "yes" or "no" provided by the primary carer. In these cases, we assumed "yes" was equal to be at least monthly for the purposes of analysing aggregate levels of contact.

In all waves and for both cohorts, over 95% of children had at least some face-to-face contact with a grandparent, including those who "rarely" had contact with a grandparent, through to those who saw them every day. (The frequency of contact is explored below.) Contact with maternal grandparents was more common than contact with paternal grandparents:

- The percentage of children who had some contact with a maternal grandparent ranged from 94% of children age 2–3 to 88% of children age 12–13.
- The percentage of children who had some contact with a paternal grandparent ranged from 88% of children age 2–3 to 82% of children age 12–13.

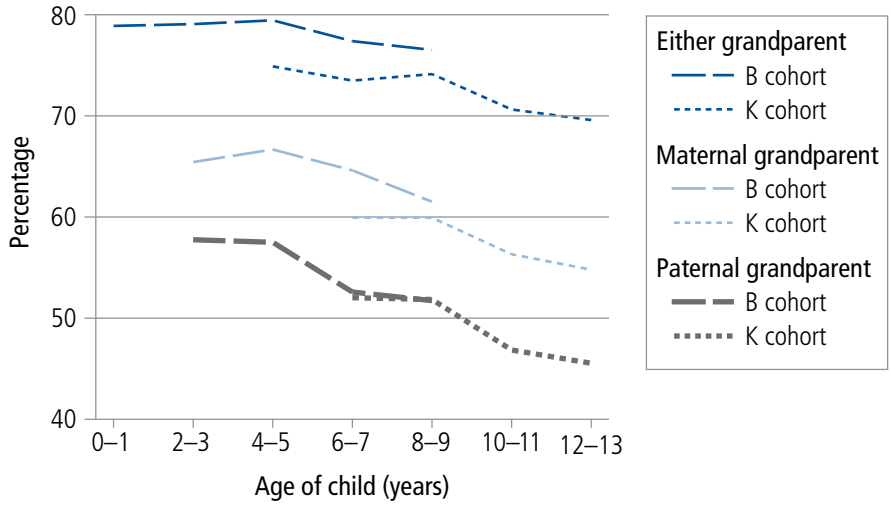
Some of the decline in children having contact with grandparents, as children grow, has been due to the death of those grandparents, as discussed in section 2.2. For example, 2% of 2–3 year old children (in the B cohort at Wave 2) were reported to have no maternal grandparents, but this was 7% of children at 12–13 years (in the K cohort at Wave 5). Children with no grandparents are still included in the calculations.

While most children had some contact with their grandparents, *regular* contact was less common. Figure 2.12 shows the percentage of children, by age and cohort, who had at least monthly contact with their grandparents (with estimates of regular contact for children with a parent living elsewhere, as described in footnote 18).

The percentage of children having at least monthly contact with a (maternal or paternal) grandparent was highest when children were under school age and declined with the age of the child. Still, the majority of children keep in regular contact with grandparents. Around 80% of children had at least monthly contact with a grandparent at 4–5 years, compared to 70% of children aged 12–13 years. The patterns by the child's age are similar to those reported previously for grandparent-provided child care (Figure 2.6). As already discussed, the trends in contact by the child's age may be more a reflection of the ageing of the grandparents, rather than of the children themselves. Similarly, differences in contact between maternal and paternal grandparents will partly be explained by children being less likely to have paternal than maternal grandparents, given that maternal grandparents are likely to be younger.

Across all ages, it was more common for children to have regular (at least monthly) contact with their maternal grandparents than their paternal grandparents. By age 12–13, 55% of children had regular contact with their maternal grandparents, compared to 46% for paternal grandparents.

When we explored differences in maternal and paternal grandparent involvement in previous sections, the higher rates of maternal grandparent involvement were particularly apparent in

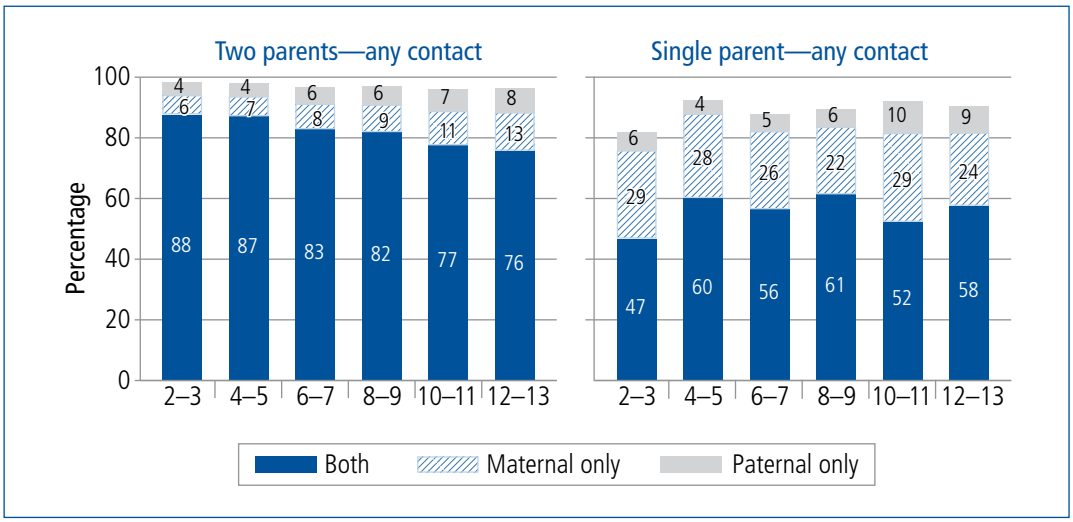


Note: Refer to footnotes 17 and 18 for information about derivation of these data.
Source: Waves 1 to 5 of the B and K cohorts.

Figure 2.12: Percentage of children who have at least monthly contact with (maternal or paternal) grandparents, by age and cohort

single-parent households, with differences less marked within two-parent households. Consistent with this, Figure 2.13 shows that for grandparent contact, compared to children in two-parent households, those in single-parent households were much less likely to have contact with both sets of grandparents, and more likely to be only in contact with their maternal grandparents. (As noted previously, the vast majority of single parents are single mothers.) This figure shows the percentage of children who have *any* contact with their grandparents, depending on whether they are living in a two-parent or a single-parent household. The height of each bar gives the percentage who have some contact with either grandparent, such that the balance is those with no grandparents and with no contact with grandparents. In analyses below we explore this more.

Among children in two-parent households, the majority had some contact with both sets of grandparents through the ages of 2–3 to 12–13 years. Still, the percentage of children who had contact with both sets of grandparents declined slightly over time; and of those children in two-parent households who only had contact with one set of grandparents, it was more common for that contact to be with their maternal, rather than their paternal grandparents.



Notes: Refer to footnotes 17 and 18 for information about derivation of these data. "Any contact" includes monthly contact or less regular contact. The balance includes children with no contact with grandparents and those who do not have grandparents.
Source: Waves 2 to 5 of the B and K cohorts

Figure 2.13: Percentage of children who have any contact with (maternal or paternal) grandparents, by child age

Focusing just on children's contact with maternal grandparents, Figure 2.14 (page 34) shows a larger proportion of children in single-parent households seeing their maternal grandparents daily or weekly. This is mainly explained by children in single-parent households being more likely than those in two-parent households to co-reside with their grandparents (as explored in Section 2.3).[18] Other key findings are:

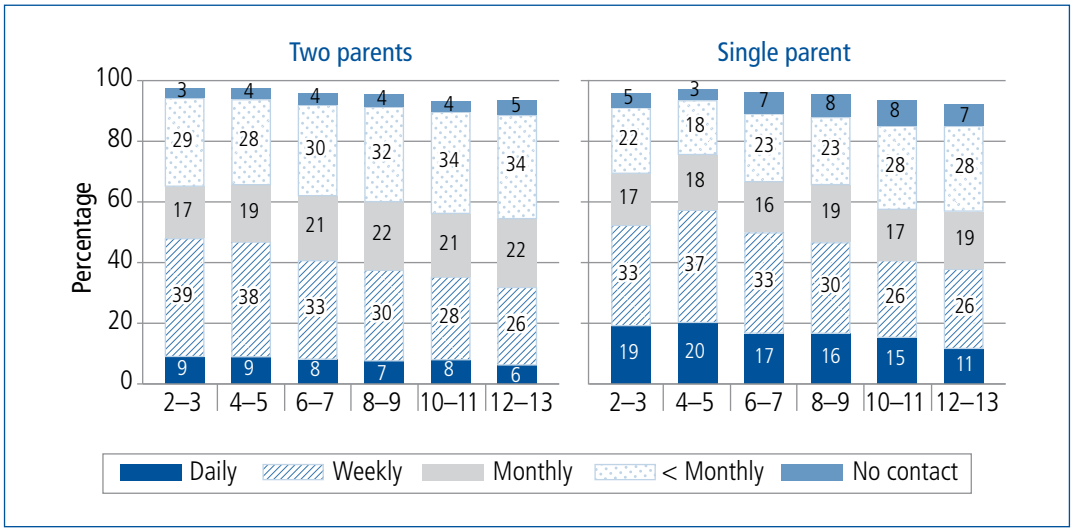
- Regardless of whether the child lived with one or two parents, the percentage of children who had daily or weekly contact with maternal grandparents declined with age.
- Very few children at any age have grandparents with whom they never had face-to-face contact.
- The height of the columns in Figure 2.14, which represents the percentage of children with maternal grandparents, declines with the age of the child.

To explore children's contact with paternal grandparents, we focus in Figure 2.15 (page 34) only on two-parent households, because of the difficulty in deriving this information for single-parent households. As Figure 2.13 showed, children have somewhat less contact with paternal grandparents

[18] When children with a resident maternal grandparent or a maternal grandparent who provided regular child care were excluded from the analysis, the patterns of contact were quite similar for single-parent and two-parent households. As expected, the percentage of children who had daily contact in either case was smaller. In two-parent households, the percentage of children who had daily contact was 5% or less across all age groups. In single-parent households, it was slightly higher, ranging from 5% to 9%.

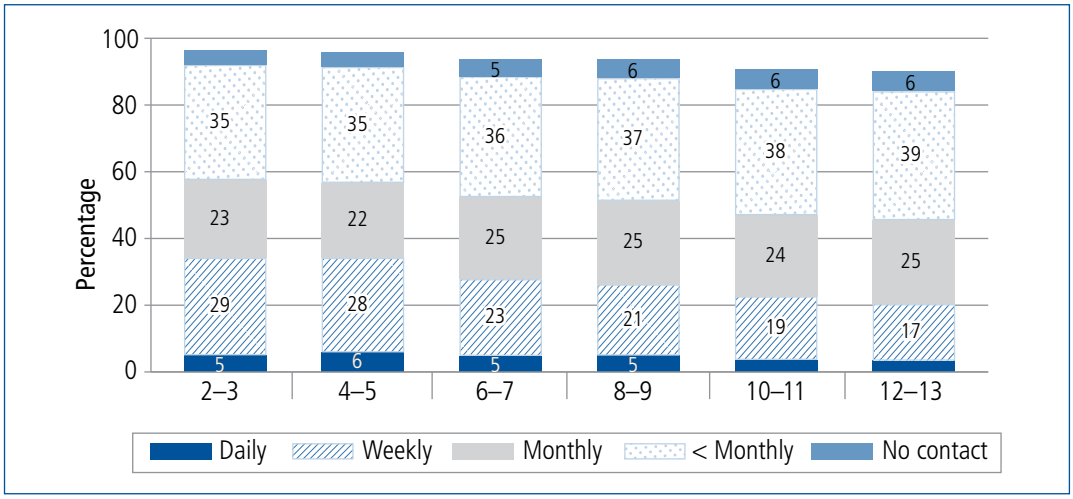
compared to maternal grandparents, and this was also apparent in children being less likely to have daily or weekly face-to-face contact with paternal grandparents. [19]

- At 2–3 years, 48% of children in two-parent households had either daily or weekly contact with a maternal grandparent but only 34% had daily or weekly contact with a paternal grandparent.
- By the age of 12–13, these percentages dropped to 32% for maternal grandparents and 20% for parental grandparents.



Notes: Column height represents the percentage of children who had maternal grandparents. Where the amount of contact is unknown, contact is assumed to be at least monthly.
Source: Waves 2 to 5 of the B and K cohorts

Figure 2.14: Frequency of contact with maternal grandparents, by child age and parents' relationship status



Notes: Column height represents the percentage of children who had paternal grandparents. Where the amount of contact is unknown, contact is assumed to be at least monthly.
Source: Waves 2 to 5 of the B and K cohorts

Figure 2.15: Frequency of contact with paternal grandparents, by child age, two-parent households

[19] When children with a resident paternal grandparent or a paternal grandparent who provided regular child care were excluded from the analysis, the figure was almost identical, perhaps because the proportion of children with resident paternal grandparents was very low and it was less common for paternal grandparents than maternal grandparents to provide regular child care.

Single-parent households were not included in Figure 2.15, as the frequency of children's contact with their other parent's parents was not collected from the primary carer. (They, in fact, may not know how often the child sees these grandparents.)

While contact with grandparents becomes less frequent as children grow, it is not the case that children usually go from having regular contact with their grandparents to having hardly any contact. In fact, if we explore how grandparent contact changes as children grow, we find the amount of contact with grandparents increases for some children over time. For example, among children in the B cohort who were living in two-parent households at age 2–3 and 8–9 years:

- Of those who had daily contact with a (maternal or paternal) grandparent at 2–3 years, 36% still had daily contact at 8–9 years; while 42% saw them weekly and 10% saw them monthly.
- Of those who had weekly contact at 2–3 years, 59% still had weekly contact at 8–9 years, while 26% saw them monthly at 8–9 years, and 7% had increased their contact to daily.
- Among children with monthly contact with a grandparent at 2–3 years, 50% were still seeing grandparents monthly at 8–9 years. While 27% of these children at 8–9 years saw grandparents less frequently, 21% had increased their contact to weekly.
- Of those children who had less than monthly contact with a grandparent when they were 2–3 years old, this was still the case at 8–9 years for 62% of children, but 11% had moved to monthly contact and 20% to at least weekly contact with a grandparent.

The above analyses have shown that it is quite common for children to have at least some contact with their grandparents, and regular contact is more common for maternal than paternal grandparents, particularly for children in single-parent households. Many factors can influence the amount of contact that grandparents have with their grandchildren, some key ones are likely to be geographical distance, grandparents' health status and their own employment status, and the nature of the grandparents' relationship with the child's parents. We do not have information on geographical distance, nor do we know about the health status of grandparents who are not resident in the LSAC household. We do not know about grandparents' employment, even if they are co-resident. Information is also not collected that allows some classification of the quality of the parent–grandparent relationship at the time of the survey.

It is likely that parents' own childhood experiences might contribute to later relationships with parents. In Table 2.4, we consider whether grandparent contact varies according to parents' feelings about the happiness of their childhood. For simplicity, this has just been done for mothers' reports

Table 2.4: Children's and mothers' contact with maternal grandparents by mothers' happiness in childhood, Wave 2

Mother's rating of happiness in childhood	Child's face-to-face contact with maternal grandparents			Mother's contact (see/talk/email) with child's maternal grandparents		
	At least monthly (%)	No or less regular contact (%)	Total (%)	At least weekly (%)	No or less regular contact (%)	Total (%)
B cohort (age 2–3)						
Very happy	73.1	26.9	100.0 ***	91.3	8.7	100.0 ***
Pretty happy	65.9	34.1	100.0	83.0	17.0	100.0
Unhappy/ Very unhappy	52.8	47.2	100.0	60.2	39.8	100.0
All	67.4	32.6	100.0	83.9	16.1	100.0
K cohort (age 6–7)						
Very happy	67.5	32.5	100.0 ***	88.9	11.1	100.0 ***
Pretty happy	62.6	37.5	100.0	77.7	22.3	100.0
Unhappy/ Very unhappy	45.2	54.8	100.0	56.1	43.9	100.0
All	62.6	37.4	100.0	79.2	20.8	100.0

Notes: Sample is restricted to children with maternal grandparents whose mothers responded to the question about childhood happiness. Significance (chi-square) tests used to compare proportions with, without monthly contact with grandparents. *** $p < .001$; ** $p < .01$; * $p < .05$; *ns* $p > .05$. Percentages may not total exactly 100.0% due to rounding.

Source: B and K cohorts, Wave 2

of happiness, against children's contact with maternal grandparents (having at least monthly contact, versus no or less regular contact). The table shows that in both cohorts, children were more likely to have at least monthly contact with their maternal grandparents if their mother reported having a happy childhood, with the highest percentage having at least monthly contact when mothers said they had a "very happy" childhood. Still, even among children whose mothers reported having an unhappy or very unhappy childhood, just over half of children in the B cohort and 45% of children in the K cohort had at least monthly contact with their maternal grandparents.

These data are likely to reflect stronger parent–grandparent relationships when parents' retrospective reports of their own childhood were happier. In fact, Table 2.4 also shows the frequency of contact between mothers and their parents, collected at the same time as the information on children's contact with these grandparents. For these data, "contact" is broader than face-to-face contact, and so we have shown the percentage having at least weekly contact.

- The majority of mothers have at least weekly contact with their mother (84% in the B cohort and 79% in the K cohort).
- Within each cohort, weekly contact is less likely when mothers reported having had an unhappy childhood, and is highest when mothers reported having had a very happy childhood.

Beyond these factors, there are likely to be demographic factors that could make a difference to the frequency or incidence of grandparents' contact with children. We explore here, whether grandparent contact varies according to parents' age, cultural background, education and employment. Table 2.5 shows that at Wave 1:

- When the child's primary carer was relatively young at the child's birth, families were significantly more likely to have daily contact with a grandparent, and this was especially marked in the B cohort. (This of course is affected by the fact—seen in section 2.3—that grandparent co-residence is more likely in these families.) Children with older parents are significantly less likely to have regular face-to-face contact with their grandparents. This is likely to be related to the grandparents being older themselves when parents are older, such that grandparents' capacity for face-to-face contact with grandchildren may be adversely affected by their frailty or ill health, or perhaps more constrained financial circumstances.
- The main finding related to the primary carer's educational attainment is that of daily contact being more likely when the educational attainment is lowest. Again, this is likely to reflect the higher rates of grandparent co-residence in the households of the least educated primary carers. It is also possible that these families are less able to afford formal child care, and therefore regular child care is more likely to be provided by grandparents.
- Weekly or monthly contact with a grandparent was somewhat more likely when both parents (or the parent in single-parent households) were employed.
- Having daily grandparent contact was most likely if one of the parents mainly spoke a language other than English at home, which may reflect high rates of grandparent co-residence. However, these data also show relatively high rates of non-contact with grandparents in these families, which is likely to be due to geographical distance.

Table 2.5: Grandparent contact by cohort and selected characteristics, Wave 1

Selected characteristics	Daily (%)	Weekly or monthly (%)	Less regular (%)	No contact or don't have (%)	Total (%)
B cohort					
Primary carer age at child's birth (years)					
15 to 24	26.1	62.0	9.4	2.4	100.0 ***
25 to 34	12.8	68.3	15.9	2.9	100.0
35 and over	8.2	61.4	23.4	7.0	100.0
Primary carer education					
Incomplete secondary only	16.0	61.6	15.3	7.1	100.0
Secondary, certificate or diploma	15.5	65.1	15.7	3.8	100.0
Bachelor degree or higher	10.1	67.4	19.2	3.3	100.0
Employment status					
Both parents (or single parent) employed	13.0	69.9	15.4	1.7	100.0 ***
One (or both) parents not employed	13.5	61.9	18.8	5.9	100.0
Main language spoken at home					
Both (or single parent) mainly speaks English	11.7	69.3	17.2	1.8	100.0 ***
One (or both) parents mainly speaks a language other than English at home	22.1	44.7	17.0	16.2	100.0
All families	**13.2**	**65.7**	**17.2**	**3.9**	**100.0**
K cohort					
Primary carer age at child's birth (years)					
15 to 24	18.5	65.3	12.6	3.6	100.0 ***
25 to 34	11.7	64.7	20.9	2.7	100.0
35 and over	9.3	56.5	27.0	7.2	100.0
Primary carer education					
Incomplete secondary only	17.9	57.1	18.1	6.9	100.0
Secondary, certificate or diploma	13.0	62.5	21.0	3.5	100.0
Bachelor degree or higher	8.5	65.7	22.8	3.0	100.0
Employment status					
Both parents (or single parent) employed	13.0	66.7	18.5	1.8	100.0 ***
One (or both) parents not employed	10.9	58.3	24.5	6.3	100.0
Main language spoken at home					
Both (or single parent) mainly speaks English	10.6	66.1	21.1	2.2	100.0 ***
One (or both) parents mainly speaks a language other than English at home	19.6	45.0	22.4	13.0	100.0
All families	**12.0**	**62.9**	**21.3**	**3.9**	**100.0**

Notes: Significance (chi-square) tests used to compare, for each variable, the proportions with different levels of contact with grandparents. *** $p < .001$; ** $p < .01$; * $p < .05$; *ns* $p > .05$. Percentages may not total exactly 100.0% due to rounding.
Source: B and K cohorts, Wave 1

2.6 Summary and discussion

This chapter looked at three broad aspects of possible grandparent involvement in children's lives. First, the co-residence of grandparents with children was explored through analyses of grandparents who live with the study children and their parent/s in multi-generational households. Second, grandparents as child care providers was explored. Third, children's contact with grandparents was explored. These different perspectives allow us to see some of the varied ways grandparents' and grandchildren's lives may intersect, providing opportunities for building relationships, help and support across generations.

Overall, the analyses of grandparents' co-residence confirmed that it is not common in Australia for children to have a co-resident grandparent. Percentages are highest among the 0–1 year old children, at 7% of these children, or more than an estimated sixteen thousand 0–1 year old children across Australia. The very young children in single-parent households quite often shared a home with a grandparent. These analyses also showed that having a co-resident grandparent was more likely for some other demographic groups; in particular, those with young parents and from culturally diverse backgrounds (as indicated by language spoken at home). These patterns may reflect, in some families, a means of addressing housing and financial security, while in others, they may reflect cultural aspects of family formation. These findings are consistent with other research on grandparent co-residence, and on multi-generational families in Australia and the United States (Dunifon et al., 2014; Mutchler & Baker, 2009; Pilkauskas & Martinson, 2014).

There were clearly advantages for many families in having co-resident grandparents. This is especially true in single-parent households, as was observed for the United States by Mutchler and Baker (2009). For example, comparing single parents with a co-resident grandparent to those without, housing tenure was more often described as living rent-free when there was a co-resident grandparent, financial hardships were less often experienced, and there was significantly greater access to help or support within the family. In couple-parent households, the presence of a grandparent did not seem to confer benefits to the family to the same degree, suggesting that there may be different reasons for this co-residence, perhaps to benefit the grandparent or for reasons unrelated to the economic circumstances of the parent(s). The analyses of the characteristics of the grandparents themselves highlighted some differences for single-parent versus couple-parent households, with younger grandparents in single-parent households than in couple households; and grandparents in couple households more likely to speak a language other than English than those in single-parent households.

Families without grandparents living with them are still often able to draw upon their help, with grandparent-provided child care being a common way that grandparents provide assistance to families. Grandparent care is often used as a supplement to other forms of care, with formal care still playing an important role in many families, even those who do use some grandparent care. Children are generally not cared for by grandparents for very many hours per week, with the average ranging from 6.4 hours when children were age 0–1, to 2.3 hours per week for 4–5 year olds. However, at least for young children, it tends to be flexible (being provided in the home of the child or the grandparents) and free: two factors that are no doubt valued by parents.

Even when non-resident grandparents do not provide regular child care, a significant proportion still see their grandchildren frequently. That is, for many grandparents, their relationship with their grandchildren involves attention and attachment, but little day-to-day interaction, as described by Mutchler and Baker (2009). Our analysis has shown that while most children have at least monthly contact with a grandparent, regular contact with maternal grandparents is more common than with paternal grandparents, and, as one would expect, contact with paternal grandparents is much less common in single-parent households.

These analyses showed some gendered patterns in grandparent involvement, with grandmothers more often co-resident compared to grandfathers. Specifically, children were more likely to be living either with grandmothers alone or with grandmothers and grandfathers together, rather than with grandfathers alone. Another gendered aspect of co-residence is that children living with grandparents more often lived with maternal grandparents rather than paternal grandparents. This, however, largely reflected the situation of single-parent households, in which single mothers were often living with their own mother or both parents. We were unable to compare grandmother-provided and grandfather-provided child care or grandmother versus grandfather contact with

children; however, as with the co-residence, both of these forms of grandparental involvement (i.e., child care or contact) more often involved maternal than paternal grandparents. This was most apparent in single-parent households but was also apparent in two-parent households.

The focus of grandparent involvement according to ages of children was a particular contribution of this chapter, made possible by the longitudinal nature of LSAC and the collection of information about grandparents from children's perspectives. These analyses showed that grandparent co-residence was most prevalent among the youngest children, especially among children living with single parents. Very few children lived with grandparents at multiple waves of LSAC, however, indicating that grandparent co-residence may be a temporary means of helping families through times in which financial or other forms of support are most needed. Grandparent involvement through providing child care is more common for children under-school age than older children, but even when children are in school, grandparent care is used instead of or as well as other forms of care. We know from other research that this grandparent care is highly valued by many families for children of varied ages (Baxter & Hand, 2016; Wheelock & Jones, 2002). In looking at children's contact with grandparents, this contact, of course, changes in nature as children grow. We saw declines in contact with grandparents as children grew older, with some of this likely to be related to the ageing and death of grandparents themselves. Nevertheless, the majority of children remained in some contact with grandparents over the ages studied here.

These analyses provide insights into the ways different generations within families support each other. Such support may be especially valued, indeed required, by those families who have difficulties accessing the resources or services they need. This might apply especially to parents who have problems accessing affordable housing or who are unable to access sufficient levels of financial assistance to meet their costs of living. For such parents, living with their own parents may alleviate significant financial difficulties, although this may not be an option for all in this situation. The availability and location of grandparents, the nature of the relationships with, and economic circumstances of the grandparents themselves will matter in making choices about grandparent co-residence. These factors, along with grandparents' age, health and employment status, are also likely to be relevant in respect to whether grandparents are available to provide child care and, to some extent, their availability to be in contact with grandchildren. Having the LSAC data on grandparent involvement only from the perspective of the children, rather than the grandparents themselves, means that we have not been able to consider all these factors.

Further, decision-making about grandparent co-residence or child care may depend upon the extent to which this grandparent involvement results in a better situation than any alternatives. In the case of grandparent co-residence, if government or other community assistance is available and able to support a family with children to live independently, then this may be a preferred alternative for some (Pilkauskas & Martinson, 2014). (See Pebley and Rudkin (1999) for a discussion of these issues and a review of the literature.) In the case of child care, while grandparent care is a valued form of child care, there are likely to be some families that use this form of care because formal care options do not meet their needs, perhaps due to affordability or availability at a location or hours that meet their needs.

Grandparents may be called upon for specific help at particular life stages, such as when parents are going through transitions in employment or relationships. This might be reflected in patterns of co-residence during such times. However, where grandparental involvement in directly providing help is most apparent in these data is through the provision of child care. For some families, this may reflect that formal services are not available, not affordable or do not suit the parents' work hours (e.g., for weekend work). However, for others, this may reflect a preference by parents for children to be cared for by family.

An important question is, of course, how does grandparental involvement make a difference to children? We have not explored this here, as key information about the nature of grandparental involvement is missing from LSAC. In particular, to ask about grandparents' influence on children, we might want to know about grandparents' style of communication or "parenting" of children, or the types of activities done while together. We could likewise ask about the wellbeing of grandparents who are more (or less) involved in their grandchildren's lives, and their feelings about the level of involvement they have. Given that grandparental involvement is part of many families' lives, more research on these questions would be of value.

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Diversity, complexity and change in children's households

3

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3.1 Introduction

While the majority of Australian children live with their two biological parents throughout their childhood (de Vaus & Gray, 2007), the changing demography of families has meant that a significant number of children experience more complex family relationships (Baxter, Edwards, & Maguire, 2012; de Vaus & Gray, 2007). Family complexity as discussed in this chapter refers to children living with a single parent or with parent figures who are not biological parents (and also when they are cared for by parents who live in two households, usually post-separation), when they live with step- or half-siblings, or with adults other than parents or parent figures.[1] This is consistent with recent approaches taken in analyses of family complexity in the United States (e.g., Brown, Manning, & Stykes, 2015; Manning, Brown, & Stykes, 2014). That is, children are considered here to not be living in a complex family if they live only with their two biological parents and only full biological siblings or no siblings at all.

While the chapter begins here with a discussion of family complexity, in analysing the LSAC data we instead refer to "household complexity", given that some households contain non-family members. We have not separately examined to what extent households are made up of more than one family, but have instead focused on describing the various relationships of household members to the LSAC study child. It is this child-focused perspective on complexity that is the key contribution of this chapter. The chapter presents this complexity from a demographic perspective. While this perspective is useful to gain some awareness of who may be part of children's lives, it is worth noting that children (and other household members) may have different views on who constitutes their family (Mason & Tipper, 2008).

Long-term demographic trends that have contributed to family complexity include the rise in divorce rates (Weston & Qu, 2014), meaning a substantial number of children today experience the separation of their parents (de Vaus & Gray, 2004). The growth in cohabiting relationships, which tend to be more unstable than marriage (Weston & Qu, 2014), has also contributed to this trend. For children who do not live with both parents, there may be complex across-household relationships when children spend some time living with each of the parents. Some children, then, have living arrangements that may be described as having a "double family" (Villeneuve-Gokalp, 2000). While it is not common for children to spend equal amounts of time in each parents' household, there are significant numbers of children who live predominantly with one parent yet spend some time in their other parent's household (Weston & Qu, 2014). Further, re-partnering by parents leads to a new set of relationships for children, within and potentially beyond their primary household (considered here to be the household within which they are enumerated for LSAC) (Baxter et al., 2012). In this chapter, the analyses begin by exploring children's experiences of complexity through a description of their relationships with parents.

[1] There are other potential sources of family complexity not explored here, as some variations in family form are unable to be studied using LSAC. In particular, this chapter does not specifically look at same-sex parented households. It also does not explore the degree to which parents, siblings or others may live part-time in another household, or whether there are others (such as the boy-/girl-friend or partner of a single parent) who make some contribution to family life yet live elsewhere, as might be the case in "living apart together" relationships (Reimondos, Evans, & Gray, 2011).

Looking beyond the complexity created by children's relationships with parents noted above, some children have complex households through another related or unrelated person living in the same household. A particular example is that of three-generation households, with extended family members such as grandparents co-resident (Brandon, 2012; Pilkauskas & Martinson, 2014). For example, Pilkauskas and Martinson (2014), using the first three waves of the B cohort of LSAC, reported that 11% of children lived in a three-generation household at some time over their early childhood. (See also Dunifon, Ziol-Guest, and Kopko (2014) for related US research.) For some children, co-resident adults may be otherwise related (such as an aunt or uncle), or not related at all, and along with grandparent co-residence, this will be explored in this chapter.

Children's relationships with parents (and other co-resident adults if applicable) do not capture all aspects of potential family complexity. As stated by Brown et al. (2015), "[the] traditional approach to conceptualising children's living arrangement relies on a measure of family structure that captures children's relationship to the parental adult(s) in the household, ignoring children's relationships to siblings as well as family members outside the household" (p. 177). Thinking about sibling relationships, even for children living with two biological parents, these relationships may be less straightforward, with the possibility of step- and half-siblings also living in the household (Cancian, Meyer, & Cook, 2011). Sibling relationships are also explored in this chapter.

Of course, family structures are not always fixed, and over a period of years children may experience various types of complexity and associated transitions. Broadening our understanding of children's complex family relationships, as described above, can be extended to consider these relationships over time. How stable are children's relationships with others, especially in more complex families? There has been some research on the incidence of parental relationship transitions (separation or divorce, or re-partnering and step-parenting) using LSAC (Baxter et al., 2012; Maguire, 2011). In other Australian analyses, using HILDA, de Vaus and Gray (2004) examined children's experiences of different family forms over childhood. For example, for children born between 1984 and 1989, one in four had experienced a period of living without at least one of their birth parents by the age of 12 years. For a recent example that uses three waves of LSAC to analyse three-generation households see Pilkauskas and Martinson (2014).

With five waves of LSAC data, we have the opportunity to extend Australian research to build up a picture of household complexity experienced by Australian children. The LSAC data allow longitudinal analyses of complex family relationships, covering ages 0–1 year to 8–9 years for the B cohort, and 4–5 years to 12–13 years for the K cohort. This allows insights on children's experiences of transitions in and stability of family relationships across these years. Analysing complexity in this way will be done throughout the chapter; to explore children's experience of family complexity to be analysed both cross-sectionally and longitudinally.

A particular focus of research on complex families has been on exploring whether children growing up in such families experience poorer outcomes than other children (e.g., Magnuson & Berger, 2009). This research is complicated by the reality that complex families are often more financially disadvantaged than other families, and tend to vary on other characteristics such as ethnicity of families (see Brown et al., 2015; Furstenberg, 2014; Manning et al., 2014; McLanahan & Percheski, 2008). Links between family complexity and children's outcomes are not explored in this chapter, but an introduction to the possible implications for children is presented by exploring how the incidence of family complexity varies across a selection of parental characteristics.

Research questions

The main research questions addressed in this chapter are:

1. To what extent do Australian children experience different forms of household complexity?
2. How does the experience of household complexity change as children grow?
3. How stable are more complex household relationships?
4. How does the incidence of household complexity vary with selected parental characteristics?

These research questions are addressed throughout the report, with household complexity explored in three main sections. Section 3.3 examines parental relationships to the child, section 3.4 examines the presence of other non-parental adults in the household and section 3.5 examines the presence of siblings or of other children. A final section (section 3.6) summarises household complexity and explores how complexity varies by parental education, parents' childhood experiences of parental

separation and ethnicity, to provide some initial insights into the extent to which household complexity is more apparent within certain demographic groups in the Australian context.

Given the depth of other data analysed here, this chapter does not differentiate households according to the gender of parents. When there is a clear gender pattern, this is noted in the text, rather than adding detail to the classifications. Further, no distinction is made between cohabiting and married couples, even though it is likely that cohabiting two-parent households are more unstable than married ones (Baxter et al., 2012; Weston & Qu, 2014).

3.2 Data and method

Analyses of the LSAC data were undertaken, using Waves 1 to 5 of both cohorts, to describe children's relationships with parents and others in the household of their primary carer ("the primary household") and, where applicable, the household of their other parent. For the purposes of these analyses, the primary household is the household in which children are enumerated in the main LSAC interview.[2]

The central data for this chapter come from information about household relationships, with each person's relationship within the primary household considered relative to the LSAC child.[3] These data are particularly well suited for the analyses of children's experiences of complex households given that the child is the focal unit. Data collections often do not capture this detail, instead only capturing relationships of household members back to a key adult reference person, so concealing possible complexity of relationships between children and others in the household.

A key issue was the identification and reporting of *parental* relationships, to make a distinction between these relationships and the presence of other adults in a household who were not identified as parents. This was straightforward in households with two biological parents, as these parents were clearly the ones in the parental role. Any other adults present in these households were identified as non-parental co-resident adults. (Siblings of the child were not counted as other co-resident adults—they are captured in the presentation of sibling relationships in section 3.5.) In households comprising single parents and no other co-resident adults, relationships were likewise simple to classify, even though in a small number of cases the single parent was not a biological parent of the child.

To present information on *parental* relationships, adults in the household were counted as parents if they were identified as being a biological, step, adoptive or foster parent to the study child. Further, "parents" could include grandparents, other relatives or adults who were unrelated to the child if parent 1 reported that they had a parental role, such that they were assigned as either "Parent 1" or "Parent 2" of the child. A maximum of two parents were identified in each household. If an adult was present and not assigned as either Parent 1 or Parent 2, they were classified as being a non-parental co-resident adult.[4]

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[2] It is possible for children to shift their primary household across waves of LSAC if, for example, their arrangements change such that they live more (or only) with their father, rather than with their mother. There were around 50 children in the K cohort and 20 in the B cohort whose primary household changed between waves of LSAC. Such changes are not identified in the analyses presented in this chapter and clearly add to the complexity of some children's lives. However, in the case of shared care families, children did not always change their LSAC primary household if they started spending significantly more time with their other parent, which is why a small number of children are reported to spend more nights in the household of their other parent than they do in the LSAC primary household (see Table 3.4).

[3] The data were "cleaned" to correct for inconsistencies in the data, since it was in the more complex households that some inconsistencies were observed. The main correction was to Wave 5 sibling relationship information, which in many cases was not consistent with earlier waves, even when households remained unchanged. Where these data were inconsistent, the relationship between siblings and the LSAC child was edited in Wave 5 to be equal to that of Wave 4 or, if missing, Wave 3. Relationships were amended within 245 households in the B cohort and 219 households in the K cohort. Small numbers of observations were excluded from analyses if there were missing data on key relationships.

[4] To demonstrate how differences in classifications of household relationships arise from this, a particular case deserves mention: that of a child living with a biological parent and another adult who is not his or her biological parent but who is married to or cohabiting with the biological parent. In some households, the other adult had been classified as a "step-parent" to the child while in others he (it was usually a he) was classified as an "unrelated adult". LSAC interviewer instructions guide interviewers on how to identify whether adults in the household should be counted as "Parent 2". If classified as a step-parent, an additional adult was coded to be "Parent 2" and the child was subsequently classified as living with two parents. If classified as "unrelated adult", whether or not this

Information about parental relationships is extended to consider whether living arrangements for children include staying some nights with a parent who lives in another household, referred to as a parent living elsewhere (PLE). The number of nights children stayed with their PLE, as reported by the primary carer in the LSAC interview, was categorised as being "below regular care" (children staying 0–51 nights per year with their PLE), "regular care" (staying 52–127 nights with their PLE) and "shared or majority care" (staying 128 or more nights with their PLE).[5] Below regular care reflects spending up to 13% of nights out of a year at the home of their PLE, regular care is 14–34% of nights, while shared or majority care involves spending 35% or more of nights at the home of their PLE.

Information about parental relationships with a PLE was expanded by examining PLE household information, as provided by PLE respondents in Waves 4 and 5. This information was only used for households in which children had at least regular care provided by the PLE. It was nevertheless missing for a number of children, for whom parental information about the PLE household is recorded as unknown.

The data were analysed in several different ways, with results for each cohort presented separately:

- Relationships at the time of each wave are presented, for the full sample at each wave for whom there was valid relationship information. The wave-specific sample weights were used to take account of non-response that might affect some households more than others. In some parts of the chapter, population weights were used to derive estimates of the number of children from the LSAC cohorts living with certain types of family complexity.[6]
- The full five waves of data were used together, for those with valid relationship data across five waves, to undertake some longitudinal analysis. This was done in three different ways:
  - The across-wave data were aggregated to present how many of the five waves of children were living within each of the different household structures. The longitudinal survey weights were used.
  - Information about household relationships at each wave, for each child, was put together to identify children's *sequences* of these relationships across waves. The different patterns of such sequences, across all children in each cohort, were identified and presented in *sequence index plots* (Brzinsky-Fay, Kohler, & Luniak, 2006). These plots are useful for identifying the different pathways children take, as (or if) their parents' relationships change over a number of years, or if there are other changes in household structure. For example, one child might be recorded as living with two biological parents at Waves 1 and 2, with a single parent at Waves 3 and 4 (following the parents' separation) and at Wave 5 be living in another two-parent family, including a non-biological parent (following the re-partnering of the single parent). All possible pathways, such as these, are presented through these analyses. These analyses were unweighted, as they were used to portray the experiences of children at the individual level.
  - Transitions in household relationship categories across consecutive waves of LSAC were examined, to be able to see how stable relationships were across two waves, and for those with unstable patterns, to be able to describe the likely transitions. For these analyses, the longitudinal survey weights were used.

person was coded to be "Parent 2" depended on whether the LSAC respondent reported to the interviewer that this person had a parental role. If he was said to have a parental role, then he was classified as Parent 2 and the child was subsequently classified as living with two parents. If he was instead reported to be without parental responsibilities to the child, then he was not counted as "Parent 2", and the child was subsequently classified as living with a single parent and a co-resident adult. In the vast majority of cases, this other adult was classified as Parent 2. (Remembering also that *temporary* household members, including de facto partners, are not included in any of the estimates shown here.)

[5] At the time of writing, these categories aligned with those used in the calculation of child support payments, as reported by the Department of Human Services (<www.humanservices.gov.au/customer/enablers/child-support/child-support-assessment/working-out-child-support-using-the-basic-formula#care-cost-table>). The number of nights/year was derived from information provided on how often the child stays with their PLE, and how many nights the child stays overnight at these times. See also, footnote 2 concerning children who are classified as "primary care" by their PLE. In Wave 3, a large number of parents of children with a PLE opted out of providing information about the PLE, including frequency of contact with child. Where possible, to avoid the loss of sample, this missing Wave 3 data was estimated, by making an assumption that it was equal to the highest of the care groups identified at Wave 2 or Wave 4. Information was estimated in this way for 102 households in the B cohort and 130 households in the K cohort.

[6] Excluding children in remote parts of Australia that were not included in the LSAC sample design.

Longitudinal analyses were not undertaken for the analyses of children's living arrangements in the PLE household, given the relatively small sample size and very diverse arrangements observed in these households.

Statistical tests were not used to compare across groups, nor were confidence intervals calculated. However, where relative standard errors (RSEs) of presented statistics were greater than 25%, the estimates have been flagged.

3.3 Parental relationships

Parental relationships in the child's primary household—cross-sectional findings

The analysis of household relationships commences by focusing on parental relationships to children. This first subsection—the single household perspective—looks only at children's relationships to parents or parent figures living in the child's primary household. For most children, their primary household will be their only household, but children who have a parent living elsewhere may spend some time in that parent's household. This will be examined later in this section (see page 52).

To report on children's living arrangements, typically children are described as living with two parents or a single parent, as is shown in Table 3.1. This information shows that the majority of children lived in households with two parents, although the proportion in this category declined as children grew and became more likely to live with single parents, reflecting the cumulative effects of relationship breakdown among parents.

The simplicity of this classification makes the description of changing household structures somewhat easy, but it conceals the diversity within these different households that are explored throughout this chapter. The main areas of diversity focused on with regard to parental relationships are:

- two-parent households that may include one or more parents who are not the biological parent of the child; and
- as noted above, children living with two parents or a single parent in their primary household who may also have a parent living elsewhere.

There may also be other adults living in the household who are not considered to be parents of the study child. This is explored in section 3.4.

Table 3.1: Simple classification of parent–child relationships in child's primary household, child age and cohort

Child's parents or parent figures in child's primary household	0–1 year (%)	2–3 years (%)	4–5 years (%)	6–7 years (%)	8–9 years (%)	10–11 years (%)	12–13 years (%)
B cohort							
Two parents/ parent figures	89.5	86.7	85.8	84.0	84.0		
Single parent/ parent figure	10.5	13.3	14.2	16.0	16.0		
Total	100.0	100.0	100.0	100.0	100.0		
No. of observations	5,107	4,606	4,386	4,242	4,077		
K cohort							
Two parents/ parent figures			85.0	83.2	83.1	81.0	81.8
Single parent/ parent figure			15.0	16.8	16.9	19.0	18.2
Total			100.0	100.0	100.0	100.0	100.0
No. of observations			4,983	4,464	4,331	4,163	3,951

Notes: "Two parents" includes households with two parents or parent figures, including those both with two biological parents and those with either or both being non-biological but nevertheless identified as parents to the study child. This includes step-parents, adoptive parents, foster parents, grandparents, other relatives and unrelated adults. See Table 3.2. One-parent households may also include other adults who are not said to be a "parent" to the study child.

Table 3.2 shows an expanded classification of parent–child relationships (within the primary household). This table specifically shows information about how the parents or parent figures are related to the LSAC child. This information updates and extends that provided in an earlier analysis of these LSAC data by Maguire (2011).

Table 3.2: Expanded classification of parent–child relationships in child's primary household, child age and cohort

Details of child's parents or parent figures in child's primary household	0–1 year (%)	2–3 years (%)	4–5 years (%)	6–7 years (%)	8–9 years (%)	10–11 years (%)	12–13 years (%)
B cohort							
Two parents/parent figures							
Two biological parents	88.9	85.7	82.3	78.5	76.5		
One biological, one other parent	0.4#	0.9	3.3	5.4	7.2		
Step-parent is other parent	0.1#	0.5	2.1	3.2	4.7		
Unrelated adult is other "parent"	0.2#	0.2#	0.9	1.5	2.1		
Relative is other "parent"	0.0#	0.1#	0.3#	0.5#	0.3#		
Two non-biological parent figures	0.2#	0.2#	0.2#	0.3#	0.3#		
Single parent/parent figure							
One biological parent	10.4	13.1	14.0	15.8	15.9		
One non-biological parent	0.1#	0.1#	0.3#	–	0.1#		
Total	100.0	100.0	100.0	100.0	100.0		
No. of observations	5,107	4,606	4,386	4,240	4,077		
K cohort							
Two parents/parent figures							
Two biological parents			81.7	79.0	75.2	72.2	72.1
One biological, one other parent			2.9	3.7	7.5	8.7	9.3
Step-parent is other parent			2.3	2.9	4.5	5.2	6.7
Unrelated adult is other "parent"			0.5	0.6	2.5	3.0	2.0
Relative is other "parent"			0.1#	0.2#	0.5#	0.5#	0.5#
Two non-biological parent figures			0.4	0.5	0.4#	0.5#	0.4#
Single parent/parent figure							
One biological parent			14.8	16.6	16.7	18.3	17.9
One non-biological parent			0.2#	0.2#	0.2#	0.3#	0.2#
Total			100.0	100.0	100.0	100.0	100.0
No. of observations			4,983	4,464	4,331	4,151	3,951

Notes: # Relative Standard Error > 25%. Percentages may not total exactly 100.0% due to rounding.

- In their primary household, the vast majority of children lived with both their biological parents (i.e., a mother and a father), although this declined from 89% of children at age 0–1 year to 72% of children at age 12–13 years.
- As children grew, the likelihood that this primary household included one biological parent plus one other parent or parent figure progressively increased.
  - This non-biological parent figure was usually identified as step-parent to the study child.
  - In some households, there was a biological parent and an unrelated adult. This "unrelated adult" was usually the cohabiting (rather than married) partner to the biological parent (83% of cases).
  - In an even smaller percentage of households, the non-biological parent was related to the child, most often being the child's grandparent.
- A very small percentage of children lived with two non-biological parents (less than 1% of children at each wave, within each cohort). This was similarly true of children living with only one non-biological parent. These households included those headed by adoptive parents, grandparents or other relatives, and foster parents.

- Most commonly, children's primary households included two biological parents. The next most common household structure within the primary household, in terms of the parental relationships identified in Table 3.2, was that of children living with a single (biological) parent. At age 0–1 year, 10% of children lived with one biological parent, and this increased as children grew, with 18% of the oldest children (the K cohort at 12–13 years) living with one biological parent.

There were some gendered patterns that were masked within the classifications used in Table 3.2.

- Most of the single parents in these LSAC data were single mothers. Combining the single parents across cohorts and waves, 97% were single mothers and 3% single fathers. Note that this predominance of single mothers to some extent reflects the LSAC study design, that means children are often enumerated in the household of their mother, even if they spend more of their time in their father's household (see footnote 2). These percentages therefore are not indicative of the gender balance of single parents in the population. For example, according to the Australian Bureau of Statistics (ABS) 2012–13 Family Characteristics Survey, of all children aged less than 15 years living with a single parent, 87% lived with a single mother and 13% with a single father.[7]
- Across the pooled data across waves and cohorts, of all the households comprising a biological parent and another parent figure, in 93% of cases, the child lived with their biological mother and another adult.

In section 3.4, the co-residence of adults other than those with a parental role is considered. This includes some grandparent co-residents, for example, as well as cohabiting partners who were reported by LSAC respondents to have no parental role with respect to the LSAC child (see footnote 4).

Parental relationships in the child's primary household—longitudinal findings

Table 3.2 showed that the majority of children, at each wave of LSAC, lived with two biological parents, but as children grew, they were more likely to live with a step-parent or with a single parent. The five waves of LSAC are now used to examine the stability of these parental relationships within the primary household. To do this, the relationships are classified broadly into that of living with two biological parents, living with "other two parents" (including one biological and one other parent or two non-biological parents) and living with a single parent (whether biological parent or not). The analyses are based on those children for whom there was valid parental relationship information across all five waves.

Table 3.3 (on page 48) shows that 93% of the B cohort children and 85% of the K cohort children were living with two biological parents in their primary household for at least one wave of LSAC. In fact, 73% of the B cohort and 69% of the K cohort had two co-residing biological parents at each of the five waves of LSAC. Consistent with Table 3.2, smaller percentages had spent any time (across waves) with "other two-parents", with very few spending four or five out of the five waves in this household form. Living at some time with a single parent was common (25% in the B cohort and 28% in the K cohort having lived with a single parent for at least one of the five waves). However, those who lived with a single parent at one or more waves were quite diverse, some having spent all five waves living with one parent, but more having done so for fewer waves.

As shown in Table 3.3, the majority of children in LSAC lived with both biological parents at all five waves. For all other children, Figure 3.1 (page 48) provides a visual representation of the different parental relationship sequences experienced across the waves of LSAC. The figure shows all sequences of parental relationship that occurred within the LSAC sample, focusing on children in all five waves, excluding those children who lived with two biological parents at each wave. The transition from living with two biological parents into other household structures is apparent in this figure, with children having often transitioned first to living with a single parent and then to living with "other two parents", which generally comprises a biological parent plus one other adult, such as a step-parent.

[7] Derived from Table 7. Retrieved from <www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4442.02012-13?OpenDocument>.

Of the 3,753 B-cohort children present for all waves, at some time across the five waves:

- 496 children (13%) changed from living with two biological parents to living with a single parent; and
- 179 (5%) changed from living with a single parent to living with two parents where one or both were not the biological parent.

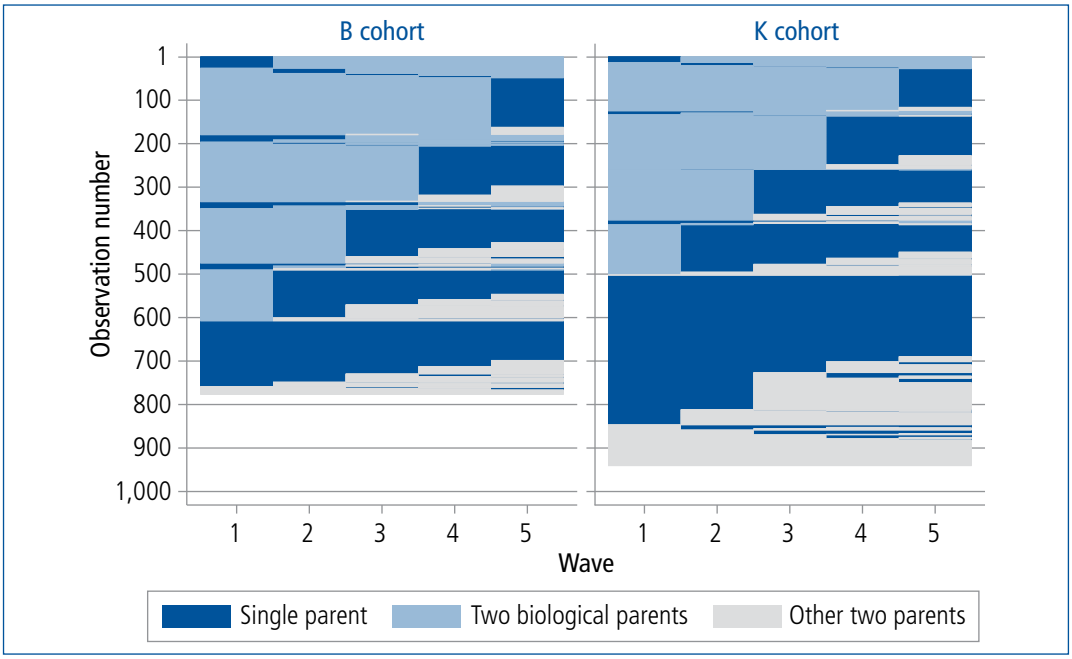
For the 3,689 K-cohort children in all waves, at some time across the five waves:

- 439 (12%) changed from living with two biological parents to living with a single parent; and
- 267 (7%) changed from living with a single parent to living with two parents where one or both were not the biological parent.

Table 3.3: Parent–child relationships (single household) in the primary household across five waves of LSAC, child age and cohort

Child's parents or parent figures in child's primary household	Number of waves with this parental relationship in the child's primary household							
		One or more waves—number of waves						
	No wave (%)	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Any (%)	Total (%)
B cohort								
Two biological parents	6.6	4.6	4.9	5.0	5.6	73.3	93.4	100.0
Other two parents	91.6	3.5	2.7	1.7	0.3#	0.1#	8.4	100.0
Single parents	75.1	7.4	5.8	5.1	3.0	3.6	24.9	100.0
K cohort								
Two biological parents	15.2	4.3	3.7	4.2	3.6	69.1	84.8	100.0
Other two parents	87.8	3.6	2.9	3.0	1.3	1.5	12.2	100.0
Single parents	72.1	6.1	6.7	4.9	3.5	6.7	27.9	100.0

Notes: These data are from households responding to all waves of LSAC. *N* = 3,753 for B cohort and 3,678 for K cohort. Single parents include single parent figures. # Relative Standard Error > 25%. Percentages may not total exactly 100.0% due to rounding.

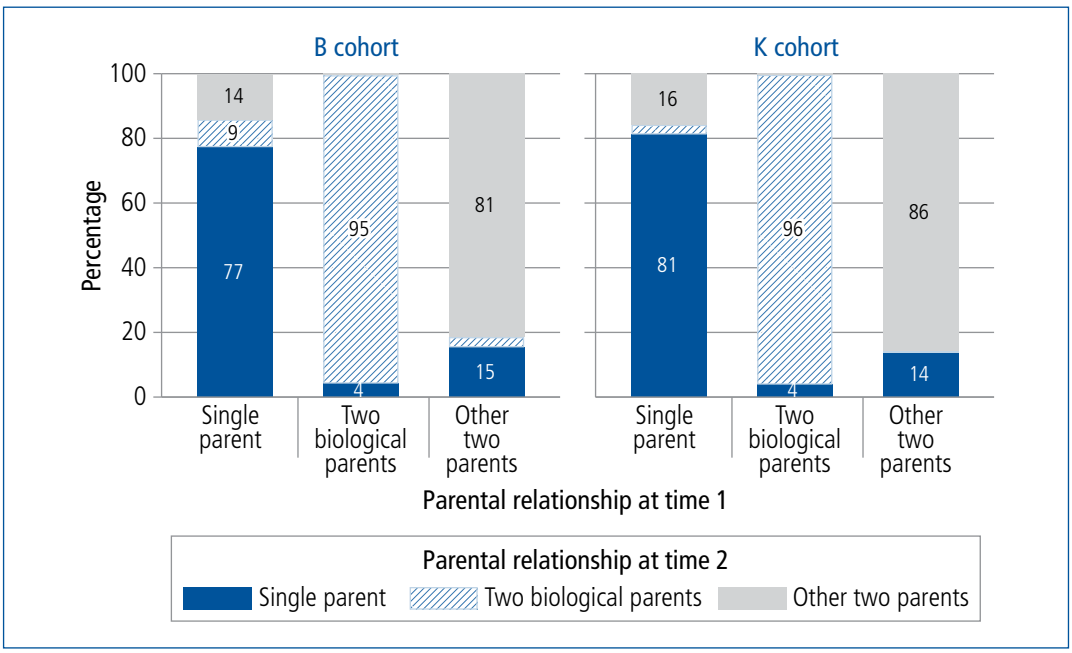


Notes: These data are not weighted, since they are based on the sequences of individual observations within the balanced panel (households responding to all waves of LSAC: *n* = 3,753 for B cohort and 3,678 for K cohort). The figure does not include children who lived with both biological parents at all five waves, leaving the transitions shown for the subsamples comprising *n* = 776 for B cohort and 940 for K cohort. "Other two parents" is predominantly biological parent plus one other adult, with the other adult most commonly being a step-parent (as seen in Table 3.2).

Figure 3.1: Selected sequences of parental relationships in the primary household across five waves of LSAC

Parental relationship transitions within the primary household can also be considered by exploring transitions between consecutive waves of LSAC, as shown in Figure 3.2. To do this, relationship at "time 2" is disaggregated for each relationship category at "time 1", covering transitions from Wave 1 to 2, Wave 2 to 3, Wave 3 to 4 and Wave 4 to 5. All these transitions are pooled in Figure 3.2. Findings were similar for each cohort:

- Usually children remained living in households with parents whose relationship category did not change across two waves, and this was most apparent for children living with two biological parents, for whom 95–96% of those living with two biological parents at one wave were still living with those parents at the subsequent wave. For the minority of children whose family relationships changed, almost all were living with a single parent at the subsequent wave.
- There was also considerable stability for those living in an "other two parent family", with 81–86% of those in this household form in one wave, being so again in the subsequent wave.
- Even among children living with a single parent at one wave, 77–81% were living with a single parent at the next wave. In the B cohort there was some evidence of families newly forming or re-forming across waves, as 9% of children who had been living with a single parent were living with two biological parents at the subsequent wave. This was less common for the older (K cohort) children. For both cohorts, 14–16% had transitioned to another two-parent family, which generally reflected the single parent having a new partner.



Notes: These data are from households responding to all waves of LSAC (n = 3,753 for B cohort and 3,678 for K cohort), but each cross-wave transition counted separately, giving a final n = 15,012 for the B cohort and n = 14,712 for the K cohort for this figure. "Other two parents" is predominantly biological parent plus one other adult, with the other adult most commonly being a step-parent (as seen in Table 3.2).

Figure 3.2: Parental relationship transitions within the primary household, by cohort

Children with parents in two households

The above analysis focused only on the child's primary household, which for this analysis is the household in which they are enumerated for the main interview of LSAC. This single household perspective provides a somewhat simplistic view of children's living arrangements for those who also have a parent living elsewhere (PLE), in another household, with whom they live some of the time.

This section starts by exploring to what extent children stay some nights during the year with a PLE. This is commonly used to classify children's care arrangements, as it is relevant in considering child support eligibility (see footnote 5), although it clearly does not provide a full picture of the

possible diversity of experiences among children in their involvement with their PLE. The number of nights children stay with their other parent (as reported by Parent 1 in the primary household) was used to classify applicable children's care arrangements as being "below regular care" (0–51 nights per year with a PLE), "regular care" (52–127 nights per year with a PLE) and "shared or majority care" (128 or more nights per year with a PLE).[8] These groups are shown by cohort and wave for children with a PLE in Table 3.4. Children without a PLE are also shown in the table, according to whether they live in a two-parent or one-parent family. For this section, the question of whether children with a PLE live in a single- or two-parent family in either household is set aside. This is explored in the next subsection.

Table 3.4: Parent–child relationships in the primary household plus care arrangements with parent living elsewhere, child age and cohort

Children's parents or parent figures in the primary household and PLE care arrangements	0–1 year (%)	2–3 years (%)	4–5 years (%)	6–7 years (%)	8–9 years (%)	10–11 years (%)	12–13 years (%)
B cohort							
Two biological parents only (no PLE)	88.9	85.7	82.8	78.4	76.5		
One biological parent only (no PLE)	0.3 #	0.7	0.8	1.0	0.9		
Other, no PLE	0.2 #	0.3 #	0.4 #	0.7	0.6		
One or two parents, child has PLE	10.7	13.4	16.0	19.9	22.0		
PLE care = below regular care	9.2	9.5	10.0	11.8	12.1		
PLE care = regular care	1.0	3.1	5.1	6.5	7.0		
PLE care = shared or majority care	0.2 #	0.6	0.8	1.6	3.0		
Total	100.0	100.0	100.0	100.0	100.0		
No. of observations	5,107	4,606	4,386	4,242	4,077		
K cohort							
Two biological parents only (no PLE)			81.7	79.0	75.8	71.9	72.1
One biological parent only (no PLE)			0.5	1.6	1.5	1.7	1.8
Other, no PLE			0.5	0.7	0.9	1.3	1.2
One or two parents, child has PLE			17.3	18.8	21.8	25.1	25.0
PLE care = below regular care			11.0	10.9	12.6	14.9	15.0
PLE care = regular care			5.3	6.4	7.0	7.6	7.5
PLE care = shared or majority care			0.8	1.3	1.9	2.6	2.5
Total			100.0	100.0	100.0	100.0	100.0
No. of observations			4,983	4,464	4,331	4,163	3,951

Notes: "Other, no PLE" is predominantly two-parent families including a non-biological parent, but includes a small number of single parents who are not biological parents. # Relative Standard Error > 25%. For a small number of children with a PLE, care arrangement information was missing (not shown in table). Percentages may not total exactly 100.0% due to rounding.

Before examining these data, it is worth noting how the PLEs are related to the study child. Across the waves, within each cohort, 99% of PLEs were biological parents, the remainder being step-parents, foster parents, grandparents and others. Most PLEs were biological fathers (overall, 95% were biological fathers and 6% were biological mothers). However, as children grew, it became more common for the PLE to be the biological mother (and for the child to be living with the biological father in the LSAC primary household). Within the B cohort, at age 0–1 year 2% of PLEs were biological mothers and by 8–9 years this had increased to 6%. Within the K cohort, at 4–5 years 5% of PLEs were biological mothers and this had increased to 10% of PLEs at 12–13 years. (See also footnote 2.)

Looking now at Table 3.4, in the B cohort, the percentage of children with a PLE increased from 11% of 0–1 year olds to 22% of 8–9 year olds. Similarly, in the K cohort, the percentage increased from 17% of 4–5 year olds to 25% of 12–13 year olds.

[8] See footnote 5 for information about this classification and footnote 2 for information concerning children potentially changing primary household across waves, and about those classified as "shared or majority care" by the PLE.

At each wave, for both cohorts, it was most common for children with a PLE to have a care arrangement classified as "below regular care", which includes those children with no contact with a PLE, who only see this parent during the day-time or who stay overnight with them less frequently than approximately once a week. For the 0–1 year old children, this represented 9% of all children. For the 12–13 year olds, it represented 15% of all children. The percentages in "regular care" were low at the youngest ages (1% of children aged 0–1 year), increasing to between 7 and 8% from ages 8–9 years through to 12–13 years. The lowest percentage of children was in shared or majority care, which was the situation for 2.5% of the 12–13 year olds.

The percentages with different care arrangements are small, given that the majority of children live with both biological parents. However, when these data are used to estimate the number of children across Australia with these different care arrangements, the numbers are nevertheless significant, as is shown in Table 3.5. For example, of children born between March 1999 and February 2000, an estimated 6,600 children at 10–11 years and 6,300 children at 12–13 years spent significant amounts of time with each of their parents, having a care arrangement classified as shared or majority care.

These estimates show that just as the number and percentage of children with a PLE is progressively higher at each child age (except for between 10–11 and 12–13 years), there are generally increases in each of the different care arrangements.

Table 3.5: Estimated numbers of children with a parent living elsewhere, care arrangements with that parent, child age [a] and cohort (thousands)

Children's care arrangements with a PLE [b]	0–1 year ('000)	2–3 years ('000)	4–5 years ('000)	6–7 years ('000)	8–9 years ('000)	10–11 years ('000)	12–13 years ('000)
B cohort							
Child has PLE	25.9	32.5	37.2	48.3	53.5		
PLE care = below regular care	22.4	23.1	23.3	28.6	29.3		
PLE care = regular care	2.5	7.6	11.9	15.8	16.9		
PLE care = shared or majority care	0.6 #	1.4	1.8	4.0	7.3		
No. of observations	488	513	576	672	778		
K cohort							
Child has PLE			43.7	47.5	53.1	63.4	63.2
PLE care = below regular care			27.8	27.6	30.7	37.7	37.9
PLE care = regular care			13.5	16.3	17.1	19.2	19.0
PLE care = shared or majority care			2.1	3.2	4.5	6.6	6.3
No. of observations			804	748	832	883	919

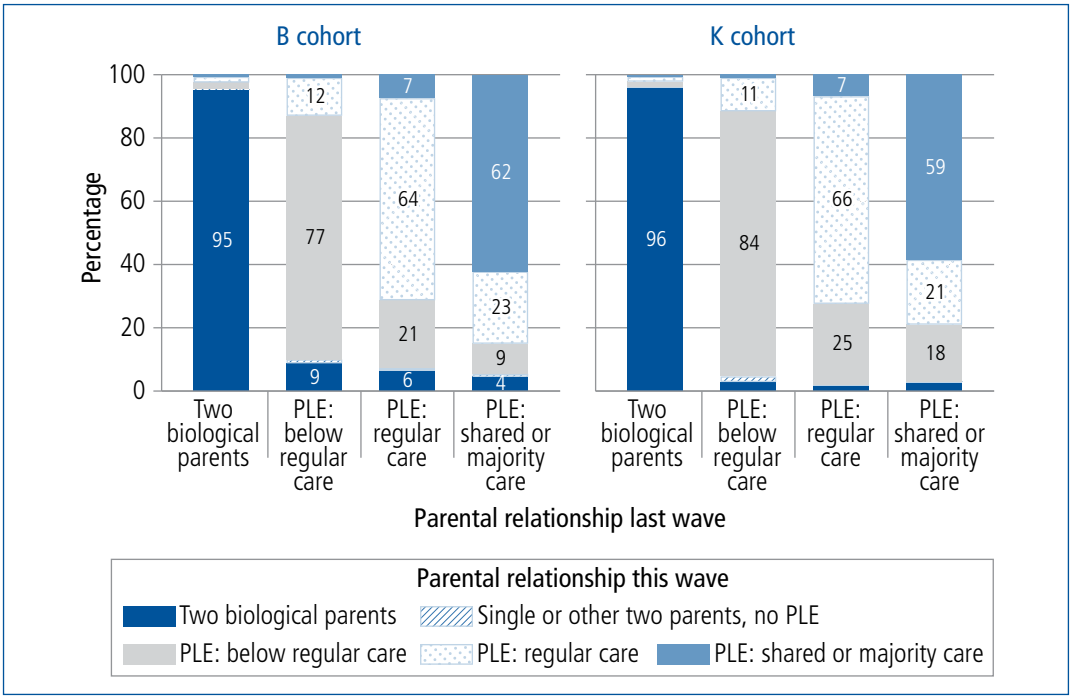
Notes: [a] Estimates refer to children born within a one-year time frame, excluding children in remote areas of Australia. For the B cohort, the time frame is between March 2003 and February 2004 and for the K cohort it is between March 1999 and February 2000. Given these time frames, the exact age of children at each survey spanned two possible years of age. [b] Care arrangements were unknown for a small number of observations (n = 50 across cohorts and waves). They were excluded in Table 3.4, but have been included in the total estimate of children with PLE here. # Relative Standard Error > 25%. For a small number of children with a PLE, care arrangement information was missing (not shown in table).

If we analyse children's care arrangements across waves of LSAC, after the cross-wave sequence of remaining with two biological parents (87% of children experienced this at some time), the next most common sequence as captured with this variable is that of remaining with below-regular contact with a PLE (11% of children experienced this at some time). Beyond this, there was much diversity in children's experiences of changing care arrangements, and so we have not explored these patterns using sequence plots. We focus instead on analysing children's possible transitions across waves (Wave 1 to 2, 2 to 3, 3 to 4, or 4 to 5), shown in Figure 3.3 (page 52). The transitions are shown as children's care arrangements at one wave ("time 2"), according to their care arrangements the previous wave ("time 1").

Of particular interest is what children's care arrangements are like when they transition from a two-parent biological family to having a PLE; that is, soon after a parental relationship separation. In both the B and K cohorts, among those living with two parents at one wave, approximately 5% were not living with two parents at the next wave. The care arrangements these children entered

were diverse, but similar percentages transitioned into "below regular care" and "regular care" (just under 2% of those previously in a two-parent family went into each of these, within each cohort), with smaller percentages transitioning into "shared or majority care".

For children with a PLE at one wave of LSAC, 74% still had a PLE at the following wave and had not changed their care arrangements. As seen in Figure 3.3, children in below regular care by their PLE were especially likely to be in that same category two years later (77% for the B cohort and 84% for the K cohort). This figure shows that among those who continued to have a PLE across waves, but had changes in care arrangements, those changes were varied with some involving children reducing their time with their PLE from one wave to the next and some increasing their time with their PLE.



Notes: These data are from households with valid relationship and care data at all waves, with each cross-wave transition counted separately (n = 14,960 for the B cohort, n = 14,656 for the K cohort). PLE = parent living elsewhere. Transitions from "single or other two parent, no PLE" are not shown as they occur only for a small number of households.

Figure 3.3: Parental relationship and care transitions across five waves of LSAC

Children's living arrangements when they have parents in two households

Children's care arrangements with a PLE were explored above to begin the expansion of the description of children's household forms, to take account of both parents' households. This is extended in this subsection, only for those children who have at least regular care by a PLE. This focus is partly because children who spend little (or no) time with a PLE are not very much or at all exposed to that parents' household, so the PLE household composition is less relevant as a descriptor of children's usual living arrangements. Also, a focus on children who have at least regular care by a PLE is necessary for pragmatic reasons, as (using LSAC) we know little about the characteristics of the household of PLEs when the child has little contact with them. It is important to acknowledge, though, that these analyses have a limitation in that children's involvement with their PLE (and exposure to that household) may not always be reflected in the number of overnight stays, which is the basis of the categories of care used here.

This information is sourced from the PLE respondent in LSAC, using information about the PLE's household that has been collected in LSAC from Wave 4.[9] PLE households are classified here as single parent, two parent or relationship unknown. The latter category refers to households for whom the PLE was not a respondent to LSAC.

Table 3.6 puts together information about the child's primary household as well as the PLE household if children have at least regular care by the PLE, focusing on households in which children have a PLE. Population estimates are provided as well as percentages, which are calculated over the total of households in which children have a PLE.

Table 3.6: Children with a PLE: Parent–child relationships in the primary household and PLE household, Waves 4 and 5, cohort [a] and child age (population estimates and percentages)

Children's parents in primary household and in PLE household	B cohort at 6–7 years	B cohort at 8–9 years	K cohort at 10–11 years	K cohort at 12–13 years
		Population estimates ('000)		
Two parents plus PLE (below regular care)	7.4	10.0	11.7	13.2
One parent plus PLE (below regular care)	21.2	19.3	26.0	24.8
Two parents plus PLE (regular care or more)				
PLE single parent	2.0	2.8	2.7	3.2
PLE two parents	1.7	2.2	3.7	3.0
PLE relationship unknown	1.0*	1.8	1.7	2.4
One parent plus PLE (regular care or more)				
PLE single parent	8.6	9.0	10.1	7.7
PLE two parents	3.5	3.3	3.6	4.0
PLE relationship unknown	2.9	5.1	3.9	5.0
Estimated total children with a PLE	**48.3**	**53.5**	**63.4**	**63.2**
		Percentages (as % of children with PLE)		
Two parents plus PLE (below regular care)	15.3	18.7	18.7	20.8
One parent plus PLE (below regular care)	43.9	36.1	41.0	39.2
Two parents plus PLE (regular care or more)				
PLE single parent	4.2	5.3	4.2	5.0
PLE two parents	3.5	4.0	5.9	4.7
PLE relationship unknown	2.1#	3.4	2.7	3.9
One parent plus PLE (regular care or more)				
PLE single parent	17.8	16.7	15.9	12.2
PLE two parents	7.2	6.2	5.7	6.3
PLE relationship unknown	6.1	9.5	6.1	7.9
Total with PLE	**100.0**	**100.0**	**100.0**	**100.0**
No. of observations	**672**	**778**	**883**	**919**

Notes: Children with a PLE with missing information about contact are included with those in "below regular care". # Relative Standard Error > 25%. Percentages may not total 100.0% exactly due to rounding. [a] For the B cohort, the estimated number of children refers to those born between March 2003 and February 2004 and for the K cohort refers to those born between March 1999 and February 2000, excluding children in remote areas of Australia.

Looking at the percentages, after the categories of children who have below regular care by a PLE, the next most common one is of children living with a single parent in their primary household, and having a PLE who is also a single parent. Children at all ages were represented by a range of situations in these data. No particularly strong patterns by child age emerged.

[9] This information is not available for all children with a PLE, as it was only collected when the PLE contact details were provided and the PLE participated in the study. For some earlier LSAC analyses of children's living arrangements in their PLE household, see Baxter et al. (2012).

Summary: Parental relationships

The majority of Australian children aged up to 12–13 years live with two biological parents, as was evident in the cross-sectional data, and also evident in the considerable stability of these relationships across waves of LSAC. As such, most LSAC children have only been classified as living with two biological parents across the five waves of LSAC.

However, the study captured children who were living in a single-parent household from Wave 1, as well as those children whose parents separated over the course of the study. Also, there were children living in households that comprised step-parents or other adults with a parental role to the children, such as grandparents. Overall, though, a very small minority of children at any of the waves of LSAC lived in a primary household that did not include at least one of their biological parents.

The analyses of parental relationship transitions showed stability in parental relationships, even within households that comprised a single parent or other two parents, although these living arrangements were more unstable than in households of two biological parents. Some changes that occurred for children with single parents involved the addition of a parent or parent figure to their primary household: either through their other biological parent coming to live (or return) to the household, or through a single parent beginning a new relationship.

For children with a parent living elsewhere, there is much diversity within LSAC in the nature of care arrangements with their parent living elsewhere. Further, care arrangements are often not stable, such that we observed changes across waves in children's patterns of care (as classified by the number of nights stayed with PLE). The population estimates for family relationships for children with a parent living elsewhere highlight that there are many thousands of children across Australia in varied and possibly quite complex across-household family relationships.

3.4 Other adults co-resident with the LSAC study child

In this section, information on the co-residence of adults other than parents or parent figures is presented, to provide some more insights on the potential complexity in children's lives. The section primarily examines these relationships in children's primary household, but we discuss the PLE households at the conclusion of the section. We identify these co-resident adults in terms of whether they were a grandparent, another related adult (not counting siblings) or an unrelated adult. Note that if an unrelated adult was a boyfriend or partner to the primary carer, in most cases this person was reported to be "Parent 2" by the primary carer, and we have not included them in estimates of unrelated adults here. That is, most of the unrelated adults are boarders or have some other unspecified relationship with others in the household.

Table 3.7 (page 55) shows the percentage of children with co-resident adults who are not parent figures. Overall, across the cohorts and waves, around 8–10% of children had a non-parental adult in their household. The co-presence of other adults does not appear to be very strongly linked with ages of children, although there is some indication of grandparents and other relatives being more often co-resident for the youngest children.

The co-presence of other adults varied considerably according to whether children were living with a single parent or two parents in their primary household, as shown in Table 3.8 (page 55), with co-resident adults much more likely for children residing with a single parent, especially at the youngest ages of LSAC children. For 0–1 year olds with a single parent, 37% had a co-resident other adult, which included 24% living with a grandparent and 20% another adult relative. (Some lived in households with grandparents as well as other adult relatives.) Another 7% of these single-parent households included an unrelated adult. Within single-parent households, children were less likely to have co-resident adults (especially grandparents or other relatives) beyond the youngest ages.

Table 3.7: Percentage with non-parental co-resident adults in primary household, by child age and cohort

Cohort and non-parental co-resident adults	0–1 year (%)	2–3 years (%)	4–5 years (%)	6–7 years (%)	8–9 years (%)	10–11 years (%)	12–13 years (%)
B cohort							
With co-resident adults present (not in a parental role)	10.2	9.8	8.3	8.8	7.8		
Grandparent	6.5	5.9	4.8	4.6	4.3		
Other relative (not sibling)	4.8	4.1	3.0	3.5	2.7		
Unrelated adult	1.8	1.8	1.3	1.9	1.8		
No. of observations	5,107	4,606	4,252	4,241	4,075		
K cohort							
With co-resident adults present (not in a parental role)			7.5	9.3	8.4	8.5	8.3
Grandparent			4.1	4.5	5.0	4.3	4.5
Other relative (not sibling)			3.2	3.0	2.8	2.7	2.2
Unrelated adult			1.2	2.8	1.5	2.0	2.2
No. of observations			4,983	4,464	4,196	4,159	3,946

Note: See Table 3.10 for sibling relationships.

Table 3.8: Percentage with non-parental co-resident adults within different household forms, by child age and cohort

Cohort and non-parental co-resident other adults, by presence of parents in primary household	0–1 year (%)	2–3 years (%)	4–5 years (%)	6–7 years (%)	8–9 years (%)	10–11 years (%)	12–13 years (%)
B cohort							
Two parents	7.0	6.6	6.1	7.0	6.6		
Grandparent	4.5	4.2	3.7	3.8	3.5		
Other relative (not sibling)	3.0	2.6	2.0	3.0	2.4		
Unrelated adult	1.1	0.7	0.7	1.0	1.4		
Single parent	36.8	30.4	20.0	18.5	14.3		
Grandparent	23.7	16.9	11.5	9.3	8.3		
Other relative (not sibling)	20.1	14.3	9.5	6.2	4.3		
Unrelated adult	7.5	8.7	4.7	6.4	3.7		
No. of observations	5,107	4,606	4,252	4,241	4,075		
K cohort							
Two parents			5.8	6.4	7.2	7.2	7.5
Grandparent			3.4	4.0	4.2	3.7	3.8
Other relative (not sibling)			2.5	2.4	2.4	2.4	2.2
Unrelated adult			0.6	0.9	1.2	1.6	1.8
Single parent			17.2	23.8	15.4	14.0	12.0
Grandparent			8.0	7.0	9.2	6.7	7.4
Other relative (not sibling)			6.8	5.8	4.9	4.1	2.2*
Unrelated adult			5.0	12.5	3.0	4.0	3.7
No. of observations			4,983	4,464	4,196	4,159	3,946

Notes: See Table 3.10 for sibling relationships.

Within two-parent households, the percentage that included non-parental co-resident adults is between 6 and 7%, with grandparents being the most common co-resident. There were no strong patterns by age of child.

Using the longitudinal data, Table 3.9 shows that about 22% of the B-cohort and the K-cohort children had a non-parental other adult living with them for at least one of the waves of LSAC. This was most often a grandparent, followed by another relative, and then an unrelated adult. It was most common, in each case, for children to have had this other adult co-resident for only one of the LSAC waves, and rare for them to have been present for all five waves.

Table 3.9: Presence of non-parental co-resident adults in the primary household across five waves of LSAC, by cohort

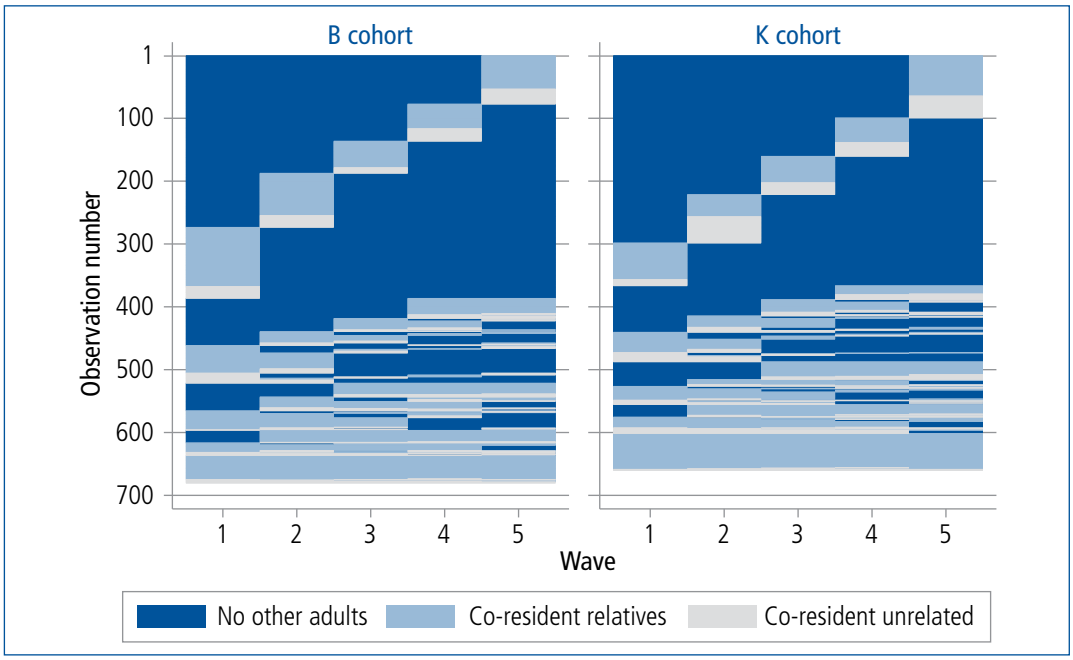
Cohort and non-parental co-resident adults in the primary household	Number of waves had other adults present						
		One or more waves					
	None (%)	1 (%)	2 (%)	3–4 (%)	5 (%)	Any (%)	Total (%)
B cohort							
Grandparent (total)	86.7	7.3	2.4	2.5	1.1	13.3	100.0
Other relative (not sibling) (total)	89.4	7.0	2.0	1.2	0.4#	10.6	100.0
Unrelated adult (total)	93.9	4.6	0.9	0.6*	0.1#	6.1	100.0
Any of the above	77.2	12.3	4.6	4.3	1.6	22.8	100.0
K cohort							
Grandparent (total)	89.7	5.3	1.4	2.1	1.6	10.3	100.0
Other relative (not sibling) (total)	92.0	5.2	1.4	0.9	0.4#	8.0	100.0
Unrelated adult (total)	92.7	5.5	1.2	0.5#	0.0#	7.3	100.0
Any of the above	78.4	11.9	4.1	3.7	1.9	21.6	100.0

Notes: These data are from households responding to all waves of LSAC. *N* = 3,753 for the B cohort and 3,678 for the K cohort.
Relative Standard Error > 25%.

This is also illustrated in Figure 3.4 (page 57), which shows all sequences within the LSAC data of children's experiences of having non-parental adults present in the household. Grandparents are combined with other relatives in these analyses. In this figure, children who lived only with parents (or parent figures) across all five waves are not shown. More than half of the sequences shown involve children experiencing only one wave of a non-parental co-resident adult, who was more likely to be a relative than an unrelated adult. This seems to occur at any of the five waves, although in the B cohort a higher percentage had a co-resident adult (especially grandparent or other relative) present only in Wave 1 or in Wave 2, consistent with the percentages being higher for the co-residence of these other adults at these waves. There were also many children with more diverse situations, especially those represented toward the bottom of the figure, in which children spent more of the five waves with another co-resident adult.

Children who live part of the time with a PLE may also be exposed to other co-resident adults in those households. Analyses of PLE households for children in at least regular care (in Waves 4 and 5, with PLE respondents) revealed percentages with co-resident adults in a similar range to those living with single parents within the primary household. For example, for the B cohort, 19% at Wave 4 and at Wave 5 had a non-parental co-resident adult (such as a grandparent) present in the PLE household. For the K cohort, 17% at Wave 4 and 11% at Wave 5 had a non-parental co-resident adult present in the PLE household. The comparable figures for this same population within the primary household were, for the B cohort, 15% at Wave 4 and 13% at Wave 5 and for the K cohort, 9% at Wave 4 and 5% at Wave 5. While sample sizes preclude detailed examination of these multiple relationships within and across households, they illustrate the high degree of multiple relationships that make up some children's lives.

To summarise, within the primary household, the majority of children did not experience the co-residence of adults other than their own parents. However, children (especially young children) living with single parents quite often were living in a household where another adult, particularly a grandparent or another adult relative, was also living.



Notes: These data are not weighted, since they show the sequences of individual observations from households with valid information about this classification on all waves of LSAC. Total *n* = 3,753 for the B cohort and 3,678 for the K cohort. This figure excludes those who had only parents/parent figures at all waves, and so is based on *n* = 679 for the B cohort and 658 for the K cohort.

Figure 3.4: Selected sequences of non-parental adult co-residence in the primary household across five waves of LSAC

These data on the co-presence of other adults highlight that families or households can encompass more than parents and siblings, although our focus on the co-residence of other adults only in numerical terms does not provide insights on what this actually means for the children. For some children and families, this co-presence may be particularly valuable, where it means improved financial circumstances or access to a broader social network. In particular, the co-residence of others for single parents with young children may be a strategy employed to get through a potentially challenging time for new mothers (see Chapter 2 of this volume). At other times, and perhaps indicated in these data by the more sporadic nature of co-residence, it may reflect a short-term situation, that nevertheless provides opportunities for the development of relationships between children and others. Of course, the transient nature of co-residence in some families may be challenging for children, if changes in co-residence are accompanied by changes in family routines, relationships and responsibilities, or if it creates risks in terms of parental capacity to supervise and monitor children.

Taking this further, it would be necessary to have more information about the reasons for co-presence, and also, to have information on whether the LSAC child and parent/s lived in their own home or in the home of the other adult. US research has shown that this is a key distinction in understanding the heterogeneity of families that include a co-resident adult (Dunifon et al., 2014). This information is not collected in LSAC, making it difficult to fully explore the nature of this form of household complexity.

3.5 Siblings and other co-resident children

The final aspect of household composition that is considered in this chapter is that of the co-presence of other children, exploring to what extent children live with others who are full siblings, step or half siblings, or other children. While normative, the presence of siblings in a household no doubt matters to the way in which families function (see Kowaleski-Jones & Dunifon, 2004). From the perspective of children, whether co-resident siblings are full siblings, or half- or step-siblings, adds another dimension to the complexity of their household (Gennetian, 2005).

This analysis is only presented for children's primary household. Information about siblings of all ages is included here, although initially shown separately for siblings who are younger than (or the

same age as) the study child and those who are older. Siblings are considered in terms of whether they are "full" siblings to the LSAC child, that is, both share the same biological mother and father; a "half" sibling (they share one of either the mother or the father); or a "step" sibling (they are not biologically related, but the parent of one is (or has in the past been) in a relationship with the parent of the other). A very small number of "other" siblings, who are those related to the LSAC child through adoption or fostering, are grouped with half- and step-siblings. They were too few in number to examine separately. Likewise, a very small proportion of children had other children aged less than 15 years in their household who were not siblings. For example, this includes co-resident cousins. Only 1–2% of children, across ages, had non-sibling children present, and these figures are not discussed throughout this chapter.

Table 3.10 shows that from about 4–5 years through to 12–13 years, almost nine out of ten children had a sibling in their household. The percentages were lower at 0–1 year (61%) and 2–3 years (80%), reflecting that some of these children were first-born children and yet to have siblings born into the family. In fact, children were most likely to gain new siblings when they were between these ages and then, to a lesser extent, between 2–3 and 4–5 years, as indicated by changes in the percentage with young siblings. Beyond 4–5 years, children without younger siblings often remained with no younger siblings at older ages.

Just less than 60% of children had at least one older sibling in the home, across almost all the ages of children shown here. This percentage declined at older ages of children, with 56% of children at 10–11 and 53% at 12–13 having older siblings in the home. No doubt this reflects some children's older siblings leaving home.

Most siblings of LSAC children were full siblings, rather than half- or step-siblings, and the variation by child age in the percentage with siblings largely represented variation in the percentage with full

Table 3.10: Children's younger and older siblings in the primary household, child age and cohort

Cohort and presence of siblings in the primary household	0–1 year (%)	2–3 years (%)	4–5 years (%)	6–7 years (%)	8–9 years (%)	10–11 years (%)	12–13 years (%)
B cohort							
Siblings of any age							
Has siblings of any age	60.9	80.1	88.6	90.5	91.0		
Full siblings	54.6	76.0	84.1	86.1	86.3		
Half- or step-siblings	10.0	9.7	10.7	10.8	10.5		
Half-siblings	9.8	9.4	10.2	10.2	9.3		
Step-siblings	0.1#	0.1#	0.4#	0.7	1.6		
No siblings of any age	39.1	19.9	11.4	9.5	9.0		
Younger siblings (or same age)							
Has younger/same age siblings	3.5	34.1	49.9	54.2	56.7		
Full siblings	3.5	33.7	48.0	51.9	53.2		
Half- or step-siblings	0.0#	0.4	2.3	3.2	4.5		
Half-siblings		0.3	2.1	2.9	3.9		
Step-siblings			0.1#	0.3	0.6		
No younger/same age siblings	96.5	65.9	50.1	45.8	43.3		
Older siblings							
Has older siblings	59.1	59.1	58.3	57.9	56.6		
Full siblings	52.6	52.9	52.6	52.4	51.9		
Half- or step-siblings	10.0	9.4	8.8	8.2	6.7		
Half-siblings	9.8	9.1	8.4	7.6	5.8		
Step-siblings	0.1	0.1	0.3	0.5	1.0		
No older siblings	40.9	40.9	41.7	42.1	43.4		
Other children aged under 15 years	1.8	1.5	1.0	1.4	1.1		
No. of observations	5,107	4,606	4,253	4,242	4,077		

continued on p. 59

continued from p. 58

Table 3.10: Children's younger and older siblings in the primary household, child age and cohort

Cohort and presence of siblings in the primary household	0–1 year (%)	2–3 years (%)	4–5 years (%)	6–7 years (%)	8–9 years (%)	10–11 years (%)	12–13 years (%)
K cohort							
Siblings of any age							
Has siblings of any age			88.5	90.4	91.4	91.4	90.2
Full siblings			83.6	85.8	86.3	86.3	85.9
Half- or step-siblings			11.6	11.4	12.4	12.2	10.7
Half-siblings			11.2	10.8	11.4	10.7	8.9
Step-siblings			0.2 #	0.5	0.9	1.5	2.0
No siblings of any age			11.5	9.6	8.6	8.6	9.8
Younger siblings (or same age)							
Has younger/same age siblings			48.4	53.0	55.2	56.9	57.7
Full siblings			46.6	50.6	51.7	53.1	54.3
Half- or step-siblings			2.0	2.9	4.6	5.6	5.9
Half-siblings			1.9	2.7	4.2	5.0	5.0
Step-siblings			0.1 #	0.3	0.5	0.7	1.0
No younger/same age siblings			51.6	47.0	44.8	43.1	42.3
Older siblings							
Has older siblings			58.7	58.1	57.5	55.9	53.0
Full siblings			51.9	52.1	51.7	50.8	48.9
Half- or step-siblings			9.9	9.0	8.4	7.1	5.3
Half-siblings			9.5	8.4	7.5	6.0	4.0
Step-siblings			0.1	0.3	0.6	0.9	1.2
No older siblings			41.3	41.9	42.5	44.1	47.0
Other children under 15 years			1.2	1.1	1.2	1.3	1.5
No. of observations			4,983	4,464	4,196	4,163	3,951

Notes: Children may have younger (or same aged) as well as older siblings; they may have full siblings as well as half- or step-siblings. The total "half- or step-siblings" includes a very small number with "other siblings", such as foster or adopted siblings. "Other children" includes relatives (e.g., cousins) and unrelated children. # Relative Standard Error > 25%.

siblings, as the percentage with other siblings was generally between 10 and 12% across all ages. The vast majority of siblings who were not full siblings were half-siblings.

Children's likelihood of having different types of co-resident siblings varied considerably according to whether children lived with two biological parents, "other two parents" or a single parent (Table 3.11 on page 60). Not surprisingly, children were least likely to have half- or step-siblings living with them in two biological parent households, and it was in these households that the vast majority of children lived with siblings, usually full siblings. Nevertheless, even with these households, there was a number with more complex sibling relationships. For example, at 0–1 year and 2–3 years, around 8% of children lived with half- or step-siblings.

If living with "other two parents", a high percentage of children lived with half-, step- or other siblings. Under 4–5 years of age this was lower (17% at age 0–1 year and 33% at 2–3 years), but beyond this, just over half of these children had at least one half-, step- or other sibling. The percentage with a half-sibling was quite high from age 4–5 years up, but also, as children grew they were increasingly likely to be living with step-siblings within these sorts of two-parent households.

Compared to children living with two biological parents, higher percentages living with single parents had half- or step-siblings. Still, many children in these households had full siblings, and this percentage increased with child age. This increase likely reflects the effects of parental separation, with many older children living in these households likely to have previously lived with two biological parents, with siblings from that relationship. In contrast, earlier analyses of LSAC data by

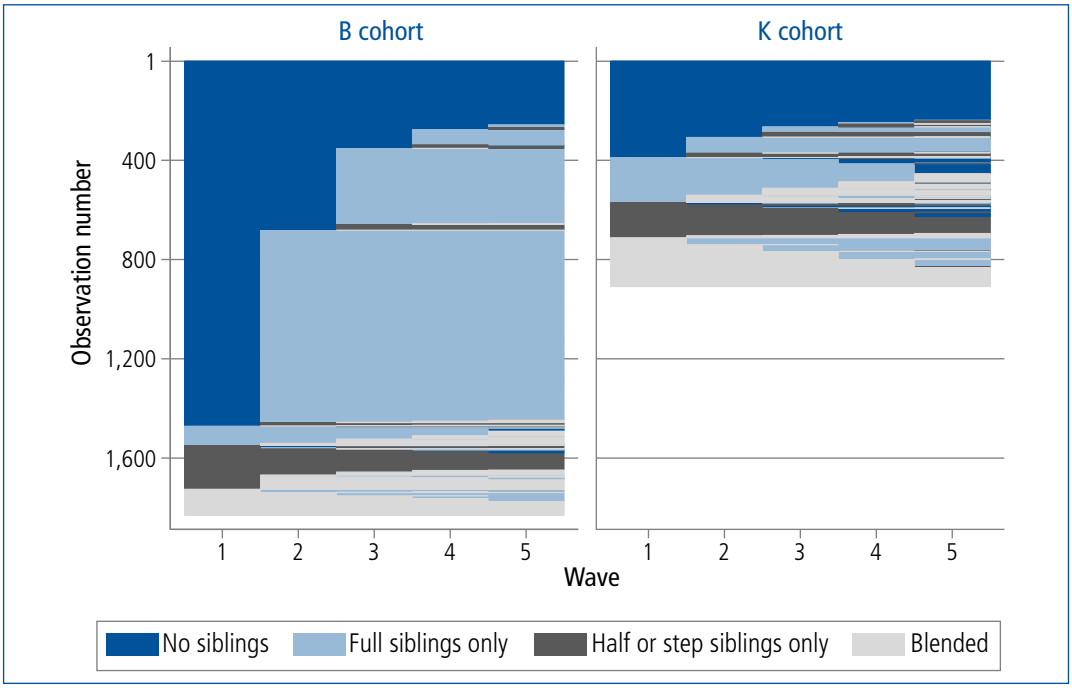
Table 3.11: Children's siblings in the primary household according to children's parental relationships, child age and cohort

Percentage with siblings, by child's parental relationships	0–1 year (%)	2–3 years (%)	4–5 years (%)	6–7 years (%)	8–9 years (%)	10–11 years (%)	12–13 years (%)
B cohort							
Two biological parents							
Has siblings of any age	61.7	82.7	91.9	94.0	94.2		
Full siblings	57.0	80.0	89.8	92.3	92.7		
Half- or step-siblings	8.3	7.8	6.9	6.5	5.0		
Half-siblings	8.1	7.7	6.7	6.1	4.5		
Step-siblings	0.1#	0.1#	0.1#	0.2#	0.6#		
No siblings of any age	38.3	17.3	8.1	6.0	5.8		
Other two parents							
Has siblings of any age	20.4	56.2	79.8	83.9	84.5		
Full siblings	10.2	34.9	49.5	60.2	61.0		
Half- or step-siblings	16.9#	33.0	50.9	50.8	49.7		
Half-siblings	3.3#	21.4#	44.8	44.8	41.4		
Step-siblings	–	5.5#	8.3#	8.8	10.2		
No siblings of any age	79.6	43.8	20.2	16.1	15.5		
Single parent							
Has siblings of any age	56.6	65.5	71.6	75.5	78.8		
Full siblings	37.1	53.4	59.6	64.7	69.3		
Half- or step-siblings	24.8	20.1	22.4	18.1	18.6		
Half-siblings	24.4	19.5	22.2	18.1	17.4		
Step-siblings	–	–	–	0.1#	2.2#		
No siblings of any age	43.4	34.5	28.4	24.5	21.2		
No. of observations	5,107	4,606	4,252	4,241	4,075		
K cohort							
Two biological parents							
Has siblings of any age			92.1	93.7	94.5	94.4	93.6
Full siblings			89.2	91.3	92.2	92.7	92.1
Half- or step-siblings			8.2	7.5	6.7	4.7	3.7
Half-siblings			8.0	7.3	6.4	4.5	3.0
Step-siblings			0.0#	0.0#	0.0#	0.1#	0.6#
No siblings of any age			7.9	6.3	5.5	5.6	6.4
Other two parents							
Has siblings of any age			66.6	76.9	81.6	85.3	86.5
Full siblings			37.7	46.5	59.7	63.4	65.3
Half- or step-siblings			50.4	53.9	50.9	53.0	52.0
Half-siblings			44.6	46.3	42.4	40.8	40.8
Step-siblings			4.2#	8.8#	10.3	13.8	14.4
No siblings of any age			33.4	23.1	18.4	14.7	13.5
Single parent							
Has siblings of any age			73.7	78.3	81.8	82.8	79.0
Full siblings			63.7	69.6	72.8	73.0	72.3
Half- or step-siblings			21.7	19.3	19.6	21.2	16.1
Half-siblings			21.3	18.6	19.2	19.7	14.9
Step-siblings			–	0.6#	0.1#	1.1#	1.0#
No siblings of any age			26.3	21.7	18.2	17.2	21.0
No. of observations			4,983	4,464	4,196	4,159	3,946

Notes: Children may have siblings aged under 15 years as well as siblings aged 15 years or more; they may have full siblings as well as half- or step-siblings. The total "half- or step-siblings" includes a very small number with "other siblings", such as foster or adopted siblings. "Other children" includes relatives (e.g., cousins) and unrelated children. # Relative Standard Error > 25%.

Baxter et al. (2012) showed that among the youngest children living with a single parent, there is a relatively high proportion who have never lived with their father. As a consequence, these children are less likely to have ever had full siblings.

Viewing these data through a longitudinal lens generally captures the addition of new siblings to the household as children grow. The sequences of sibling presence are summarised for children in five waves of LSAC, by classifying children as having no siblings, having only full siblings, having only half- or step-siblings, or having a blend of full and half- or step-siblings. We exclude, however, children who had full siblings at all five waves, to focus on the more diverse or changing sibling relationships. The top of Figure 3.5 shows those children who had no siblings across the five waves (6% of the B cohort and 8% of the K cohort, see also the summary in Table 3.12) and those transitioning from no siblings to having at least one sibling at some wave. Most children who transitioned from having no siblings experienced the addition to their household of *full* siblings, reflecting the birth of new siblings. There is some evidence of additions to the more complex households, as children grew, with the percentage of children with blended sibling relationships increasing across the waves of LSAC. This reflected some children gaining full siblings, from starting out with just half- or step-siblings, as new siblings were born to the LSAC child's (two biological) parents. It also reflected children gaining half- or step-siblings, from starting out with just full siblings, so likely reflecting a new parental relationship that entails new children joining the LSAC child's household. There is evidence in these sequences also, of some children transitioning back to having only full siblings from having been in a household with a blend of full and half- or step-siblings. This may reflect some older children having left home or the breakdown of a parental relationship that involved a step-parent and his (or her) children leaving the LSAC household.



Notes: These data are not weighted, since they show the sequences of individual observations from households with valid information about this classification on all waves of LSAC. This figure excludes those with only full siblings at all five waves and so is based on n = 1,830 for the B cohort and n = 909 for the K cohort. "Blended" are children who have full siblings and half- or step-siblings in the household. Siblings of all ages are included.

Figure 3.5: Selected sequences of sibling co-residence across five waves of LSAC

Previously in this chapter the more complex family situations of children with regular care by a PLE has been explored. This has not been done here in relation to the co-residence of siblings, given the additional complexities of identifying whether siblings in the PLE household live there full-time, or like the LSAC study child, live there part-time through care arrangements. Some children may actually be double-counted if they are counted in the LSAC household as well as the PLE household, if siblings' care arrangements are the same as (or similar to) those of the LSAC study child. (See

Baxter et al., 2012 for some analyses of earlier LSAC data for some description of the presence of siblings across households.)

In summary, most Australian children grow up with at least one sibling, with the majority having siblings that they are biologically related to through both their mother and father. This, of course, reflects that the majority of children grow up, at least until age 12–13 years, living with both biological parents. It was quite uncommon for children up to 12–13 years to be living with a step-sibling, which also reflects that only a small proportion of children lived with a step-parent across the five waves of LSAC. However, having a half-sibling was considerably more common than having a step-sibling, and even within two biological parent households, half-siblings were sometimes present, especially for younger children. Children often lived with half-siblings when they were living in "complex" household structures (those that did not involve two biological parents).

The presence of siblings, no doubt, matters to family routines, and these siblings form part of the network of family relationships. Taking account of their presence and relationships to the study child provides more context to family life than is gained by looking only at a child's relationships to his or her parents or parent figures (see Gennetian, 2005; Kowaleski-Jones & Dunifon, 2004).

Table 3.12: Children's siblings in the primary household across five waves of LSAC, child age and cohort

Cohort and presence of siblings across waves	Number of waves had siblings present						
		One or more wave					
	None (%)	1 (%)	2 (%)	3–4 (%)	5 (%)	Any (%)	Total
B cohort							
Siblings of any age	7.8	1.1	2.2	29.9	59.0	92.2	100.0
Full siblings	12.8	0.5#	2.0	30.5	54.2	87.2	100.0
Half- or step-siblings	86.5	2.4	1.7	3.4	6.1	13.5	100.0
K cohort							
Siblings of any age	6.3	0.6#	1.3	6.8	85.1	93.7	100.0
Full siblings	11.9	0.6#	0.6#	5.2	81.6	88.1	100.0
Half- or step-siblings	82.5	3.3	2.6	6.0	5.6	17.5	100.0

Notes: These data are from households responding to all waves of LSAC. N = 3,753 for the B cohort and 3,678 for the K cohort. The total "half- or step-siblings" includes a very small number with "other siblings", such as foster or adopted siblings.
Relative Standard Error > 25%.

3.6 Overview of complexity and where it is found

This section ties the above analyses together to first describe children's overall likelihood of experiencing household complexity across the five waves of LSAC. To do this, some broad indicators of complexity have been used, with the focus entirely on complexity within the primary household, without taking account of PLE households. This simplification of course means that the analyses cannot fully capture the diversity of household structures that have been described in the analyses above. However, they provide some overall summary measures that can then be used to compare across demographic groups to see whether experiences of household complexity are more likely for some children than others. A similar approach was taken by Manning et al. (2014) to identify children as having parent and/or sibling complexity.

First, a summary of household complexity is shown in Table 3.13 (page 63), which gives the percentage of children at each wave who experienced each of the following:

- "Parental complexity" captures children living with a single parent or in an "other" (not two-biological parent) two-parent household.
- "Other adult complexity" captures children whose household included non-parental co-resident adults.

- "Sibling complexity" captures children who lived with half- or step-siblings in their primary household.
- "Household complexity" is having a primary household that is characterised by any of these different forms of complexity.

The percentage who experienced any of these, by cohort and wave, is shown in Table 3.13. The percentage experiencing household complexity was lowest, at 24%, for the 0–1 year olds at Wave 1 in the B cohort, and increased across ages of children, up to 36% of the 12–13 year olds at Wave 5 in the K cohort. These increasing percentages reflected the increased likelihood of children living in a household that includes parents other than two biological parents. Other forms of household complexity do not have such a strong trend by child age.

From those children in five waves of LSAC, Table 3.13 also presents the percentage of children who experienced each or any of these forms of complexity at any time over the five waves. These data that take a longitudinal perspective highlight the prevalence of household complexity across childhood. Overall, 43% of the B-cohort and 46% of the K-cohort children experienced at least one of these forms of complexity at one or more time across the five waves. Most commonly, this was having lived with a single parent or with "other two parents" (one or both being not a biological parent) at some time (27% of the B cohort and 31% of the K cohort), although more than one in five in each cohort (23% in the B cohort and 22% in the K cohort) lived with non-parental adults at some time. Also, 14% of the B-cohort and 18% of the K-cohort children had lived with step- or half-siblings at some time.

Table 3.13: Percentage of households experiencing different types of complexity, child age and cohort

Type of complexity experienced	0–1 year (%)	2–3 years (%)	4–5 years (%)	6–7 years (%)	8–9 years (%)	10–11 years (%)	12–13 years (%)	Any of five waves
B cohort								
"Parental complexity" (single parents or "other two parents")	11.1	14.3	17.7	21.6	23.5			26.6
"Other adult complexity" (non-parental co-resident adult)	10.2	9.8	8.3	8.8	7.8			22.8
"Sibling complexity" (half, step or otherwise related sibling co-resident)	10.0	9.7	10.7	10.8	10.5			13.5
"Household complexity" (any of the above)	24.1	26.3	27.9	31.5	31.7			43.0
No. of observations	5,107	4,606	4,386	4,242	4,077			3,753
K cohort								
"Parental complexity" (single parents or "other two parents")			18.3	21.0	24.8	27.8	27.9	30.8
"Other adult complexity" (non-parental co-resident adult)			7.5	9.3	8.4	8.5	8.3	21.6
"Sibling complexity" (half, step or otherwise related sibling co-resident)			11.6	11.4	12.4	12.2	10.7	17.5
"Household complexity" (any of the above)			29.0	31.2	34.2	35.4	35.5	45.6
No. of observations			4,983	4,464	4,331	4,163	3,951	3,678

Note: The cross-sectional data include all responding households at each wave while the final column is based on those with data at each of the five waves.

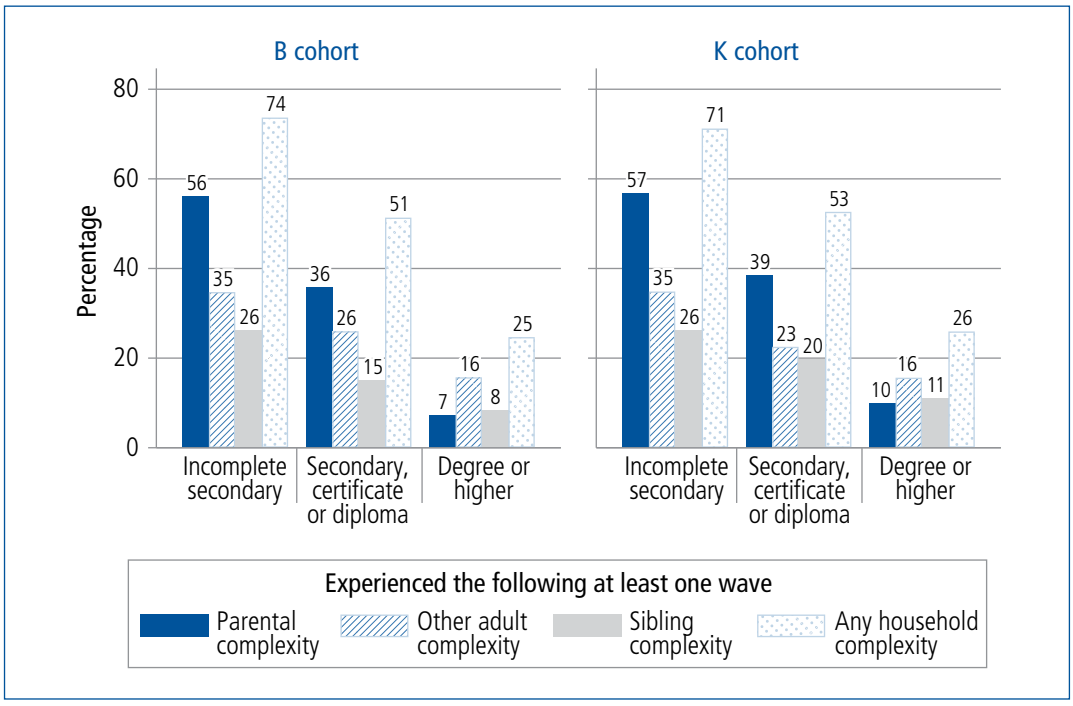
In the following figures the longitudinal experiences of household complexity are explored for a selection of family characteristics. A set of characteristics was chosen to provide some indication of possible differences across socio-economic groups (using parental education), of intergenerational experiences of household complexity (using parents' reports of having experienced parental

separation in childhood), and of possible cultural differences (using country of birth and ethnicity). This follows from the literature on household complexity in which these differences have been explored. For each of these, for simplicity, these characteristics refer to those of the child's primary carer. These analyses provide some initial insights, that can be explored further using LSAC. In particular, it should be noted that the associations observed may be inter-related (inasmuch as education, childhood experiences of parental separation and ethnicity might be correlated) and they may be related to characteristics not taken into account, such as parents' age.[10]

Figure 3.6 shows children's experiences of household complexity by parents' educational attainment. For both cohorts, children of higher educated parents (tertiary degree or higher) were less likely to experience any of the forms of complexity shown than those with lower education (incomplete secondary schooling). For example, in the B cohort, comparing the two extremes:

- 56% of children with lower educated parents experienced parental complexity at some time over the five waves, compared to 7% of those with higher educated parents.
- 35% of children with lower educated parents experienced other-adult complexity at some time over the five waves, compared to 16% of those with higher educated parents.
- 26% of children with lower educated parents experienced sibling complexity at some time over the five waves, compared to 8% of those with higher educated parents.
- In summary, 74% of children with lower educated parents experienced some household complexity at some time over the five waves, compared to 25% of those with higher educated parents.

The findings for the K cohort were virtually the same as those reported for the B cohort.



Notes: Analyses are based on households in all fives waves of LSAC, by the primary carer's highest level of educational attainment, as captured at Wave 1. Sample sizes: Incomplete secondary only (n = 196 for the B cohort and 270 for the K cohort); Complete secondary, certificate or diploma (n = 1,903 for the B cohort and 1,939 for the K cohort); Degree or higher (n = 1,654 for the B cohort and 1,466 for the K cohort).

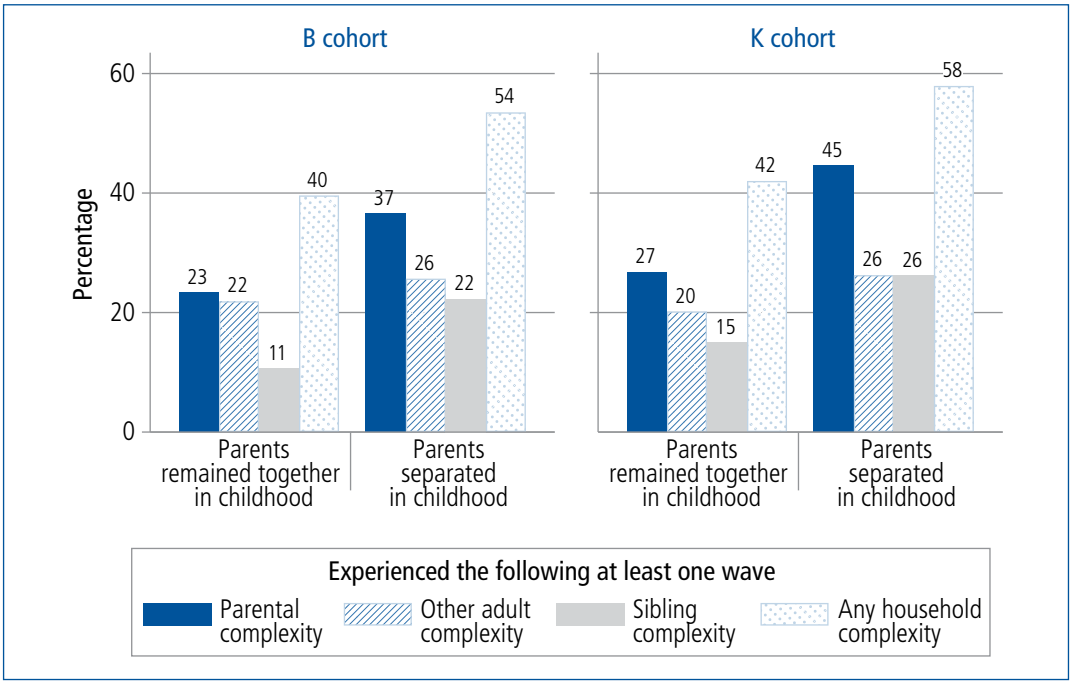
Figure 3.6: Household complexity summary across five waves, by parents' educational attainment

Figure 3.7 (page 65) compares children's experiences of household complexity by the primary carers' reports of whether they had experienced their own parents' separation in childhood (before

[10] Educational attainment, country of birth and ethnicity were taken from the Wave 1 data. Parental separation during childhood was taken from the Wave 2 data (it was not collected in Wave 1).

age 18 years). Marked differences across the two groups (those who did, compared to those who did not experience their parents' separation) were apparent.

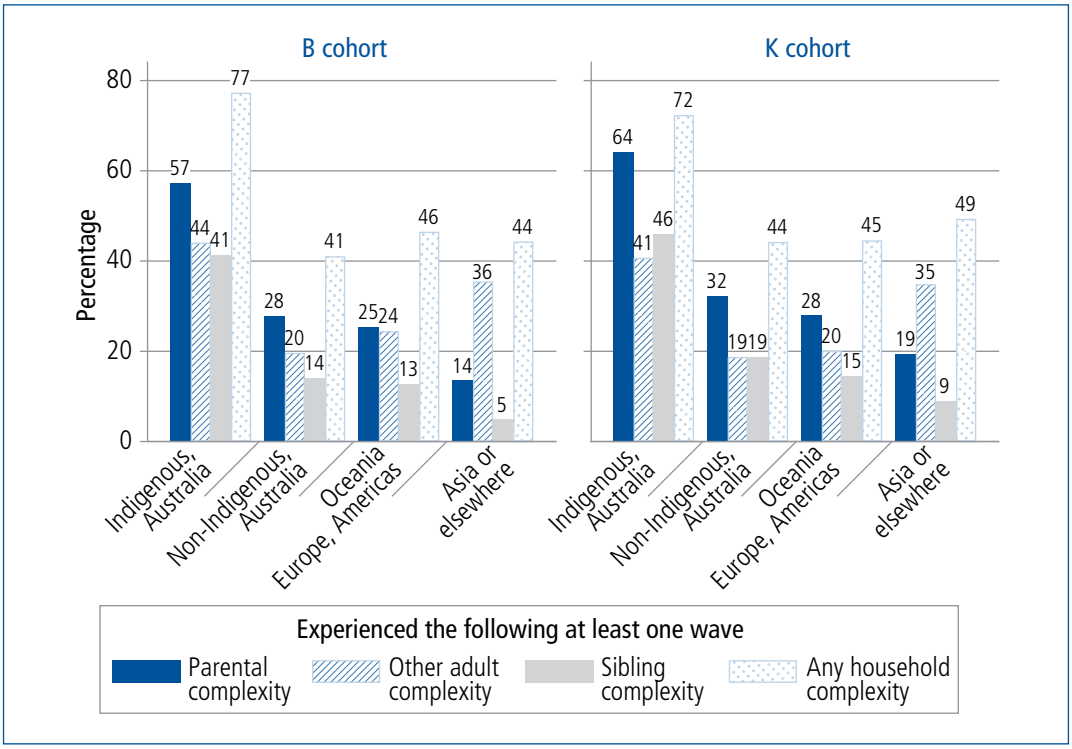
- Most striking differences were found in relation to the proportion of children having experienced parental complexity. Among children of parents who themselves had not experienced parental separation, 23% in the B cohort and 27% in the K cohort had experienced parental complexity over the five waves of LSAC. This compared to 37% in the B cohort and 45% in the K cohort for children of parents who had experienced parental separation during their own childhood.
- Differences were also apparent for sibling complexity. The percentage experiencing sibling complexity was 11 percentage points higher for those children whose parents had experienced parental separation in childhood.
- Differences were less marked for other adult complexity.
- Overall differences in the percentage experiencing household complexity were apparent, largely as a result of differences in parental complexity.



Notes: Analyses are based on households in all fives waves of LSAC, by the primary carer's reports of having experienced her/his parent's separation during childhood (before 18 years). Those with parents who never lived together are included in "parents separated in childhood". Sample sizes: Parents remained together in childhood (n = 2,728 for the B cohort, 2,745 for the K cohort); Parents separated in childhood (n = 1,021 for the B cohort, 927 for the K cohort).

Figure 3.7: Household complexity summary across five waves, by parents' childhood experiences of parental separation

Figure 3.8 (page 66) summarises household complexity according to the primary carers' country of birth and ethnicity. Children with Indigenous parents were the most likely to have experienced household complexity, and this was apparent in relation to parental complexity, other adult complexity and sibling complexity in both cohorts. More than seven out of ten children of Indigenous parents experienced at least one form of household complexity at some time over the five waves. Experiences of household complexity were fairly similar for children of Australian-born, non-Indigenous parents and those of parents born in Oceania, Europe or the Americas. Compared to these groups, there were differences apparent for children of parents born in Asian countries or elsewhere (they were predominantly Asian-born parents), who were the least likely to experience parental complexity and sibling complexity, but were more likely to experience "other adult" complexity. This higher rate of "other adult" complexity is consistent with other research by Pilkauskas and Martinson (2014), which shows across Australia, the UK and the US, Asian families are particularly likely to include three generations of family members.



Notes: Analyses are based on households in all fives waves of LSAC, by the primary carer's country of birth, with those identifying as Indigenous shown separately. Sample sizes: Indigenous Australia (n = 67 for the B cohort, 68 for the K cohort); Non-Indigenous Australia (n = 2,951 for the B cohort, 2,802 for the K cohort); Oceania, Europe or Americas (n = 390 for the B cohort, 423 for the K cohort); Asia or elsewhere (n = 345 for the B cohort, 386 for the K cohort).

Figure 3.8 Household complexity summary across five waves, by parents' country of birth and ethnicity

3.7 Summary and discussion

This chapter aimed to describe household complexity in order to understand the extent to which Australian children might experience different forms of complexity through their childhood. As such, the analysis explored household structure by describing co-residence with parents (including those living elsewhere) and parent figures, other adults such as grandparents, other relatives or unrelated adults, and different types of siblings. To summarise the findings and discuss the results more broadly, this section is structured around the research questions that were set out in the introduction. After answering these research questions, a discussion of the strengths and limitations of this analysis and some other contributions of this chapter are discussed.

Research questions and answers

The first question was "to what extent do Australian children experience different forms of household complexity?" The answer depends upon how complexity is measured, whether this is considered in terms of all forms of complexity explored here (parental, other adult and sibling) and whether it is measured at a point in time, or over a broader time frame. At the broadest level, the longitudinal analysis showed that more than four in ten children experienced some form of household complexity at some time over the first five waves of LSAC. This clearly represents a substantial number of children that have some experience of household complexity. Different sorts of complexity no doubt have different effects on children, and these may be positive or negative. For example, the co-residence of other adults has the potential to improve the wellbeing of children and families but may introduce unintended risks. Furstenberg (2014), writing about this form of family complexity, notes that there is a case for expecting that children would not be adversely affected by living in such families, given the potential for a greater number of parent figures ("so

long as the attention and care is stable and coordinated", p. 22) and additional resources available to the family. Other forms of complexity may be more challenging for children and, as stated by Meyer and Carlson (2014, p. 263), "… by the time they reach adulthood, individuals may have accumulated a complicated mix of family relationships and experiences, which may in turn shape their own approach to family formation and hence the life chances of the next generation" (p. 263).

Much of this complexity reflects the proportion of children who at some stage live in a household with a single parent or with two parents in which at least one was not a biological parent (27% in the B cohort and 31% in the K cohort at some stage experienced this parental complexity). Related to this is the sibling complexity associated with living with half- or step-siblings (14% of the B cohort and 18% in the K cohort experienced this at some time over the five waves). Co-resident "other adult" complexity was fairly common (23% of the B cohort and 22% of the K cohort when considered over the five waves). These percentages reflect a longitudinal view over five waves and therefore are greater than those observed if looking only at a point in time as they capture dynamic changes in household form as children grow.

As was observed by Manning et al. (2014) in analysing parental and sibling complexity in the US, incorporation of information about siblings into an analysis of household complexity does highlight that focusing only on information about children's relationships to parents conceals complexity in some children's lives (Cancian et al., 2011; Gennetian, 2005; Halpern-Meekin & Tach, 2008). This chapter has expanded on that, to include parental, sibling as well as other adult complexity, recognising that the presence of these other adults may be a significant factor in describing children's family circumstances (Dunifon et al., 2014; Pilkauskas & Martinson, 2014).

The summary indicators of parental complexity or household complexity did not capture all aspects explored in this chapter. In particular, these indicators did not encapsulate the additional complexity that is experienced by some children who have parents living in two households. These children have additional complexities to contend with, especially those who spend time living in each parents' household. The living arrangements of these children was diverse even as viewed from the data available in LSAC, which does not include the circumstances of all children with a parent living elsewhere.

The second question was "how does the experience of household complexity change as children grow?". The main change was that children were increasingly likely to be exposed to household complexity as they grew because of the cumulative effects of parental relationship breakdown that meant children became more likely to experience parental complexity by living apart from one of their parents. Further, as children grew, they were more likely to experience parental complexity through the re-partnering of parents, but this applied to a relatively small proportion of the sample. Sibling complexity changes were less marked than those related to parental complexity as children grew to ages 12–13 years. For the complexity associated with co-resident adults, there was more potential complexity at the younger ages of children, which was more prominent for those living primarily with a parent who was currently single. After this, trends in co-resident adult complexity were not apparent.

It will be interesting to explore changes in household complexity beyond these ages, to examine whether some types of complexity become more apparent, particularly those related to re-partnering by parents and perhaps related to changes in the presence of siblings. Sibling presence is likely to change as children grow, as older siblings leave home. Of course, children themselves will be increasingly likely to leave their parental home as they grow older.

The third research question was "how stable are more complex household structures?". To answer this, we examined transitions across consecutive waves of LSAC, which may to some extent overstate stability, since they cover a two-year period and multiple transitions may actually occur between waves. Overall, the analyses showed considerable stability in children's experiences of different types of parental relationships over the two-year period between waves. In relation to parental complexity, this was especially so for children living with two biological parents, but children with other parental relationships were also more likely to remain with those parental relationships across a two-year period than they were to change to a different one. Nevertheless, complex households as indicated by parental relationships were more unstable than others. As such, children living in complex households may face challenges through living with a single parent or with one or two non-biological parents, and their increased likelihood of experiencing further parental relationship transitions may have additional implications for their own wellbeing (Magnuson & Berger, 2009).

Finally, the fourth question asked "how does the incidence of household complexity vary with selected parental characteristics?". This question was posed because international research shows that there are strong selection biases in regard to household complexity; in particular, with a higher incidence of financial disadvantage among more complex families (see Furstenberg, 2014). Other differences related to race and parental education have also been observed (Brown et al., 2015; Manning et al., 2014; McLanahan & Percheski, 2008), and these variables, along with financial disadvantage, explain some of the associations between family complexity and children's wellbeing (Mollborn, Fomby, & Dennis, 2011). Household complexity as defined here, especially with regard to parental complexity, will be strongly related to financial wellbeing since single-parent households were counted as complex ones, and families of single parents have on average poorer financial wellbeing compared to those of two parents (Baxter, Gray, Hand, & Hayes, 2013). This was, therefore, not explored here. Instead, some variables that related to pre-existing characteristics of parents were used—those that were not directly related to their structure. These initial analyses showed some marked differences in household complexity across different demographic groups. Children in households of lower educated parents, parents who had themselves experienced parental separation in childhood and Indigenous parents were at greatest risk of experiencing household complexity themselves. The greatest differences related to higher proportions experiencing parental complexity. These findings suggest strong correlations and potential for intergenerational transfers in disadvantage, inasmuch as we expect complexity to be associated with poorer socio-economic circumstances (e.g., Hancock, Edwards, & Zubrick, 2013). It may be that some forms of complexity—in particular, other adult complexity—actually help with the financial and other circumstances of families (Mutchler & Baker, 2009), and this will be something to explore further in the future (see also Chapter 2, this volume, regarding co-resident grandparents).

Strengths and limitations

This chapter provided a detailed exploration of household complexity, making use of the five waves of LSAC, from two cohorts, to explore variation in complexity from cross-sectional and longitudinal perspectives. These data were particularly valuable for drawing out different aspects of household complexity, given that LSAC has the child as the focal unit, allowing relationships to be identified between children and all others in the household.

Despite the usefulness of LSAC for these analyses, there were some limitations that should be acknowledged. There are three main limitations. The first is that while LSAC is broadly representative of families across Australia, the more complex households may be under-represented in these data. This may be especially so in later waves of LSAC, insofar as non-response might be expected to be greater in more complex households. While survey weights correct for some of the bias associated with selective attrition, they do not take account of all of the sorts of complexity explored in this chapter. Further, given that LSAC is not representative of families in remote parts of Australia, we know that we are not fully representing the complexity experienced by families living in these areas, and this might be especially relevant in thinking about children in Indigenous families. To the extent that LSAC under-represents other demographic groups (such as newly arrived migrants) we might not have a full picture of complexity across all families. The second limitation relates to children with parents living in two households. While LSAC allows us to go beyond usual sets of data to explore some children's living arrangements across households, these data are not complete, and so we cannot fully gauge the complexity of all LSAC children's family relationships. Thirdly, this chapter made use of information about children's households at the time of the LSAC collection at each wave. No attempt was made to fill in information about relationship changes that occurred between waves, nor to incorporate information on relationship changes that occurred prior to the first wave of LSAC. Together, these limitations might lead to an understatement of the complexity of family life faced by some children. The analyses, nevertheless, provide some estimates of this complexity that go beyond typical classifications of Australian family forms.

Discussion

The main contribution of this chapter was the detailed attention to household complexity. Throughout this analysis, indicators of dimensions of household complexity beyond those related to parental complexity were explored. While it is quite common in Australian research to give some attention to parental complexity, at least as captured based on relationships within one household,

it is quite uncommon to include information about other forms of complexity. Should we consider using a different set of indicators of complexity in undertaking research on Australian families?

Of course the answer will depend upon the research question and the target population. It may be of merit, for example, to take account of potential sources of household complexity if analysing single-parent families with young children who may have co-resident adults. For all families with children, even two biological parent families, it may be worth including indicators of relationships between children, especially if the focus is on children's wellbeing. Also, incorporating information about children's living arrangements within another parents' household may be helpful, although this is possibly the most difficult to capture well and the diversity of such arrangements makes it difficult to represent this complexity fully.

Regardless of decisions made about which indicators to use, capturing complexity fully is difficult, especially to take account of past experiences of complexity that may have lasting influences on children. Researchers, policy-makers and service delivery agencies therefore need to be cognisant of this potential for children to have lives that are more complex than indicated by usual classifications of family form.

Understanding the extent and nature of children's experiences of different household relationships is important contextual information for thinking about the value and appropriateness of policies and services to children and their families. For children who experience family relationships that are more complex or more transient, the usual approaches that address the wellbeing of children and families may need some modification to take account of children's particular circumstances.

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Demographic, attitudinal and psychosocial factors associated with childhood immunisation

4

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4.1 Introduction

In June 2014 over 90% of Australian children were fully immunised at the milestone ages of 12, 24 and 60 months (Hull, 2015). These excellent levels of coverage must be improved and maintained over time. To achieve this, it is important to identify which potentially modifiable factors are related to incomplete immunisation. This chapter uses LSAC data linked to the Australian Childhood Immunisation Register to examine the demographic, psychosocial and attitudinal factors related to incomplete immunisation at 12, 24 and 60 months. For historical context, Box 4.1 provides an overview of major immunisation policy initiatives in Australia in the last 20 years.

The Australian Childhood Immunisation Register (ACIR) was established on 1 January 1996. It is the first purpose-built immunisation register established in the world. The ACIR holds identification and immunisation details for all children up to 7 years of age who are enrolled in Medicare, which is 99% of children by 12 months of age.[1] The National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases (NCIRS) has used the ACIR to report on rates of immunisation in the population; for example, through the Immunisation Coverage Annual Reports (Hull, Dey, Menzies, Brotherton, & McIntyre, 2012; Hull et al., 2011; Hull, Mahajan, Dey, Menzies, & McIntyre, 2010).

Since December 2007, coverage has been reported for children at three milestone ages: 12 months, 24 months and 60 months. The 2012 annual report showed rates of complete immunisation above 90% at these ages in most states and territories (Hull et al., 2012). Rates of complete immunisation have been historically lower for Aboriginal and Torres Strait Islander children (Hull et al., 2010, 2011), but coverage for standard vaccines at 24 and 60 months has improved in recent years and is now comparable to coverage for non-Indigenous children. Coverage for Indigenous children at 12 months remains lower than coverage for non-Indigenous children (Hull et al., 2012; Naidu et al., 2013). Homel and Edwards (2016) provide an overview of national immunisation coverage for the period 2000–09, which is when the children in LSAC were receiving childhood vaccinations.[2]

To better understand incomplete immunisation, Australian researchers have linked ACIR data to other databases that provide information about the children on the register, as well as their families and communities. Using linked postcode data, Hull, McIntyre, and Sayer (2001) found that high proportions of people born overseas and single parents were associated with lower coverage of DTPa (diphtheria, tetanus and pertussis) and MMR (measles, mumps, rubella) at 12 and 24 months in all areas. In metropolitan postcodes, lower coverage was associated with high levels of education and occupation and a high proportion of Indigenous residents. In rural postcodes, high unemployment was associated with lower rates of coverage. However, across all postcodes the strongest correlate of low coverage was a high proportion of children in the postcode who had not received immunisation by 3 months of age.

[1] This was changed to under 20 years of age from 1 January 2016

[2] Comprehensive comparative information about international rates of immunisation are provided by the World Health Organization <www.who.int/topics/immunization/en/>. For an overview and history of conscientious objection and compulsory vaccination in international perspective see Salmon et al. (2006).

In another example, Haynes and Stone (2004) linked ACIR data for children born in 1998 at the individual level with perinatal and birth defect databases for the state of Victoria. Incomplete immunisation at 12 and 24 months was associated with mothers having had more births, 12–23 months spacing between pregnancy, being divorced or separated or a single parent, mothers being under 25 years of age at birth, mothers being Indigenous or born overseas, living in the most advantaged or most disadvantaged socio-economic areas compared to the middle socio-economic areas, having no private health insurance, having had a home birth, a metropolitan place of birth and children with low birth weight (for immunisation at 12 months only).

These Australian findings accord with the international literature on demographic and social factors associated with childhood immunisation rates (Brown et al., 2010; Pearce, Law, Elliman, Cole, Bedord, & the Millenium Cohort Study Child Health Group, 2008). A systematic review of this literature highlighted low socio-economic status, lack of health insurance, low parental education, younger maternal age, large family size, being in a minority ethnic group and negative attitudes towards immunisation as factors frequently associated with incomplete immunisation (Falagas & Zarkadoulia, 2008).

Fewer studies have examined whether correlates of non-immunisation differ from correlates of partial immunisation. However, the existing evidence suggests that families of children who are non-immunised are generally more affluent than families of children who are fully immunised. Families of children who are partially immunised, on the other hand, are more disadvantaged than families of children who are fully immunised. For instance, a large US study reported that children who were not immunised at all (compared to those who were fully immunised) had parents who were more likely to have safety concerns about vaccines, not trust doctors, were white, married, had a university degree, had high household income and had a child who was male (Smith, Chu, & Barker, 2004). Children who were partially immunised (compared to those who were fully immunised) were more likely to have parents who were black, not married, had no university degree, lived near the poverty level, and lived in a central city. Analysis from the UK Millenium Cohort study also suggests a different profile for the two groups (Samad et al., 2006). Compared to children who were fully immunised at 12 months, children who were non-immunised were more likely to have mothers who were university educated, older and were of black Caribbean ethnicity, while children who were partially immunised were more likely to be living in disadvantaged areas, had larger families, had parents who were lone or teenage parents, had mothers who smoked during pregnancy, and were more likely to have been admitted to hospital by 9 months. If these findings are replicated in Australia, they suggest that policy responses and information campaigns need to be different for these two groups.

Using the linked data from the ACIR to the LSAC sample, this chapter will explore patterns and predictors of full, partial and non-immunisation at the milestone ages of 12, 24 and 60 months. The rich data from LSAC can be used to provide a demographic profile of children who were not fully immunised at these milestone ages, and also enable us to explore the importance of possible barriers to immunisation such as remoteness. In addition, we examine the role of psychosocial factors such as maternal depression, stress and parenting. Mothers who experience depressive symptoms and high levels of stress may have difficulties in accessing preventive health measures for their child (Kavanaugh, Halterman, Montes, Epstein, Hightower, & Weitzman, 2006) but these factors have not been considered in previous studies of immunisation. Parents' understanding of whether their child is up to date with their immunisations will also be cross-referenced with immunisations in the ACIR to gauge whether parental understanding was consistent with the vaccination schedule at the time of data collection.

Notably, LSAC collected information about parental attitudes to childhood immunisation. Parent disagreement with immunisation has been identified in a number of studies as a robust predictor of incomplete immunisation (Falagas & Zarkadoulia, 2008), but the association between parent disagreement and partial immunisation has not been examined. In Australia, 1.6% of children born in 2010 had parents who lodged an official conscientious objection to immunisation. A further 2% had no vaccines recorded on the ACIR. To our knowledge, this is the first nationally representative study with linked data to compare the importance of attitudes with the importance of demographic and psychosocial factors in predicting both partial and non-immunisation.

Research questions

This chapter addresses the following research questions:

1. What are the rates of full, partial and non-immunisation in the LSAC children?
2. How persistent is incomplete immunisation between 12 and 60 months?
3. How accurate is parents' understanding of whether children are up to date with the immunisation schedule?
4. What demographic, psychosocial and attitudinal factors are associated with full, partial and non-immunisation?
5. What are the most important correlates of partial immunisation and non-immunisation?

Box 4.1: Historical context: Summary of policies to increase childhood immunisation in Australia since 1996[3]

Timeline of major policy responses

1996 ACIR notification payment for general practices introduced.

1997 First National Immunisation Program (NIP) introduced with a Seven Point Plan to increase immunisation coverage nationally.

1998 Parental incentives introduced (the Maternity Immunisation Allowance (MIA) and Child Care Assistance Rebate and Child Care Cash Rebate) and school-entry requirements. Provider incentives introduced from July 1—the General Practice Immunisation Incentive Scheme (GPII)

2000 Child care assistance and cash rebates replaced by Child Care Rebate.

2008 Service Incentive Payment (SIP) component of GPII discontinued.

2012 1 July: MIA discontinued. Family Tax Benefit (FTB) Part A supplement tied to immunisation, medical exemption or conscientious objection. Outcomes Bonus payment component of the GPII discontinued.

2013 New National Immunisation Strategy for 2013–2018 published.

2016 From 1 January, the vaccine conscientious objection no longer considered an exemption category for immunisation, meaning that families with children who do not meet the immunisation requirements and do not have a medical exemption will not receive the Child Care Benefit, Child Care Rebate, or the FTB Part A end-of-year supplement.

Accompanying this change is funding over 4 years to increase national immunisation rates (see Immunise Australia, 21 April 2015). Activities under this initiative will:

- provide additional incentives to immunisation providers to identify children who are delayed for immunisation and perform catch-up vaccinations;
- provide a range of tools to assist providers in having conversations with vaccine-hesitant parents; and
- initiate public awareness campaigns about the importance of immunisation.

Details of selected policy responses

Surveys in the 1980s revealed substantial disparities across states and territories in funding and access to vaccines, with some estimates suggesting only about 53% of children were fully immunised. This gave rise to the first National Immunisation Strategy in 1993, followed by the establishment of the ACIR in 1996. In 1997, the Immunise Australia program was introduced

[3] This is a summary of main initiatives only. For more details, refer to Chin et al. (2012); Hull, Deeks & McIntyre, (2009); Hull et al. (2012); KPMG Consulting's (2000) evaluation of the General Practice Immunisation Incentives (GPII) Scheme; NCIRS coverage reports 2003–2005 (NCIRS, 2007) and 2005–2007 (NCIRS, 2010); Ruff, Taylor & Nolan (2012); and the Department of Health (2013) National Immunisation Strategy for Australia 2013–2018.

(also known as the National Immunisation Program, or NIP). The Immunise Australia Program outlined a Seven Point Plan to improve immunisation coverage across the nation. The seven initiatives were: (1) incentives for parents, including the MIA and immunisation requirements for childcare payments; (2) establishment of incentives for GPs, under the GPII; (3) monitoring and evaluation of immunisation targets using ACIR; (4) immunisation days targeted at areas of low coverage; (5) initiatives aimed at measles eradication; (6) education and research, including information campaigns to the public and service providers; and the establishment of the National Centre for Immunisation Research and Surveillance (NCIRS); and (7) school entry requirements. We outline a few of these here.

Incentives for parents: These were designed to prompt parents to complete immunisations, or to register their medical exemptions or conscientious objection to immunisation.

The MIA: This was a one-off, non-taxable payment that could be claimed on or before a child's 5th birthday if the child was shown to have completed the immunisation schedule, or the parent was a registered conscientious objector, or the child had a medical exemption (Chin, Crawford, Rowles, & Buttery, 2012). Originally it was means-tested but this was removed in July 2004. In 2008 the payment was $236 (Department of Social Services, 2015a). From 2009 the MIA was paid in two instalments. In July 2012 the MIA was discontinued and, instead, eligibility for the Family Tax Benefit (FTB) Part A supplement was linked to immunisation. To be eligible for the payment, children need to be fully immunised, or have an approved medical or conscientious exemption, during the financial years that each child turns 1, 2 and 5 years old (Department of Human Services, 2015).

Child care payments: From April 1998, families applying for the Child Care Assistance and Child Care Cash Rebate were required to demonstrate that their child's immunisation coverage was up to date for their age, or that they had an approved medical or conscientious objection. From July 2000, these payments were replaced by the Child Care Benefit (CCB) and Child Care Rebate (CCR). To receive CCB and CCR, all children under 7 must meet immunisation requirements, or have approved exemptions.

Until the end of 2015, parents who registered a conscientious objection by talking to a doctor and completing the appropriate form were considered to have met immunisation requirements and could receive the payments. The incentives were designed to encourage, rather than coerce, parents to promptly immunise their children. From January 2016, however, vaccine objectors are not considered to have met immunisation requirements (Department of Social Services, 2015b).

Incentives for providers: There have been a number of incentives for providers since 1996. The ACIR notification payment (or Information Payment) of up to $6 is paid to all providers after notification that all NIP vaccines for a milestone age have been administered for a child (Hull et al., 2012).

From 1998, the GPII was designed to encourage providers to report immunisation to ACIR, and to achieve increasingly high targets of proportions of children under 7 years in their practices immunised. The GPII included several payments. The Service Incentive Payment (SIP) of $18.50 was paid to the provider upon notification to ACIR that an immunisation schedule had been completed for a child at key milestone ages. The Outcomes Bonus payment of $3.50 per whole-patient equivalent was paid quarterly to general practices that achieved an immunisation level of 70% or better, with this percentage increased progressively to 90%. The SIP was discontinued in 2008 and the Outcomes Bonus payment ceased in July 2012 (Chin et al, 2012; Hull et al., 2012).

From 1 July 2016, providers will be paid an incentive of $6 for identifying children in their practice who are more than 2 months overdue, and calling them in for catch-up vaccines. The payment can be made for each childhood schedule caught-up, potentially up to $36 for the full schedule. This is on top of the existing $6 payment.

School entry requirements: These were worked out with states and territories. Parents must provide an immunisation status certificate, which can be obtained from ACIR. Children not immunised or children of conscientious objectors can attend but may be excluded from school if an outbreak of a vaccine-preventable disease occurs.

4.2 Data and method

Linked data from the Australian Childhood Immunisation Register

We examined immunisation in 4,779 B-cohort children using linked data from the Australian Childhood Immunisation Register (ACIR). Of the 5,107 children in the B cohort, 328 (6.4%) were not included because parents either did not give consent for their children's data to be linked with Medicare data, or because incomplete consent forms meant data could not be linked (see the LSAC Data User Guide, Australian Institute of Family Studies, 2013).

The B cohort was selected to be representative of the population of Australian children born between March 2003 and February 2004. In the analyses we use population weights so that estimates reflect rates of immunisation in this larger population of Australian children. However, some very remote postcodes were not included in the sample design, and temporary residents were not included (Soloff, Lawrence & Johnstone, 2005). In addition, the 328 children who could not be linked to ACIR mean that our estimates of this population are around 230,000. The representativeness of the LSAC–ACIR linked data is discussed in Homel and Edwards (2016). Homel and Edwards concluded that the LSAC linked sample slightly over-represents completely immunised children.

Defining immunisation status at 12, 24 and 60 months

Immunisation status was defined according to criteria developed by the ACIR and initially reported in O'Brien, Sam, and Mead (1998). In this study we use the ACIR data matched to LSAC participants to assess full immunisation, partial immunisation and non-immunisation at three milestone ages: 12 months, 24 months and 60 months (5 years old). To be fully immunised at each of these ages a child should have completed all the required types and doses of vaccinations listed in the Australian Standard Vaccination Schedule. The relevant schedules for the B cohort are in the *Australian Immunisation Handbook*, 7th edition (2000) and 8th edition (2003), and in quarterly and annual coverage reports using ACIR data for the period, by the National Centre for Immunisation Research and Surveillance (NCIRS) (Hull et al., 2010).

Table 4.1 (page 76) summarises the types and number of doses of vaccines the B-cohort children should have received by each age. To make it clear how immunisation status is defined at each age, we emphasise the following points:

1. The ages at which vaccines are due according to the schedule are much earlier than the milestone age at which they are assessed. Specifically:
   - All the vaccines that are required to be fully immunised at 12 months are due by 6 months.
   - All the vaccines that are required to be fully immunised at 24 months are due by 12 months.
   - All the vaccines that are required to be fully immunised at 60 months are due by 48 months (i.e., 4 years old).

   Therefore, the milestone ages are either 6 or 12 months later than the age at which vaccines are due according to the schedule. This means that even children who are several months delayed in receiving scheduled vaccinations have usually received them by the milestone age.
2. A child was considered to have received a scheduled vaccine if the final dose was recorded on or before his or her birthday at the relevant milestone age. For example, there are three doses of DTPa due at 2, 4 and 6 months. A child born on 1 April 2003 was considered to have received the DTPa vaccine for the 12-month milestone age if the third dose was recorded in the ACIR on or before 1 April 2004. This assumes that the first and second doses have also been received, and this assumption has been shown to be valid (Hull & McIntyre, 2000; Hull, Lawrence, MacIntyre, & McIntyre, 2003).
3. Children were defined as *fully immunised* at 12, 24 or 60 months if they had received all the required doses outlined in Table 4.1. For example, a fully-immunised child at 12 months had received the third doses of DTPa and IPV, and the second or third doses of Hib and HepB. Children were defined as *partially immunised* if they had received some doses but not others. For instance, a 12 month old who had received the third dose of DTPa but no other vaccines was defined as partially immunised at 12 months. Children were defined as *non-immunised* at each age if they had not received any doses.

4. Immunisation status at each milestone age is independent from other ages. This means that each milestone is assessed as its own event, without taking into account the status of the child at the previous milestone. For example, as long as a K-cohort child has received the doses that are assessed at 72 months (see Table 4.1), she is fully immunised even if she was not fully immunised at 24 months.

Table 4.1: Vaccinations required to be fully immunised at 12, 24 and 60 months for children in the B cohort

Milestone age	Vaccine	Dose number required to be fully immunised
12 months	DTPa: Diphtheria, tetanus and acellular pertussis (whooping cough)	3rd dose (due at 6 months)
	IPV: Polio	3rd dose (due at 6 months)
	Hib: Haemophilus influenzae type b*	2nd or 3rd dose (due at 6 months)
	HepB: Hepatitis B*	2nd or 3rd dose (due at 6 months)
24 months	DTPa: Diphtheria, tetanus and acellular pertussis (whooping cough)	3rd dose (due at 6 months)
	IPV: Polio	3rd dose (due at 6 months)
	Hib: Haemophilus influenzae type b*	3rd or 4th dose (due at 6 or 12 months)
	HepB: Hepatitis B*	3rd dose (due at 12 months)
	MMR: Measles, mumps and rubella	1st dose (due at 12 months)
60 months	DTPa: Diphtheria, tetanus and acellular pertussis (whooping cough)	4th dose (due at 48 months)
	IPV: Polio	4th dose (due at 48 months)
	MMR: Measles, mumps and rubella	2nd dose (due at 48 months)

Note: * The number of doses required for Hib and HepB varied by the type of vaccine used and by state or territory.

Source: Chin, et al. (2012); National Health and Medical Research Council (2000, 2003); O'Brien et al. (1998)

Using LSAC variables as predictors of immunisation status at milestone ages

We used information from the Wave 1 LSAC interview to examine demographic and psychosocial factors associated with immunisation at 12 and 24 months, and information from Wave 2 to examine factors associated with immunisation at 60 months. Therefore, at 24 and 60 months the demographic and psychosocial factors preceded the ages at which immunisation occurred. At 12 months, these factors were assessed around the time that vaccines were received.

4.3 Results

How many children are fully, partially and non-immunised?

Table 4.2 (page 77) shows the percentage and number of children born between March 2003 and February 2004 who were fully, partially or non-immunised at 12, 24 and 60 months. Because LSAC is a nationally representative sample of children born between March 2003 and February 2004, the estimates reflect rates of immunisation in the broader population of Australian children in this birth cohort. At 12 and 24 months, over 90% of children were fully immunised, but this dropped to just over 80% by 60 months. These rates are 1–2 percentage points higher at 12 and 24 months than the national estimates published by the NCIRS for the period, but consistent with the national estimates at 60 months (NCIRS, 2007; 2010).

Although only a small percentage of children were partially or non-immunised at 12 and 24 months, these nonetheless represent about 15,000 and 11,000 children respectively. By the 60-month milestone, the number of children who had not received the scheduled final vaccinations (4th doses of polio and DTPa and a 2nd dose of MMR) increased to about 42,000.

Table 4.2: Percentage of B-cohort children fully, partially and non-immunised at 12, 24 and 60 months of age

	12 months		24 months		60 months	
	% (95% CI)	*n* ('000s) (95% CI)	% (95% CI)	*n* ('000s) (95% CI)	% (95% CI)	*n* ('000s) (95% CI)
Fully immunised	93.5 (92.7–94.3)	210.0 (210.0–220.0)	95.4 (94.7–96.0)	220.0 (210.0–220.0)	81.4 (80.1–82.6)	180.0 (180.0–190.0)
Partially immunised	4.1 (3.5–4.7)	9.2 (7.8–11.0)	2.5 (2.0–3.0)	5.6 (4.5–6.8)	16.7 (15.5–18.0)	38.0 (35.0–41.0)
Non–immunised	2.4 (2.0–2.9)	5.5 (4.5–6.5)	2.2 (1.8–2.6)	4.9 (3.9–5.9)	1.9 (1.5–2.4)	4.3 (3.3–5.2)

Notes: Total observations in sample = 4,779. Total *n* in population = 226,872. CI = confidence interval.

How persistent is incomplete immunisation over time?

About 79% of children (n = 180,000) were fully immunised at each age, and about 2% (n = 4,273) of children were not immunised at any age. This shows that although full immunisation was the norm, there was quite a large group who fluctuated between complete and incomplete immunisation before the age of 5. Table 4.3 shows how immunisation status changed from 12 to 24 months, and Table 4.4 shows how immunisation status changed from 24 to 60 months.

Table 4.3: Patterns of change in immunisation status between 12 and 24 months

Status at 12 months	Status at 24 months					
	Fully immunised		Partially immunised		Non-immunised	
	% (95% CI)	Population *n* (95% CI)	% (95% CI)	Population *n* (95% CI)	% (95% CI)	Population *n* (95% CI)
Fully immunised	99.1 (98.7–99.3)	210,000 (200,000–220,000)	0.9 (0.7–1.3)	2,003 (1,330–2,676)	0	0
Partially immunised	66.2 (59.8–72.8)	6,114 (4,973–7,255)	33.9 (27.2–41.2)	3,128 (2,299–3,958)	0	0
Non–immunised	2.12 (0.5–8.4)	117 (–49–282)	9.2 (5.2–16.1)	507 (202–812)	88.7 (81.2–93.4)	4,871 (3,884–5,858)

Table 4.4: Patterns of change in immunisation status between 24 and 60 months

Status at 24 months	Status at 60 months					
	Fully immunised		Partially immunised		Non-immunised	
	% (95% CI)	Population *n* (95% CI)	% (95% CI)	Population *n* (95% CI)	% (95% CI)	Population *n* (95% CI)
Fully immunised	84.2 (82.9–85.4)	180,000 (180,000–190,000)	15.8 (14.6–17.1)	34,000 (31,000–37,000)	0	0
Partially immunised	40.2 (30.9–50.3)	2,268 (1,527–3,010)	59.8 (49.7–69.1)	3,370 (2,509–4,231)	0	0
Non–immunised	5.3 (2.1–12.8)	257 (19–494)	7.0 (3.2–14.8)	341 (73–609)	87.7 (78.8–93.2)	4,273 (3,310–5,237)

Between 12 and 24 months, most children remained fully immunised or became fully immunised. Of children who were fully immunised at 12 months, 99% remained fully immunised at 24 months. Further, two-thirds of children who were partially immunised at 12 months were fully immunised at 24 months, suggesting that there is "catch-up" over this period. In contrast, non-immunisation was quite stable, with 89% of non-immunised 12 month olds still non-immunised at 24 months. This was also true between 24 and 60 months (Table 4.4).

Maintenance of full immunisation was much less consistent from 24 to 60 months. Although most children who were fully immunised at 24 months were also fully immunised at 60 months, about

16% were partially immunised. This means that although these children had received all the required doses for the 24-month milestone, they had not received the final doses of DTPa, IPV and MMR due by 48 months and assessed at 60 months (see Table 4.1). Some incomplete immunisation at 60 months in this cohort may be due to the fact that the milestone assessment age changed from 72 months to 60 months from January 2008. Although all the children in this study reached the milestone after this change, it may have taken some parents and providers time to adjust to the change as coverage increased into 2009. However, this change does not make results for the current sample unrepresentative of the population. About 40% of the children who were partially immunised at 24 months were fully immunised at 60 months, but the remainder were still partially immunised at 60 months.

How accurate is parents' understanding of whether children are up to date with the immunisation schedule?

In the first wave of the LSAC survey, the parent who knew the child best (Parent 1, usually the child's mother) was asked:

> Is [your child] up to date with his/her immunisations, that is needles or injections?

In response, the parent could answer:

> (1) Yes, completely up to date, (2) No, but has had most, (3) No, but has had some, or (4) No, hasn't had any.

Most parents (91%) said their child was completely up to date, 7% said the child had had most immunisations, 1% said their child had had some immunisations, and 2% said their child had received no immunisations.

We examined how this parental knowledge was related to actual immunisation status at Wave 1. We used a subsample of 2,636 children (55.2% of the B cohort) who were aged between 7 months and 11 months at the time of the parent interview. This was because all of the vaccines assessed at 12 months (outlined in Table 4.1) are actually due to be administered at 2, 4 and 6 months. Children who were 7 months or older at the time of the Wave 1 interview would have had the opportunity to have received the 2, 4 and 6 month vaccines before the question was asked. Children younger than 11 months would also not yet be due for the 12-month doses (see Table 4.1), avoiding problems interpreting what parents mean when asked whether their child is up to date.

Figure 4.1 shows the cross-tabulation of parental knowledge and immunisation status at Wave 1. The bars show the percentage of children within each immunisation status whose parents said they were up to date, had most immunisations, had some immunisations, or had no immunisations. It is

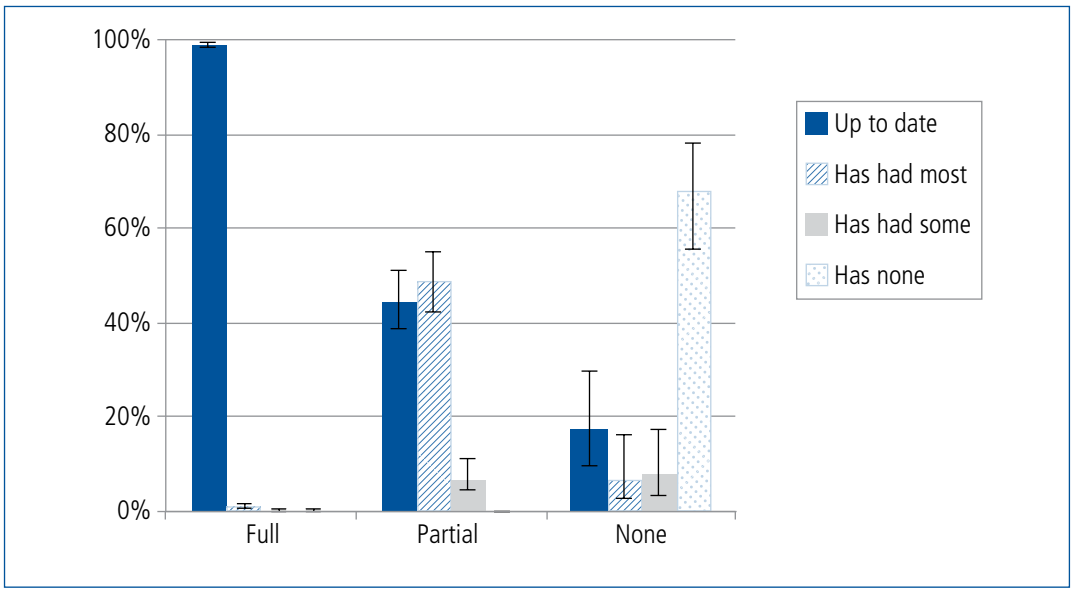

Figure 4.1: Immunisation status at Wave 1 for children aged 7–10 months old by level of parental knowledge about completeness of child's immunisation

clear that parents of fully immunised children were most accurate about their child's immunisation status, parents of partially immunised children were least accurate, and parents of non-immunised children were moderately accurate.

Of all fully immunised children, 99% of parents correctly said their child was up to date. However, 44% of parents of partially immunised children also said their child was completely up to date with immunisations—representing about 6,160 children aged 7 to 10 months. Of children who were not immunised, 18% of parents said their child was up to date, about 730 children. A further 15% said their child had had most or some immunisations. The majority, 68%, said accurately that their child had received no immunisations.

Overall, 5% of parents (equating to a poopulation estimate of just under 7,000 children aged 7 to 10 months) reported that their child was fully immunised when he or she was not fully immunised. Most of these children were partially immunised. These patterns suggest that parents of partially immunised children, in particular, may be unaware that their child is not up to date with the immunisation schedule.

What demographic, psychosocial and attitudinal factors are associated with full, partial and non-immunisation?

In this section we describe the results of analyses, examining how a wide range of demographic, psychosocial and attitudinal variables were associated with full, partial and non-immunisation at 12, 24 and 60 months.

Variables in the models

The demographic and psychosocial variables included in our models are described in Table 4.5 (on page 80). Many of the *demographic* variables were selected because they have been linked to incomplete immunisation in past studies in Australia, the US and the UK (Bond, Nolan, & Lester, 1999; Brenner, Simons-Morton, Bhaskar, Das, Clemens, & NIH-D.C. Initiative Immunization Working Group, 2001; Brown et al., 2010; Falagas & Zarkadoulia, 2008; Hanna, Wakefield, Doolan, & Messner, 1994; Haynes & Stone, 2004; Luman, Mason, Shefer, & Chu, 2003; Pearce et al., 2008; Samad et al., 2006; Smith et al., 2004). We also considered whether immunisation status was related to whether a family received the Child Care Benefit, because meeting immunisation requirements is an eligibility criterion for receiving this benefit. In addition to these demographic and household factors, we examined a range of *psychosocial variables* assessing maternal depressive symptoms, stress and parenting.

Finally, we examined the importance of parental attitudes to child immunisation. In the first wave of the LSAC survey, the child's parent was asked:

> Overall, how much do you agree with children being immunised, that is having their needles or injections?

In response, the parent could answer:

> (1) Very strongly agree, (2) Quite strongly agree, (3) Neither agree nor disagree, (4) Quite strongly disagree, or (5) Very strongly disagree.

Figure 4.2 shows that a large majority of parents agreed with children being immunised. Only 1.9% said they quite or very strongly disagreed with immunisation. This equates to about 4,390 parents in the Australian population of 1 year olds.

To assist interpretation, in the models the five responses were dichotomised as 0 if the response was 1, 2 or 3 (very strongly or quite strongly agree, or neutral) and 1 if the response was 4 or 5 (disagree very strongly or quite strongly). The dotted line in Figure 4.2 illustrates how responses were dichotomised.

It is important to note that parents who disagreed with childhood immunisation were not necessarily conscientious objectors. In Australia, parents whose child is registered with Medicare can choose to lodge an official objection to immunisation. However, they may still object to immunisation and not register as a conscientious objector (Hull et al., 2012). Data on conscientious objections are not available in the ACIR linked data. Therefore, it is impossible to know how many of the 1.9% of parents who quite or very strongly disagreed with immunisation were conscientious objectors.

Table 4.5: Description of variables used to predict immunisation status at 12, 24 and 60 months

Variable	Categories	Description	Assessed at Waves	Predicts immunisation at
Demographic and household factors				
Young mother	1 = younger than 25 0 = 25 and older	Age of the mother at the time of the study child's birth	1 (0–1 years)*	12, 24 and 60 months
Mother of Indigenous origin	1 = Yes, 0 = No	The study child's mother is of Indigenous origin	1 (0–1 years)*	12, 24 and 60 months
Mother's country of birth	0 = Australia/NZ 1 = Elsewhere	The country in which the study child's mother was born	1 (0–1 years)*	12, 24 and 60 months
Mother speaks English at home	1 = Yes, 0 = No	The main language spoken at home by the study child's mother	1 (0–1 years)*	12, 24 and 60 months
Single mother family	1 = Yes, 0 = No	In Waves 1 and 2, a family was defined as single–mother if the child's father or non–responding parent was not present in the household at that wave. This includes children who may share care across two households or have contact with their parent living elsewhere.	1 (0–1 years); 2 (2–3 years)	12, 24 and 60 months
Number of siblings in household	0 = none, 1 = 1 sibling, 2 = 2 siblings, 3 = 3 or more siblings	The number of siblings of the study child in the household	1 (0–1 years); 2 (2–3 years)	12, 24 and 60 months
Mother has university degree	1 = Yes, 0 = No	The study child's mother has a university degree	1 (0–1 years)*	12, 24 and 60 months
Low parental income	1 = low (bottom 20%), 0 = higher (upper 80%)	Parental income is the sum of the usual weekly income for both mother and father (if present)	1 (0–1 years); 2 (2–3 years)	12, 24 and 60 months
Financial stress	1 = Yes, 0 = No	Experienced one or more instance of financial stress in the last 12 months as indicated by 6 items (e.g., Parent has not been able to pay gas, electricity or telephone bills on time due to a shortage of money)	1 (0–1 years); 2 (2–3 years)	12, 24 and 60 months
Household receives Child Care Benefit	1 = Yes, 0 = No	At least one of the study child's caregivers receives the Child Care Benefit	1 (0–1 years)**	12, 24 and 60 months
Difficulty affording medical care	1 = Yes, 0 = No	The study child's main caregiver has had difficulty affording medical care or medicines needed by the study child in the last 12 months	1 (0–1 years)**	12, 24 and 60 months
SEIFA Index of Disadvantage	0 = High (Bottom 25%), 1 = Medium–High (25–50%), 2 = Medium–Low (50–75%), 3 = Low (Top 25%)	Higher scores on the SEIFA index of disadvantage indicate less disadvantage in the local area	1 (0–1 years); 2 (2–3 years)	12, 24 and 60 months

Table 4.5: Description of variables used to predict immunisation status at 12, 24 and 60 months

Variable	Categories	Description	Assessed at Waves	Predicts immunisation at
Remote residence	1 = Remote or very remote area 0 = Moderate to highly accessible area	Household is located in an area classified as remote or very remote in terms of road distance from the local service centre	1 (0–1 years); 2 (2–3 years)	12, 24 and 60 months
Household lives in public housing	1 = Yes, 0 = No	The study child's household lives in housing provided by a state or territory housing authority, government housing or a housing co–operative	1 (0–1 years); 2 (2–3 years)	12, 24 and 60 months
Residential mobility	1 = Yes, 0 = No	At Wave 1, this indicates that the study child has moved residences at least once since birth. At Wave 2, this indicates that the study child has moved at least once in the last 2 years.	1 (0–1 years); 2 (2–3 years)	12, 24 and 60 months
Psychosocial factors				
Maternal psychological distress	1 = Low (0–7), 2 = Moderate (8–12), 3 = High (13–24)	Kessler 6 (K6) scale, a 6–item scale measuring psychological distress (e.g., In the past 4 weeks about how often did you feel so sad that nothing could cheer you up?) Scores rescaled from 0–24 (Hilton et al., 2008) and respondents classified as low, moderate or high. High denotes mental disorder very likely.	1 (0–1 years); 2 (2–3 years)	12, 24 and 60 months
Time pressure	1 = Yes, 0 = No	Mother often or always feels rushed or pressed for time	1 (0–1 years); 2 (2–3 years)	12, 24 and 60 months
Stressful life events	0 = no events, 1 = 1 event, 2 = 2 events, 3 = 3 or more events	Study child's primary caregiver's experiences of 10 stressful life events in the last 12 months (e.g., serious illness, unemployment, serious interpersonal problems). Total score categorised into quartiles.	1 (0–1 years); 2 (2–3 years)	12, 24 and 60 months
Hostile parenting	1 = Low (Bottom 33%), 2 = Medium (Middle 33%), 3 = High (Top 33%)	Weighted average of five items on the hostile parenting scale (e.g., I have been angry with this child; I have left this child alone in his/her bedroom when he/she was particularly upset). Respondents classified into three equal groups based on percentile scores.	1 (0–1 years); 2 (2–3 years)	12, 24 and 60 months
Parental warmth	1 = Low (Bottom 33%), 2 = Medium (Middle 33%), 3 = High (Top 33%)	Weighted average of six items (e.g., How often do you express affection by hugging, kissing and holding this child?). Respondents classified into three equal groups based on percentile scores.	1 (0–1 years); 2 (2–3 years)	12, 24 and 60 months

Notes: * These variables were considered fixed demographic factors and were used in all analyses.
** These variables were assessed at Wave 1 only and were not included in the model predicting immunisation status at 60 months.

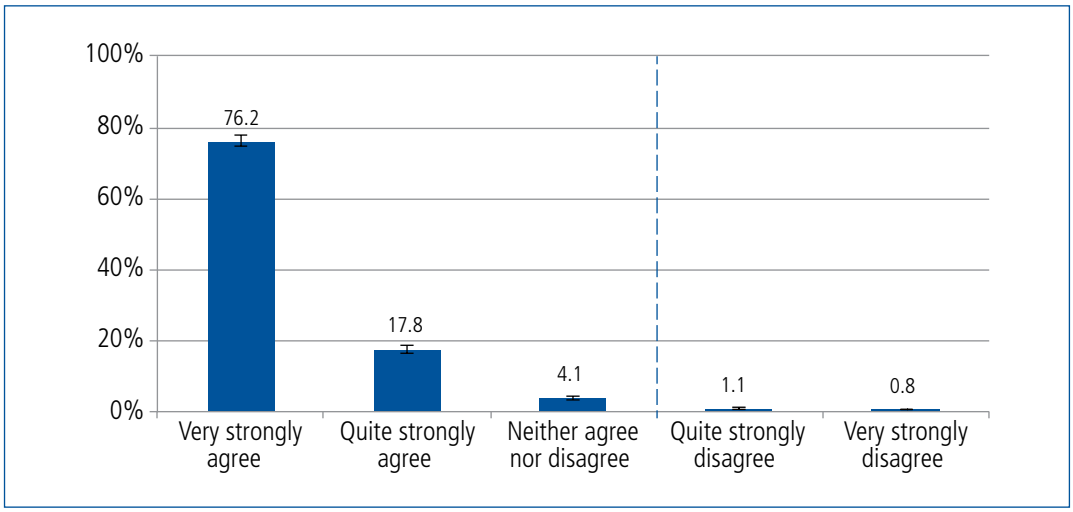

Figure 4.2: Parental attitude to child immunisation in the B cohort

Data analysis

We examined the relationship between immunisation status at 12, 24 and 60 months and the demographic/household factors, psychosocial factors and parental attitude to immunisation using multinomial logistic regression. Separate analyses were carried out for immunisation status at each milestone age of 12, 24 and 60 months. For each immunisation status outcome, we first examined univariate models, in which only one predictor variable at a time was included. We then examined a multivariate model, in which all the relevant predictor variables in Table 4.5 and parental attitude to immunisation were simultaneously included. Therefore, the results of each multivariate model estimate the effect of each variable on the immunisation status outcome after controlling for effects of all other variables. For each immunisation status outcome, the same sample was used for the univariate and multivariate models.

To assist interpretation, in the sections below, we discuss separately the results for demographic factors, psychosocial factors and parental attitude. However, in the multivariate models the results are from models that include all predictor variables so, for example, results for demographic factors are adjusted for psychosocial factors and parental attitude. Estimates are presented as the average percentage point change in the probability of each immunisation status (i.e., fully immunised, partially immunised, non-immunised) associated with a one-unit increase in each predictor variable. Because all of the predictor variables are categorical, this means a change to being in one category compared to the reference category; for example, having two study-child siblings in the household compared to no study-child siblings.

Results for demographic characteristics

Table 4.6 (page 84) shows univariate and multivariate estimates for effects of demographic characteristics on full, partial and non-immunisation status at 12 months. Table 4.7 (page 85) shows effects for 24 months. In the univariate models for immunisation status at 12 months, the following patterns emerged:

- Children in single-mother households were less likely to be fully immunised, and more likely to be partially immunised.
- Children living in households with a greater number of children had a lower likelihood of full immunisation, and higher likelihood of partial immunisation.
- Children in households that had experienced financial stress were less likely to be fully immunised and more likely to be partially immunised.
- Children in households receiving the Child Care Benefit were less likely to be non-immunised.
- Children who had moved residence at least once since birth were more likely to be partially immunised.

At 24 months, the univariate models for immunisation status showed only two key patterns:

- Children living in households with a greater number of children had a lower likelihood of full immunisation, and higher likelihood of partial immunisation, though these effects were not as strong as at 12 months.

- Children in households in the lowest income quintile were less likely to be fully immunised and more likely to be partially immunised.

In the multivariate model for 12 months, effects for being in a single-mother household, financial hardship and residential mobility were no longer significant. Consequently, multivariate results for 12- and 24-month status were quite similar. At both ages, a higher number of siblings was associated with a higher likelihood of partial immunisation, and receipt of the Child Care Benefit with a lower likelihood of non-immunisation. At 24 months, low parental income continued to be associated with a higher likelihood of partial immunisation. In the multivariate models only, children of mothers who were born outside Australia were less likely to be fully immunised, although at 12 months, children of mothers who spoke English at home were also less likely to be fully immunised.

The effects of demographic factors on immunisation at 60 months are shown in Table 4.8. There was only one variable (low income) that was significantly associated with partial immunisation in the univariate models that was no longer significant in the multivariate model. All other variables that were significantly associated with non-immunisation in the univariate models were still associated with non-immunisation in the multivariate model, except that effect sizes were somewhat attenuated. We discuss estimates from the multivariate model.

Findings showed that having more siblings in the household continued to be strongly associated with partial immunisation. The likelihood of partial immunisation at 60 months was 17 percentage points higher for study children in a household with three or more siblings compared to children in a household with no siblings. Also, a few statistically significant factors emerged that had not been significant in multivariate models at earlier ages. At 60 months, the likelihood of partial immunisation was 7 percentage points higher in children in single-mother households than children in dual-parent households. Experience of financial stress in the last 12 months was also associated with an increased likelihood of partial immunisation. Finally, children who had moved at least once in the last 12 months were less likely to be fully immunised. This may be because residential mobility is an indicator of disadvantage (Edwards, Mullan, Katz, & Higgins, 2014), or because moving disrupts connections between parents and health care providers. Regardless, the findings suggest that indicators of disadvantage are a little more strongly connected to partial immunisation at 60 months compared to 12 and 24 months. It is likely that the much larger percentage of partially immunised 60 month olds provides the necessary power for these factors to reach statistical significance.

Results for psychosocial factors

Table 4.9 (page 87) shows univariate and multivariate estimates for effects of psychosocial factors on full, partial and non-immunisation status at 12 months, and Table 4.10 (page 88) shows effects at 24 months. Only a few psychosocial variables were significantly associated with immunisation status at 12 or 24 months:

- In both the 12- and 24-month univariate models, children of mothers who reported experiencing more stressful life events, especially three events and more, were less likely to be fully immunised and more likely to be non-immunised. The association between stressful life events and immunisation status was reduced in size in the 12-month multivariate model, and was non-significant in the 24-month multivariate model.
- In the 12-month univariate model children of mothers who reported symptomatic levels of depressive symptoms were more likely to be partially immunised, but this was not statistically significant in the multivariate model.
- In the 12-month univariate model medium levels of warm parenting (compared to low levels of warm parenting) were associated with a higher likelihood of full immunisation, but this was not significant in the multivariate model.

Table 4.11 (page 88) shows univariate and multivariate estimates for effects of psychosocial factors on the probability of full, partial and non-immunisation status at 60 months. The same variables were significant in both univariate and multivariate models, so we focus on the multivariate estimates. By the time children were 5 years old, mothers' experience of frequent time pressure was associated with a decreased probability of full immunisation and an increased probability of partial immunisation. Interestingly, higher levels of hostile parenting at Wave 2 were associated with a *higher* probability of full immunisation and a *lower* probability of partial immunisation: the likelihood of full immunisation at 60 months was 5 percentage points higher in children of parents who reported high levels of harsh parenting compared to low levels of harsh parenting.

Table 4.6: Percentage point changes in full, partial and non-immunisation at 12 months by demographic characteristics at Wave 1

	Fully immunised		Partially immunised		Non-immunised	
	Univariate % change (95% CI)	Multivariate % change (95% CI)	Univariate % change (95% CI)	Multivariate % change (95% CI)	Univariate % change (95% CI)	Multivariate % change (95% CI)
Young mother	–1.09 (–3.46–1.29)	–1.74 (–4.31–0.84)	0.72 (–1.29–2.72)	1.02 (–1.27–3.31)	0.37 (–1.06–1.80)	0.72 (–0.79–2.23)
Mother Indigenous	–5.08 (–11.78–1.61)	–0.80 (–4.74–3.15)	5.56 (–0.70–11.82)	1.08 (–2.05–4.21)	–0.48 (–3.36–2.40)	–0.29 (–2.89–2.32)
Mother born outside Aus/NZ	–1.07 (–3.38–1.24)	–2.97 (–5.84––0.11)*	–0.14 (–1.78–1.50)	1.17 (–1.19–3.53)	1.21 (–0.23–2.65)	1.80 (–0.19–3.79)
Mother speaks English at home	–1.03 (–3.27–1.20)	–2.68 (–4.70––0.65)*	1.33 (–0.32–2.97)	1.99 (0.39–3.59)*	–0.29 (–1.82–1.23)	0.68 (–0.54–1.91)
Single–mother household	–4.67 (–8.82––0.51)*	–3.62 (–7.73–0.50)	3.87 (0.48–7.25)*	2.19 (–1.26–5.63)	0.80 (–1.37–2.97)	1.43 (–1.0–3.86)
Number of siblings						
One	–1.39 (–3.05–0.27)	–2.01 (–3.57––0.45)*	1.50 (0.15–2.85)*	1.74 (0.33–3.16)*	–0.10 (–1.22–1.01)	0.26 (–0.70–1.23)
Two	–4.04 (–6.58––1.49)**	–3.87 (–6.23––1.51)**	2.42 (0.52–4.32)*	2.64 (0.51–4.77)*	1.61 (–0.36–3.59)	1.22 (–0.24–2.68)
Three or more	–6.56 (–10.16––2.97)***	–6.59 (–10.31––2.87)**	5.40 (2.20–8.60)**	5.24 (1.95–8.52)**	1.16 (–1.20–3.53)	1.35 (–0.91–3.61)
Mother has degree	–0.27 (–1.85–1.31)	–1.40 (–3.13–0.32)	–0.38 (–1.62–0.85)	0.63 (–0.85–2.11)	0.66 (–0.49–1.80)	0.77 (–0.35–1.90)
Low parental income	–2.37 (–4.77–0.04)	–0.48 (–2.61–1.64)	1.57 (–0.31–3.45)	0.44 (–1.30–2.18)	0.80 (–0.62–2.22)	0.04 (–1.24–1.33)
Financial stress	–2.79 (–4.77––0.80)**	–1.36 (–3.21–0.49)	1.54 (0.0–3.08)*	0.51 (–0.98–2.0)	1.24 (–0.03–2.51)	0.85 (–0.20–1.90)
Household receives Child Care Benefit	1.64 (–0.05–3.33)	1.77 (0.20–3.35)*	–0.27 (–1.64–1.11)	–0.77 (–2.05–0.52)	–1.37 (–2.38––0.36)**	–1.01 (–1.97––0.04)*
Difficulty affording medical care	0.73 (–2.18–3.65)	2.09 (–0.14–4.31)	0.0 (–2.34–2.34)	–1.09 (–3.0–0.83)	–0.73 (–2.55–1.08)	–1.0 (–2.44–0.44)
SEIFA index of area disadvantage						
2nd quartile	–1.87 (–4.24–0.50)	–1.72 (–3.89–0.45)	0.85 (–0.98–2.68)	1.02 (–0.73–2.77)	1.02 (–0.29–2.32)	0.70 (–0.48–1.88)
3rd quartile	0.51 (–1.86–2.88)	0.47 (–1.54–2.47)	–1.27 (–2.85–0.31)	–0.74 (–2.28–0.80)	0.76 (–0.76–2.28)	0.27 (–0.96–1.50)
4th quartile	–0.54 (–2.84–1.76)	–0.86 (–3.06–1.35)	0.09 (–1.77–1.96)	0.93 (–1.08–2.94)	0.44 (–0.90–1.79)	–0.07 (–1.17–1.02)
Remote residence	–2.61 (–6.99–1.77)	–0.71 (–3.96–2.55)	2.68 (–1.11–6.48)	1.18 (–2.10–4.45)	–0.07 (–1.85–1.70)	–0.47 (–1.54–0.60)
Public housing	–4.0 (–8.81–0.81)	–0.13 (–3.15–2.89)	2.79 (–1.11–6.70)	0.09 (–2.46–2.64)	1.21 (–1.68–4.10)	0.04 (–1.79–1.86)
Residential mobility	–2.23 (–4.76–0.31)	–1.79 (–4.21–0.63)	2.22 (0.03–4.41)*	1.86 (–0.38–4.10)	0.0 (–1.38–1.38)	–0.07 (–1.06–0.93)

Notes: Statistically significant differences are noted: * $p < .05$; ** $p < .01$; *** $p < .001$. Analyses control for psychosocial factors and parental attitude to immunisation.
Source: B cohort, Wave 1 ($n = 3,755$)

Table 4.7: Percentage point changes in full, partial and non-immunisation at 24 months by demographic characteristics at Wave 1

	Fully immunised		Partially immunised		Non-immunised	
	Univariate % change (95% CI)	Multivariate % change (95% CI)	Univariate % change (95% CI)	Multivariate % change (95% CI)	Univariate % change (95% CI)	Multivariate % change (95% CI)
Young mother	–0.11 (–1.89–1.68)	–0.36 (–2.09–1.37)	0.24 (–1.10–1.59)	0.18 (–1.15–1.52)	–0.14 (–1.41–1.13)	0.18 (–1.10–1.46)
Mother Indigenous	–3.94 (–10.51–2.63)	–0.18 (–2.99–2.62)	5.35 (–0.99–11.70)	1.93 (–0.05–3.90)	–1.41 (–2.96–0.13)	–1.74 (–3.68–0.19)
Mother born outside Aus/NZ	–1.49 (–3.22–0.25)	–2.79 (–5.25– –0.33) *	0.53 (–0.65–1.71)	1.17 (–0.68–3.02)	0.96 (–0.39–2.31)	1.62 (–0.33–3.57)
Mother speaks English at home	–0.11 (–1.89–1.68)	–1.43 (–3.31–0.45)	–0.03 (–1.40–1.35)	0.47 (–1.0–1.93)	0.13 (–1.20–1.47)	0.97 (–0.17–2.10)
Single–mother household	–3.02 (–6.61–0.58)	–3.21 (–7.13–0.71)	2.34 (–0.15–4.84)	1.02 (–1.24–3.28)	0.67 (–1.30–2.65)	2.19 (–0.60–4.98)
Number of siblings						
One	–1.23 (–2.63–0.17)	–1.68 (–2.88– –0.47) **	1.65 (0.63–2.68) **	1.82 (0.70–2.94) **	–0.42 (–1.42–0.57)	–0.14 (–0.95–0.66)
Two	–2.74 (–4.94– –0.54) *	–2.46 (–4.32– –0.61) **	1.19 (–0.11–2.48)	1.42 (–0.13–2.98)	1.55 (–0.36–3.46)	1.04 (–0.26–2.34)
Three or more	–3.45 (–6.75– –0.14) *	–3.65 (–6.96– –0.35) *	2.41 (–0.21–5.04)	2.52 (–0.01–5.04)	1.04 (–1.14–3.22)	1.14 (–0.90–3.18)
Mother has degree	–0.56 (–1.93–0.81)	–1.21 (–2.70–0.28)	–0.16 (–1.07–0.76)	0.37 (–0.69–1.43)	0.72 (–0.33–1.77)	0.84 (–0.17–1.85)
Low parental income	–2.22 (–4.21– –0.24) *	–0.94 (–2.57–0.69)	1.99 (0.41–3.57) *	1.34 (0.02–2.66) *	0.23 (–1.03–1.50)	–0.40 (–1.58–0.78)
Financial stress	–1.57 (–3.28–0.13)	–0.46 (–1.99–1.07)	0.47 (–0.64–1.58)	–0.50 (–1.63–0.64)	1.10 (–0.03–2.24)	0.96 (–0.01–1.92)
Household receives Child Care Benefit	1.26 (–0.21–2.73)	1.06 (–0.43–2.56)	0.17 (–1.11–1.45)	0.07 (–1.25–1.40)	–1.43 (–2.31– –0.55) **	–1.14 (–1.95– –0.32) **
Difficulty affording medical care	–0.93 (–3.91–2.04)	–0.25 (–2.77–2.28)	1.73 (–0.77–4.24)	1.08 (–1.15–3.31)	–0.80 (–2.46–0.86)	–0.83 (–2.17–0.51)
SEIFA index of area disadvantage						
2nd quartile	–1.27 (–3.09–0.56)	–1.06 (–2.74–0.63)	0.35 (–0.99–1.70)	0.58 (–0.70–1.86)	0.91 (–0.36–2.18)	0.48 (–0.70–1.66)
3rd quartile	–0.71 (–2.85–1.43)	–0.54 (–2.35–1.26)	0.10 (–1.24–1.44)	0.58 (–0.78–1.94)	0.61 (–0.77–1.99)	–0.04 (–1.14–1.06)
4th quartile	0.07 (–1.64–1.77)	0.30 (–1.24–1.84)	–0.22 (–1.51–1.07)	0.21 (–1.08–1.50)	0.15 (–1.13–1.44)	–0.51 (–1.53–0.51)
Remote residence	–2.48 (–6.22–1.25)	–0.70 (–3.77–2.37)	2.87 (–0.87–6.61)	1.43 (–1.76–4.63)	–0.38 (–2.07–1.31)	–0.74 (–1.93–0.46)
Public housing	–2.15 (–6.24–1.95)	0.57 (–1.52–2.67)	1.97 (–1.42–5.35)	–0.10 (–1.78–1.57)	0.18 (–2.05–2.41)	–0.47 (–1.70–0.76)
Residential mobility	–0.77 (–2.57–1.02)	–0.59 (–2.20–1.01)	1.11 (–0.26–2.49)	0.83 (–0.54–2.21)	–0.34 (–1.57–0.90)	–0.24 (–1.09–0.62)

Notes: Statistically significant differences are noted: * $p < .05$; ** $p < .01$; *** $p < .001$. Analyses control for psychosocial factors and parental attitude to immunisation.
Source: B cohort, Wave 1 (n = 3,755)

Table 4.8: Percentage point changes in full, partial and non-immunisation at 60 months by demographic characteristics at Wave 2 [a]

	Fully immunised		Partially immunised		Non-immunised	
	Univariate % change (95% CI)	Multivariate % change (95% CI)	Univariate % change (95% CI)	Multivariate % change (95% CI)	Univariate % change (95% CI)	Multivariate % change (95% CI)
Young mother	3.57 (–0.59–7.73)	3.12 (–1.16–7.40)	–3.02 (–6.91–0.86)	–2.69 (–6.88–1.51)	–0.54 (–2.03–0.94)	–0.43 (–1.79–0.92)
Mother born outside Aus/NZ	–1.43 (–5.04–2.17)	–4.21 (–8.78–0.37)	0.75 (–2.69–4.18)	2.84 (–1.70–7.38)	0.69 (–0.60–1.98)	1.37 (–0.06–2.80)
Mother speaks English at home	–1.53 (–5.42–2.36)	–3.39 (–7.88–1.10)	1.37 (–2.40–5.14)	2.82 (–1.56–7.20)	0.16 (–1.24–1.56)	0.57 (–0.78–1.92)
Single–mother household	–7.23 (–12.91––1.54) *	–6.95 (–13.53––0.37) *	7.36 (1.78–12.93) *	6.25 (–0.19–12.69)	–0.13 (–1.98–1.72)	0.70 (–1.41–2.82)
Number of siblings						
One	–2.88 (–6.04–0.29)	–3.48 (–6.52––0.44) *	3.57 (0.71–6.43) *	4.18 (1.26–7.09) **	–0.69 (–2.16–0.78)	–0.69 (–1.92–0.53)
Two	–12.29 (–16.45––8.12) ***	–11.91 (–15.91––7.90) ***	12.08 (8.22–15.93) ***	12.09 (8.25–15.94) ***	0.21 (–1.80–2.21)	–0.19 (–1.59–1.21)
Three or more	–19.10 (–25.81––12.38) ***	–15.89 (–21.89––9.88) ***	18.98 (12.52–25.43) ***	16.69 (10.82–22.57) ***	0.12 (–2.11–2.34)	–0.81 (–2.34–0.73)
Mother has degree	–0.23 (–3.0–2.54)	–1.24 (–4.05–1.56)	–0.85 (–3.31–1.60)	0.28 (–2.27–2.84)	1.08 (–0.05–2.22)	0.96 (–0.05–1.96)
Low parental income	–3.73 (–7.79–0.33)	–1.09 (–5.47–3.28)	4.36 (0.42–8.29) *	1.75 (–2.49–5.98)	–0.63 (–1.70–0.44)	–0.65 (–1.93–0.62)
Financial stress	–7.04 (–11.10––2.99) **	–4.87 (–8.82––0.93) *	6.82 (2.92–10.72) **	4.27 (0.47–8.08) *	0.22 (–1.20–1.64)	0.60 (–0.69–1.89)
SEIFA index of area disadvantage						
2nd quartile	1.52 (–2.12–5.16)	0.59 (–2.96–4.14)	–2.17 (–5.73–1.39)	–0.97 (–4.47–2.54)	0.64 (–0.69–1.98)	0.38 (–0.93–1.69)
3rd quartile	1.26 (–2.47–5.0)	0.62 (–2.90–4.14)	–1.66 (–5.14–1.82)	–0.63 (–4.0–2.75)	0.40 (–0.89–1.68)	0.01 (–0.97–0.98)
4th quartile	0.14 (–4.06–4.33)	–0.10 (–4.02–3.83)	–0.46 (–4.25–3.34)	0.74 (–3.07–4.55)	0.32 (–1.17–1.80)	–0.64 (–1.53–0.24)
Public housing	–7.48 (–15.77–0.80)	–1.77 (–8.43–4.89)	5.68 (–2.07–13.43)	–0.07 (–6.18–6.03)	1.81 (–1.88–5.49)	1.84 (–1.52–5.20)
Residential mobility	–3.32 (–6.34––0.29) *	–3.23 (–6.16––0.29) *	2.33 (–0.52–5.18)	2.68 (–0.17–5.52)	0.99 (–0.23–2.20)	0.55 (–0.41–1.51)

Notes: Statistically significant differences are noted: * $p < .05$; ** $p < .01$; *** $p < .001$. Analyses control for psychosocial factors and parental attitude to immunisation. [a] The numbers of children participating at each wave of LSAC vary, meaning that the sample size used to predict immunisation status at 60 months differs slightly from the sample size used to predict immunisation at12 and 24 months. This means that some of the differences observed between the apparent effects of the same predictors measured at Wave 1 vs Wave 2 could be due to this change in sample size.

Source: B cohort, Wave 2 (n = 3,069)

Table 4.9: Percentage point changes in full, partial and non-immunisation at 12 months by psychosocial factors at Wave 1

	Fully immunised		Partially immunised		Non-immunised	
	Univariate % change (95% CI)	Multivariate % change (95% CI)	Univariate % change (95% CI)	Multivariate % change (95% CI)	Univariate % change (95% CI)	Multivariate % change (95% CI)
Psychological distress						
Moderate	–1.09 (–4.38–2.21)	0.72 (–1.74–3.18)	–0.12 (–2.14–1.91)	–0.58 (–2.39–1.23)	1.20 (–0.98–3.38)	–0.14 (–1.58–1.31)
Symptomatic	–6.35 (–12.73–0.03)	–3.96 (–9.22–1.29)	6.06 (0.37–11.75)*	4.31 (–0.76–9.38)	0.29 (–3.30–3.88)	–0.35 (–2.56–1.86)
Time pressure	–0.47 (–1.96–1.03)	0.46 (–1.01–1.93)	0.87 (–0.35–2.09)	0.26 (–1.09–1.61)	–0.41 (–1.46–0.65)	–0.72 (–1.57–0.13)
Number stressful life events last 12 months						
1 event	0.87 (–0.86–2.61)	1.27 (–0.36–2.91)	–1.21 (–2.66–0.23)	–1.40 (–2.88–0.09)	0.34 (–0.73–1.41)	0.12 (–0.84–1.09)
2 events	–2.51 (–4.97––0.04)*	–1.94 (–4.33–0.45)	1.43 (–0.53–3.38)	1.19 (–0.81–3.19)	1.08 (–0.49–2.65)	0.75 (–0.59–2.10)
3+ events	–3.44 (–6.07––0.82)*	–1.54 (–3.98–0.90)	0.83 (–1.29–2.94)	0.01 (–2.16–2.19)	2.62 (0.94–4.30)**	1.53 (0.16–2.90)*
Parenting warmth						
Medium	2.01 (0.09–3.92)*	1.67 (–0.18–3.52)	–1.04 (–2.50–0.42)	–1.14 (–2.68–0.40)	–0.96 (–2.22–0.30)	–0.53 (–1.60–0.53)
High	0.67 (–1.39–2.73)	0.48 (–1.60–2.56)	0.12 (–1.53–1.77)	0.04 (–1.72–1.81)	–0.79 (–2.04–0.46)	–0.52 (–1.57–0.53)
Hostile parenting						
Medium	0.30 (–1.73–2.32)	1.04 (–0.81–2.90)	–0.57 (–2.21–1.08)	–0.59 (–2.24–1.06)	0.27 (–0.96–1.50)	–0.45 (–1.43–0.52)
High	0.66 (–1.30–2.62)	1.21 (–0.69–3.12)	–0.84 (–2.51–0.83)	–0.79 (–2.51–0.93)	0.18 (–1.08–1.44)	–0.42 (–1.41–0.57)

Notes: Statistically significant differences are noted: * $p < .05$; ** $p < .01$; *** $p < .001$. Analyses control for demographic/household factors and parental attitude to immunisation.
Source: B cohort, Wave 1 ($n = 3,755$)

Table 4.10: Percentage point changes in full, partial and non-immunisation at 24 months by psychosocial factors at Wave 1

	Fully immunised		Partially immunised		Non-immunised	
	Univariate % change (95% CI)	Multivariate % change (95% CI)	Univariate % change (95% CI)	Multivariate % change (95% CI)	Univariate % change (95% CI)	Multivariate % change (95% CI)
Psychological distress						
Moderate	–1.47 (–4.31–1.37)	0.12 (–1.80–2.03)	–0.06 (–1.71–1.58)	–0.42 (–1.84–1.0)	1.53 (–0.66–3.72)	0.30 (–1.12–1.72)
Symptomatic	–0.11 (–4.20–3.97)	1.19 (–1.08–3.47)	0.73 (–2.47–3.93)	–0.49 (–2.46–1.48)	–0.62 (–3.27–2.04)	–0.70 (–1.96–0.55)
Time pressure	0.37 (–0.92–1.65)	0.95 (–0.26–2.15)	0.02 (–0.90–0.94)	–0.23 (–1.19–0.73)	–0.39 (–1.37–0.59)	–0.71 (–1.51–0.08)
Number stressful life events last 12 months						
1 event	0.59 (–0.81–1.98)	0.78 (–0.48–2.03)	–0.94 (–1.94–0.05)	–0.96 (–1.97–0.06)	0.36 (–0.65–1.37)	0.18 (–0.74–1.10)
2 events	–1.36 (–3.49–0.76)	–1.0 (–2.87–0.86)	0.49 (–0.95–1.93)	0.46 (–1.02–1.94)	0.87 (–0.58–2.32)	0.54 (–0.65–1.73)
3+ events	–3.11 (–5.32––0.89) *	–1.85 (–3.92–0.22)	1.13 (–0.40–2.67)	0.89 (–0.91–2.68)	1.97 (0.44–3.51) *	0.96 (–0.11–2.03)
Parenting warmth						
Medium	0.67 (–0.95–2.29)	0.18 (–1.32–1.69)	0.17 (–1.01–1.34)	0.26 (–0.95–1.46)	–0.84 (–2.0–0.33)	–0.44 (–1.40–0.52)
High	0.43 (–1.18–2.05)	0.26 (–1.15–1.67)	–0.01 (–1.15–1.13)	–0.13 (–1.16–0.91)	–0.42 (–1.60–0.75)	–0.13 (–1.11–0.85)
Hostile parenting						
Medium	0.11 (–1.51–1.73)	0.70 (–0.71–2.10)	–0.58 (–1.71–0.55)	–0.55 (–1.73–0.64)	0.47 (–0.67–1.61)	–0.15 (–1.01–0.71)
High	0.36 (–1.24–1.96)	0.69 (–0.78–2.17)	–0.50 (–1.70–0.70)	–0.39 (–1.66–0.88)	0.14 (–1.05–1.33)	–0.31 (–1.22–0.61)

Notes: Statistically significant differences are noted: * $p < .05$; ** $p < .01$; *** $p < .001$. Analyses control for demographic/household factors and parental attitude to immunisation.
Source: B cohort, Wave 1 (n = 3,755)

Table 4.11: Percentage point changes in full, partial and non-immunisation at 60 months by psychosocial factors at Wave 2

	Fully immunised		Partially immunised		Non-immunised	
	Univariate % change (95% CI)	Multivariate % change (95% CI)	Univariate % change (95% CI)	Multivariate % change (95% CI)	Univariate % change (95% CI)	Multivariate % change (95% CI)
Time pressure	–4.93 (–7.44––2.42) ***	–3.83 (–6.33––1.34) **	4.22 (1.78–6.65) **	3.63 (1.15–6.11) **	0.71 (–0.32–1.74)	0.20 (–0.71–1.12)
Number stressful life events last 12 months						
1 event	3.13 (–0.44–6.71)	2.66 (–0.70–6.02)	–2.39 (–5.77–0.98)	–2.08 (–5.39–1.24)	–0.74 (–1.94–0.46)	–0.58 (–1.62–0.45)
2 events	2.75 (–1.24–6.74)	3.21 (–0.69–7.11)	–2.44 (–6.32–1.43)	–2.54 (–6.57–1.48)	–0.31 (–1.85–1.23)	–0.67 (–1.97–0.64)
3+ events	–1.72 (–6.12–2.68)	0.89 (–3.18–4.96)	0.80 (–3.52–5.12)	–1.19 (–5.30–2.92)	0.92 (–0.88–2.72)	0.30 (–1.16–1.76)
Parenting warmth						
Medium and high †	–0.58 (–3.44–2.27)	–1.20 (–4.02–1.61)	0.60 (–2.04–3.24)	1.07 (–1.60–3.75)	–0.01 (–1.05–1.02)	0.13 (–0.71–0.97)
Hostile parenting						
Medium	3.24 (–0.23–6.71)	3.17 (–0.12–6.45)	–3.53 (–6.79––0.28) *	–3.31 (–6.54––0.09) *	0.29 (–0.98–1.57)	0.15 (–1.0–1.29)
High	5.23 (1.80–8.65) **	4.85 (1.37–8.33) **	–4.09 (–7.39––0.80) *	–3.92 (–7.34––0.50) *	–1.13 (–2.27–0.01)	–0.93 (–1.93–0.07)

Notes: Statistically significant differences are noted: * $p < .05$; ** $p < .01$; *** $p < .001$. Analyses control for demographic/household factors and parental attitude to immunisation.
† The upper two 33% percentiles were not unique for parenting warmth at Wave 2, therefore parenting warmth was classified as low and medium/high
Source: B cohort, Wave 2 (n = 3,069)

Results for parental attitude to childhood immunisation

Table 4.12 shows the effect of a parent disagreeing very strongly or quite strongly (compared to agreeing very strongly or quite strongly, or being neutral) on predicted change in the probability of being fully immunised, partially immunised and non-immunised at 12 and 24 months, and of being non-immunised at 60 months. At all ages, and in both univariate and multivariate models, parental disagreement was associated with at least a 60 percentage point lower likelihood of full immunisation. However, parental disagreement was not related to partial immunisation at 12 and 24 months. This strongly suggests that non-immunisation is mostly the result of parental choice, while partial immunisation may be better accounted for by demographic or other psychosocial factors.

Table 4.12: Percentage point changes in immunisation status at 12, 24 and 60 months in relation to parent disagreement with immunisation

	Parent disagrees quite strongly or very strongly with child immunisation	
	Univariate % change (95% CI)	Multivariate % change (95% CI)
12 months [1]		
Fully immunised	–70.44 (–80.58––60.30) ***	–66.51 (–76.22––56.81) ***
Partially immunised	1.01 (–4.08–6.09)	1.13 (–4.56–6.81)
Non-immunised	69.43 (58.70–80.16) ***	65.39 (54.90–75.88) ***
24 months [1]		
Fully immunised	–70.61 (–80.96––60.26) ***	–66.78 (–76.39––57.17) ***
Partially immunised	4.62 (–1.07–10.30)	5.02 (–1.21–11.26)
Non-immunised	65.99 (54.94–77.05) ***	61.76 (51.10–72.41) ***
60 months [2]		
Fully immunised	–68.97 (–79.93––58.01) ***	–66.05 (–78.33––53.78) ***
Partially immunised	6.03 (–4.10–16.15)	5.07 (–4.94–15.09)
Non-immunised	62.95 (50.18–75.71) ***	60.98 (47.05–74.92) ***

Notes: Statistically significant differences are noted: * $p < .05$; ** $p < .01$; *** $p < .001$.
Analyses control for demographic/household and psychosocial factors.

Source: [1] B cohort, Wave 1 (n = 3,755); [2] B cohort, Wave 2 (n = 3,069).

What are the most important correlates of non- and partial immunisation?

The results of the multivariate models discussed above showed that several demographic variables increased the risk of partial immunisation. Consistent with the literature, children with more siblings were at increased risk of not being fully immunised (Bond, Nolan, & Lester, 1999; Brown et al., 2010; Falagas & Zarkadoulia, 2008; Haynes & Stone, 2004; Pearce et al., 2008; Samad et al., 2006). Children in households experiencing indicators of disadvantage (e.g., low income, financial strain, residential mobility) were at slightly higher risk of being partially immunised than children in households not experiencing these indicators of disadvantage. These effects were strongest at 60 months and smallest at 24 months. Effects of psychosocial variables were small and inconsistent over time, but generally suggested that stressful life events and lack of time played some role in hindering full immunisation.

Overall, however, results showed that parental attitude was far and away the most important correlate of non-immunisation (but not partial immunisation) at all three ages. Figure 4.3 (page 90) illustrates this with simple cross-tabulation of the dichotomised parental attitude variable with immunisation status at 12 months. Parents who agreed with immunisation were very likely to immunise their child. On the other hand, 67% of children whose parents disagreed—either quite strongly or very strongly—were non-immunised. In the population of Australian 1 year olds in 2004, this would equate to between 2,190 and 3,689 children.

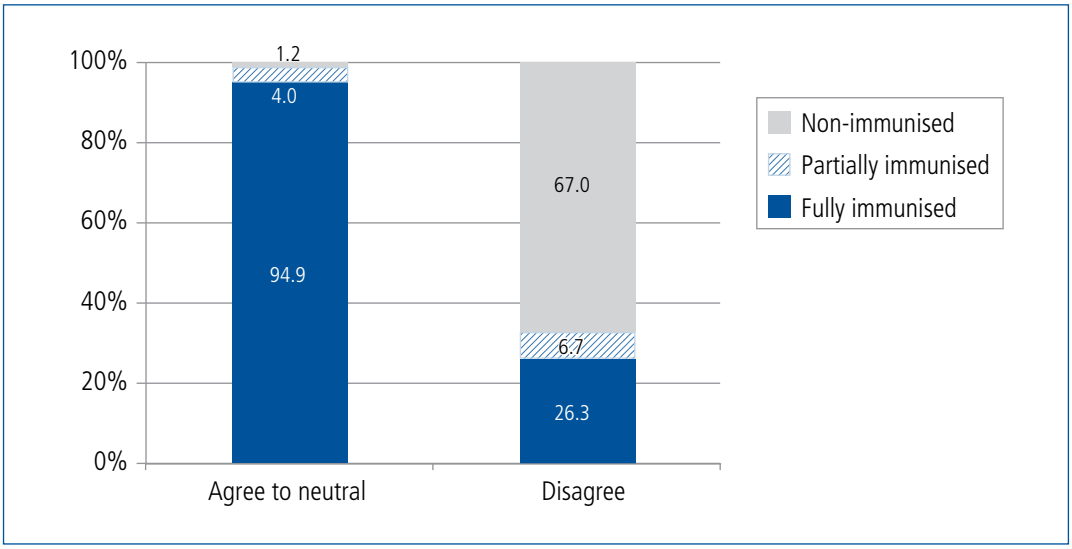

Figure 4.3: Parental attitude to child immunisation and immunisation status at 12 months

Exploring the role of parental attitudes in childhood immunisation

Given the importance of parental attitudes, we carried out follow-up analyses to understand how much of an impact changing parental attitude might have. First, we estimated the *population attributable fraction* for parental attitudes with regard to non-immunisation. The population attributable fraction (Greenland & Drescher, 1993) provides an estimate of how much non-immunisation can be accounted for by parent disagreement. For instance, it can suggest how much of the existing proportion of non-immunisation *in the whole sample* might be prevented if some kind of intervention could make all parents not disagree with immunisation. Additionally, it can tell us how much of the non-immunisation *among disagreeing parents* only might be prevented if all these parents agreed with immunisation. All these estimates assume that parental attitude to childhood immunisation has a causal effect on non-immunisation, and that all other factors (i.e., demographics, psychosocial factors) remain the same.

Figure 4.4 shows these population attributable fractions for non-immunisation at 12, 24 and 60 months. *In the whole sample* at 12 and 24 months, around 50% of all non-immunisation was attributable to parent disagreement with childhood immunisation, and at 60 months around 62% of non-immunisation was attributable to this parent disagreement. Therefore, at each of these ages, between 2,000 and 3,000 cases of non-immunisation might be prevented if parental disagreement could be removed. In parents who disagree, virtually *all* of the non-immunisation at 12, 24 and 60 months is attributable to this disagreement.

For comparison, we carried out the same analyses for number of siblings with regard to partial immunisation, as siblings were the next most consistent predictor of immunisation status. The results are shown in Figure 4.5. We pooled across siblings, estimating at each age how many cases of partial immunisation were attributable to living in a household with at least one sibling, compared to no siblings. At 12 months, about 40% of partial immunisation in the whole sample was attributable to number of siblings, rising to about 50% at 24 and 60 months. Among families with siblings, between half and two-thirds of cases of partial immunisation were attributable to number of siblings (50% at 12 months and 60 months; 65% at 24 months). Two features of these analyses may be noted in comparison to those for attitudes. First, the confidence intervals are much larger, showing that the estimates for the role of siblings in partial immunisation are less stable than for attitudes. Second, among larger families only about 50–60% of cases of partial immunisation were attributable to family size. Both these features suggest that it is not family size alone that increases the risk of partial immunisation, but other factors that may be correlated with family size such as lack of time, lack of transport, difficulties with child care arrangements and lower financial resources.

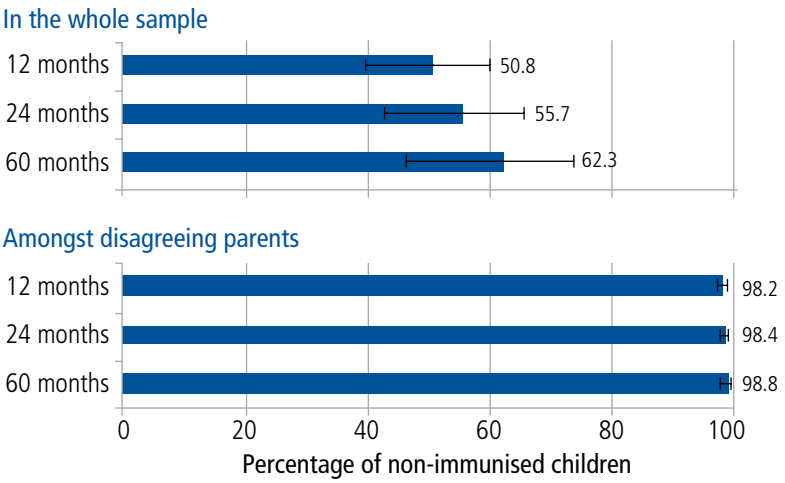

Figure 4.4: The percentage of non-immunisation at 12, 24 and 60 months that is attributable to parent disagreement with childhood immunisation

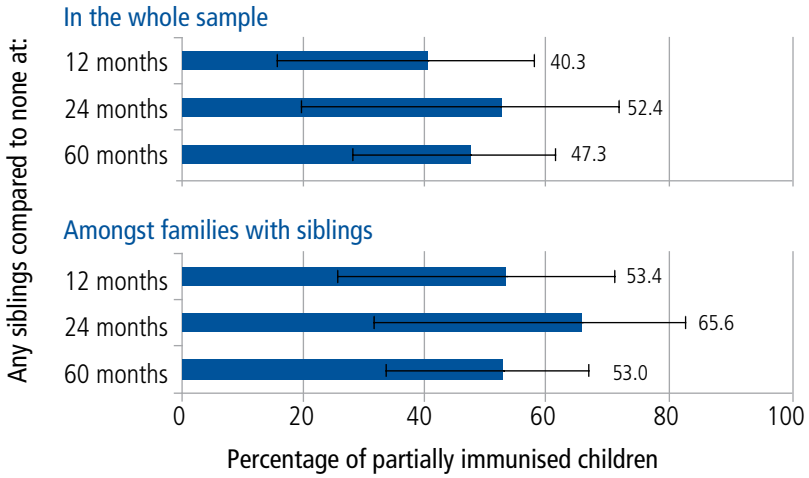

Figure 4.5: The percentage of partial immunisation at 12, 24 and 60 months that is attributable to children living in a household with at least one sibling

4.4 Conclusion

The aim of this chapter was to describe patterns and predictors of incomplete immunisation at 12, 24 and 60 months in the LSAC B cohort. The LSAC data were linked to immunisation records. This enabled us to use the extensive information about children's families and communities available in LSAC to examine how children's immunisation status was related to a range of demographic and psychosocial factors.

These analyses make two important contributions to the literature. First, unlike most previous studies that have examined predictors of incomplete immunisation, we considered how children who were fully immunised were different from both children who were partially immunised, and from children who were not immunised at all. Our results are consistent with international studies showing that there are some important differences between these groups (Samad et al., 2006; Smith et al., 2004). Second, this is the first nationally representative study to show that parental attitude to immunisation is a stronger correlate of incomplete immunisation than demographic or psychosocial variables. We discuss these findings in more detail shortly.

Patterns of full, partial, and non-immunisation

Our first three research questions asked:

1. What are the rates of full, partial and non-immunisation in the LSAC children?
2. How persistent is incomplete immunisation between 12 and 60 months?
3. How accurate is parents' understanding of whether children are up to date with the immunisation schedule?

Rates of full immunisation at 12 and 24 months were above 90%, and at 60 months the rate was a little over 80%, which are comparable with national estimates from the period. To date, studies have not examined the extent to which children's immunisation status persists over time. Our descriptive results showed that most children who started out partially immunised went on to be fully immunised at older ages, but that children who started out non-immunised were very unlikely to be even partially immunised in the future. This suggests that strategies to encourage catch-up immunisation might need to be different for these groups.

Parents' perceptions of how up to date their children were with the immunisation schedule provided another interesting perspective on immunisation status and gives an insight into whether information campaigns would be effective in raising the immunisation rate. Using a subsample of children who were aged 7–10 months old at the Wave 1 interview, we found that 44% of parents of partially immunised children thought their child was fully up to date with the immunisation schedule. In contrast, 99% of parents of fully immunised children said their child was fully up to date, and parents of non-immunised children were also quite accurate (about 18% thought their child was fully up to date).

The poor correspondence between parent perceptions and actual immunisation record data for partially immunised children, in particular, suggests that increasing parents' knowledge about the schedule may lead to higher rates of full immunisation. It may also lead to children achieving the full immunisation status earlier, given that those with partial immunisation are likely to eventually become fully immunised. While contemporary parents may have more knowledge than parents in 2004–08, we cannot know if this is the case because contemporary data of this nature are not available. Moreover, the schedule has been expanded in recent years, adding to the amount of information parents must retain.

Predictors of full, partial and non-immunisation

Our last two research questions were:

4. What demographic, psychosocial and attitudinal factors are associated with full, partial, and non-immunisation?
5. What are the most important correlates of partial immunisation and non-immunisation?

The importance of parental attitude to childhood immunisation

Previous studies examining incomplete immunisation have generally focused on demographic and social factors, especially indicators of poverty and disadvantage. However, objection to vaccination is one of the factors contributing to outbreaks of diseases such as measles and whooping cough (Dawson & Apte, 2015). Our results demonstrate for the first time that about 50% of *non-immunisation* in Australian children at the childhood milestones of 12, 24 and 60 months (between 2004 and 2006) was attributable to parent disagreement with immunisation. *Partial immunisation*, on the other hand, was not related to parental disagreement.

It is interesting to note that at 12 and 24 months, there were about as many non-immunised children of parents who *agreed* with immunisation as there were non-immunised children of parents who disagreed with immunisation. The key difference is that among parents who *disagreed* almost all non-immunisation of children was attributable to parental attitudes (see Figure 4.4, (page 91)). Whereas, non-immunisation in the children of parents who agreed with immunisation was not well explained and was not attributable to any single factor included in our analysis. As we discuss shortly, the other demographic and psychosocial variables were not strongly related to non-immunisation.

Demographic and psychosocial factors

The relatively small influences for demographic and psychosocial factors are a notable feature of these analyses, especially in comparison to studies that have shown a strong influence of these factors (e.g., Haynes & Stone, 2004). There are two main reasons that probably account for the small influence of non-attitudinal factors in this study. First, some demographic and psychosocial variables were not associated with immunisation status in the multivariate models because they were correlated with other variables in the model, and thus had no unique explanatory power for immunisation status. For example, the univariate models for immunisation status at 12 months showed that single-parent families and low income were associated with incomplete immunisation, but these associations were not statistically significant in the multivariate model. These associations were small even in the univariate models, so overall we conclude that collinearity is not the only explanation for the small influences of demographic and psychosocial variables. The second reason is that partial and non-immunisation were rare, especially at 12 and 24 months, and there was insufficient power to observe associations between demographic variables and these outcomes that affected only 5–7% of the sample. Studies of whole populations in Australia have uncovered associations between indicators of low socio-economic status and incomplete immunisation (e.g., Haynes & Stone, 2004; Hull et al., 2001). A sample with a larger proportion of disadvantaged families might be required to more thoroughly investigate demographic risk factors for partial and non-immunisation, especially at 12 and 24 months.

However, some of the demographic and psychosocial variables did emerge as statistically significant predictors of immunisation status in the first two years:

- At 12 and 24 months, children in families with *more siblings* were more likely to be partially immunised.
- At 12 and 24 months, children in families who were *receiving the Child Care Benefit* were more likely to be fully immunised, or less likely to be non-immunised. As complete immunisation was an eligibility requirement for the Child Care Benefit, this likely reflects the incentive to immunise.
- At 24 months only, children in households in the *lowest income* quintile were more likely to be partially immunised.
- At 12 months only, children of mothers who had experienced three or more *stressful life events* in the past year were more likely to be non-immunised.
- At 12 and 24 months, there was a small decrease in the likelihood of full immunisation among the children of mothers *born outside Australia*. Other Australian research has shown that having a mother born overseas is associated with increased risk of incomplete immunisation (Haynes & Stone, 2004). However, in the present study, we also found that full immunisation at 12 months was less likely in children of mothers who spoke English at home. This makes it unclear how to interpret these two coefficients. Given that the effects were small and not statistically significant in the univariate models, we do not interpret these effects further.

The demographic and psychosocial variables were more strongly related to immunisation status at 60 months. A higher likelihood of incomplete immunisation at 60 months was related to:

- having more siblings;
- single parenthood;
- experience of financial stress;
- having moved in the last 2 years;
- a mother often or always feeling rushed; and
- lower levels of parenting hostility.

Moreover, the effects sizes for siblings were substantially larger at 60 months than at 12 or 24 months. These results suggest that financial and time pressures may make it difficult for some parents of 4 year olds to keep up with the immunisation schedule. However, all these influences were small in comparison to the role of parental attitudes.

The relationship between more hostile parenting and a higher likelihood of full immunisation at 60 months is puzzling. One possibility is that low levels of hostility actually indicate parenting that is overly permissive, or low in control. "Control" refers to firm discipline and the setting of appropriate limits and expectations on children's behaviour. Appropriate control is generally associated with

a wide range of positive child outcomes, including health outcomes (Amato & Fowler, 2002). For example, a study using the K cohort found that low paternal parenting control increased the odds of 4–5 year olds being overweight or obese (Wake, Nicholson, Hardy, & Smith, 2007). It is possible that low control could also lead to delayed immunisation, especially if parents are also stressed in other ways. There could also be a complex relationship between parenting style and parental attitude to immunisation (such as parents with a harsh discipline style being more rule-bound, socially conservative and compliant), or this could be a chance finding. Understanding this finding requires more research.

Apart from attitudes, the only factor that was consistently associated with immunisation status at 12, 24 and 60 months was the number of siblings in the household. At all ages, children with siblings were less likely to be fully immunised, or more likely to be partially immunised, compared to children with no siblings in the household. This finding is consistent with past studies that have frequently found large family size to be related to incomplete immunisation (Falagas & Zarkadoulia, 2008; Luman et al., 2003) and suggests that caring for many children might create barriers to immunisation. For instance, it is possible that factors such as time pressure and financial stress are clustered in some larger families.

Partial immunisation versus non-immunisation

Previous studies comparing partial and non-immunisation suggest that partially immunised children are from less affluent families than both fully immunised and non-immunised children (e.g., Samad et al., 2006; Smith et al., 2004). However, in LSAC data, demographic factors were not as strongly related to the probability of children being partially immunised as we expected, especially at 12 and 24 months. One reason for this may be that because infant immunisation coverage in Australia is high, even children from high-risk families are engaged by the public health system. As discussed, however, it is also likely that we had insufficient power to uncover the reasons why a small group of children are not fully immunised, even though their parents have not made the choice to reject vaccination entirely.

Subtypes of incompletely immunised children

Comparison of the univariate and multivariate models generally suggests that the demographic factors, psychosocial factors and attitudes to immunisation operate somewhat independently to their relationship to immunisation status. This raises the possibility that there may be fairly distinct groups of incomplete-immunising parents, perhaps including those who disagree, those who have difficulties accessing timely vaccinations because of disadvantage or lack of time or lack of knowledge of the schedule, and those whose children have health concerns that prevent complete immunisation. Some researchers have begun to explore a subgroup approach to non-immunisation (Pearce, Marshall, Bedford, & Lynch, 2015) and this is an issue for future research.

Limitations

The strengths of this study include its nationally representative design and linked administrative data on immunisation, eliminating the problems with parent or provider recall present in other studies of immunisation. It also fills a gap in the literature by examining the association between immunisation status and parental attitude to immunisation alongside demographic and psychosocial factors. While the availability of data on attitudes is an advantage, information about specific reasons for incomplete immunisation was not available, so we could not examine the role of health-related concerns or contra-indications. Another weakness was that the parental attitude item was available from the primary caregiver at Wave 1 only. This means that we could not assess the extent to which both parents agreed or disagreed with childhood immunisation. Also, changes in attitude could not be assessed. However, Wave 1 parental attitude remained strongly related to incomplete immunisation 4 years later, even after controlling for more contemporaneous factors. This suggests that the attitude of the primary caregiver might be quite stable in the first few years of a child's life. The LSAC data also cannot examine geographic variations in immunisation coverage and conscientious objection (Hull, Dey, Menzies, & McIntyre, 2013; Hull et al., 2012).

Another limitation is that the LSAC sample excluded temporary residents, who may be new arrivals to Australia (Soloff et al., 2005). Research shows that children born overseas are also less likely to be completely immunised. Children from some developing countries, or who are refugees, may arrive

without adequate immunisation. Also, immunisations received overseas are not always transferred to the ACIR (Gibbs, Hoskins, & Effler, 2015). The correlation between maternal or child overseas birth and partial/non-immunisation would need to be examined using other data.

Finally, these data are now 7–10 years old, somewhat limiting the extent to which conclusions can be drawn about Australian infants and parents in the present. As coverage at 12 and 24 months has remained relatively stable, it is likely that contemporary findings would be similar to our findings for 12 and 24 months. As coverage at 60 months has increased to over 90%, however, our findings could be less applicable to a contemporary 60-month cohort.

Policy implications

The present study highlighted improvement in parental attitudes as the factor that could yield the greatest increase in immunisation coverage at all ages. For example, 2,000 to 3,000 more children Australia-wide might be immunised at 12 months if all parents agreed with immunisation. However, the evidence suggests that it is very difficult to shift the attitudes of those who object to immunisation. Some information and education campaigns have reported small improvements in parents' intentions to vaccinate (Gowdra, Schaffer, Kopec, Markel, & Dempsey, 2013; Williams, Rothman, Offit, Schaffner, Sullivan, & Edwards, 2013) but a recent nationally representative US trial of a vaccine-information campaign found that it actually decreased intent to vaccinate among parents who had the least favourable attitudes towards vaccines (Nyhan, Reifler, Richey, & Freed, 2014). Therefore, targeting committed vaccine-objectors may not be an effective approach.

A more cost-effective approach might be to instead target those who are vaccine hesitant, rather than hardened objectors. Researchers have begun to develop communication frameworks for GPs and other immunisation providers for talking with vaccine-hesitant parents (Danchin & Nolan, 2014; Leask, Kinnersley, Jackson, Cheater, Bedford, & Rowles, 2012). These frameworks emphasise respectful communication that is tailored to specific parents' concerns, and that aims to guide—rather than direct—the parent towards making a quality, evidence-based decision. Such approaches have been useful in other areas of health promotion such as smoking cessation, but evidence in the vaccine setting is still sparse. An important component of the current funding boost to the National Immunisation Program involves providing tools to assist immunisation providers to talk with vaccine-hesitant parents, as well as awareness campaigns (see Box 4.1, (page 73)). To support the development of these policy initiatives, future research should explore the role of mild disagreement with immunisation for explaining immunisation status at key milestones.

Other effective approaches are to address logistic problems that some families, especially those with several children, may have in accessing immunisation. Recall and reminder systems at both the provider and family level could be effective in increasing vaccine uptake (Harvey, Reissland, & Mason, 2015), as could "catch-up plans" for delayed and overdue vaccinations (Ward, Chow, King, & Leask, 2012). As we found that 44% of parents of partially immunised children thought their child was fully up to date with the schedule, these strategies to remind parents, in concert with targeted messages addressing the concerns of immunisation-hesitant parents, should be especially useful in addressing partial immunisation.

Future research

This study has contributed to our understanding of some factors underlying partial and non-immunisation in an Australian birth cohort. However, much remains to be learned about reasons for incomplete immunisation in Australia. Future researchers should consider focusing on sub-populations that may be at high risk of incomplete immunisation, such as very disadvantaged families and new arrivals to Australia. The specific reasons for late immunisation in large families should be more closely examined, in order to design effective interventions. More detailed measures of parental attitudes towards immunisation should also be examined, especially vaccine hesitancy. In addition, it would be interesting to consider whether the identification of distinct clusters of parents, defined by demographic and attitudinal differences, would be useful for targeting policy initiatives.

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Australian children's screen time and participation in extracurricular activities

5

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5.1 Introduction

Over the past decade, screen time has begun to play an increasing role in children's lives. Media devices such as computers and mobile devices have provided significant opportunities for sociability, learning, creativity, self-expression and entertainment, and television remains a central element of children's leisure time (Houghton et al., 2015). High levels of screen-based activities during childhood, however, have detrimental effects on aspects of children's wellbeing (Caroli, Argentieri, Cardone, & Masi, 2004; Laurson, Lee, Gentile, Walsh, & Eisenmann, 2014). As a consequence, there has been considerable interest in understanding more about how much time children spend on screen-based activities, how the amount of screen time varies across children from different families, and whether time spent on these activities is related to children's time spent on other activities and their wellbeing. This chapter uses LSAC data to explore some of these issues.

Use of new electronic media, such as computers and electronic games, has become increasingly prevalent in children's lives, with almost every Australian household with children under 15 years of age (96%) having access to the Internet at home in 2012–13 (Australian Bureau of Statistics, 2014). As at April 2012, 90% of children aged 5–14 years had accessed the Internet in the previous year (Australian Bureau of Statistics, 2012). According to this same survey, watching television (including DVDs and movies) consumed more of children's leisure time than other identified recreational activities (Australian Bureau of Statistics, 2012), and so remains an important area to explore in relation to screen time.

Concerns about potential negative effects of excessive screen time have led to recommendations about placing limits on children's screen time. For example, the Australian Government, as part of its physical activity and sedentary behaviour guidelines for children aged 5–12 years (Department of Health, 2014) recommends that electronic media use for entertainment purposes be limited to a maximum of 2 hours per day. This recommendation was originally made for children in the United States (American Academy of Pediatrics, 2013). Acknowledging the changed technological environment in which children are now growing up, the American Academy of Pediatrics expects to publish revised guidelines in 2016. For Australia and the US (as well as other countries), current guidelines concerning screen time go beyond the 2-hour recommended limit; including suggesting parents limit access to screens in children's bedrooms, monitor how children are using screens, spend screen time together with their children and act as role models by also limiting their own screen time. In anticipation of publishing revised guidelines, a 2015 article by the American Academy of Pediatrics (2015) accentuated the importance of these broader approaches to managing children's screen time.

Much research has focused on the extent to which children adhere to the recommended 2-hour daily maximum of screen time, with it increasingly apparent that most children, across a number of countries, spend more time on screens than this (see Houghton et al., 2015; Melkevik, Torsheim, Iannotti, & Wold, 2010). For example, Houghton et al. (2015) reported that the proportion of 8–16 year olds exceeding 2 hours of screen-based activities (all forms, not just entertainment) per weekday, increased from 45% of 8 years olds up to 80% of 16 years olds. Hardy, Dobbins, Denney-Wilson, Okely, and Booth (2006), in a study of 11–15 year olds in selected schools in New South Wales, found that 53% of children in primary school and 72% of children in secondary school spent

2 or more hours per day on small-screen recreation (including television, computers, video and DVDs). In a sample of children aged 3–5 in Melbourne, Victoria (Hinkley, Salmon, Okely, Crawford, & Hesketh, 2012) children spent an average of 113 minutes per day on screen-based entertainment, including television viewing, computer/Internet and electronic games use during a typical week.

Children's screen time encompasses a broad range of activities, with mobile screen media, such as mobile phones and iPads, providing young people with access to an increased variety of activities throughout the day. This includes recreational activities such as watching television and playing games, as well as educational activities and social networking (Houghton et al., 2015; Straker, Smith, Hands, Olds, & Abbott, 2013). The guidelines for screen time noted above refer to screen time for entertainment reasons, but estimates of children's screen time often include these other activities. Clearly, it is important to go beyond aggregate measures of screen time to take account of such differences, especially when thinking about the possible implications of screen time for children's wellbeing (Straker et al., 2013). Time spent on different screen-based activities provides some indicator of children's potential exposure to risk and opportunities for their wellbeing, and we will focus on *time* in this chapter. Of course, there are other dimensions to this, such as the content of the program or game and the degree to which it actually involves physical activity or communication with others. We are not able to explore these aspects with LSAC.

Factors related to screen-based activities

In exploring differences in the amount of time children spend on screen-based activities a key focus has been on children's gender. Some studies have found that boys are more likely than girls to spend more than 2 hours daily on screen-based activities (Carlson & Berger, 2010; Hardy et al., 2006; Hesketh, Wake, Graham, & Waters, 2007), while others have found the opposite (Houghton et al., 2015). It is likely different findings reflect differences in how screen time is measured, given that gender differences are apparent for specific types of screen-based activities. Studies have found similar computer usage and computer access between boys and girls (see Marshall, Gorely, & Biddle, 2006), but significant differences in purpose and intensity between the two groups may exist. For example, in a study by Houghton et al. (2015), boys spent more time on screen-based activities for gaming than girls, while girls spent more time than boys on screen-based activities for social networking.

Age-related differences are also apparent, with older children spending more time than younger children on screen-time activities (Carlson & Berger, 2010; Houghton et al., 2015). Longitudinal studies also indicate that screen time tends to increase with age. Marshall et al. (2006), for example, reported that screen time increased from early childhood, peaking at about age 9–12 years, and decreasing in adolescence. In a study of 1,039 children aged 10–13 years in South Australia, Olds, Ridley, and Dollman (2006) reported that screen time increased at an overall rate of about 16 minutes per year of age. The overall age trends are not necessarily reflected in all screen-time activities. For example, Houghton et al. (2015) showed that spending more than 2 hours per day "gaming" declined with age while spending more than 2 hours per day on social networking peaked at grade 9, compared to younger ages.

Time use research shows that children of parents with higher levels of education spend less time watching television and more time reading (Bianchi & Robinson, 1997; Hofferth & Sandberg, 2001; Timmer, Eccles, & O'Brien, 1985), although when looking at other forms of screen time, parental education is not always a correlate. For example, Christakis, Ebel, Rivara, and Zimmerman (2004) found that children's time spent playing computer games did not vary with parental education, although they found higher education was associated with decreased hours of television and video viewing. Exploring parental education differences for specific types of screen time will be a focus of this chapter.

Accessibility of electronic media and family regulation also has an important influence on the amount of time children spend on screen-based activities (LeBlanc et al., 2015). Having more televisions in the household, a computer in the child's bedroom and not having rules for television watching or computer use are related to more time spent on related sedentary behaviours (Carlson & Berger, 2010; De Jong, Visscher, HiraSing, Heymans, Seidell, & Renders, 2013; Tandon, Zhou, Sallis, Cain, Frank, & Saelens, 2012). There is also considerable diversity across Australian families in the degree to which children have access to televisions, and in the different sets of rules and ways of enforcing these rules within the home (Bittman & Sipthorp, 2011). As these are modifiable factors

for parents, it is not surprising that these are some of the factors targeted in recommendations for parents on ways to manage their children's screen time (American Academy of Pediatrics, 2015; Australian Government Department of Health, 2014).

We will be exploring these factors here, and looking at not only how much time children spend on screen-time activities (overall, and specific activities) but also the times of day that screen-time activities occur.

A key concern about screen-based activities is that they may displace time spent in activities that are more developmentally beneficial to children. In this chapter, we explore how screen time varies according to children's participation in extracurricular activities, such as team and individual sports, art and music lessons and involvement with community groups. Activities such as these are generally linked with positive outcomes for children (see discussion in Simoncini & Caltabiano, 2012).

Much of the concern about screen time is that the typically sedentary nature of this time may cause health problems such as obesity. There are numerous studies that have confirmed a relationship between the amount of screen time (or specific types of screen time) and poorer health outcomes among children (e.g., Caroli et al., 2004; Fairclough, Boddy, Hackett, & Stratton, 2009; Hancox & Poulton, 2005; Laurson et al., 2014). A possible explanation for the associations between screen time and poorer health outcomes is that spending time on screen-based activities detracts from children's time spent in active pursuits, but there is no strong evidence of this being the case, with some research finding that time spent on screen-based activities is not negatively correlated with time spent on active pastimes (De Jong et al., 2013; Melkevik et al., 2010).

In this chapter, we will consider how children's screen time varies according to children's self-reported health and their enjoyment of physical activities to provide new insights on the way in which screen time and health may be related. Self-report indicators such as these are associated with children's participation in physical activities outside of school (Mullan & Maguire, 2012).

Debate continues on the possible long-term effects of children's screen time on children's social and educational wellbeing. We will not be exploring this here, but LSAC will offer opportunities to analyse such associations as the children grow older.

Research questions

This chapter assesses LSAC children's time spent on different types of screen-based activities at home, including watching television, playing electronic games and using computers. This study includes analyses of parent reports, children's reports as well as children's time use information to explore this topic. The specific research questions examined in this chapter are:

1. What are the patterns of screen time (watching television, using the computer and playing electronic games) among Australian children from the ages of 4–5 to 12–13 years?
2. Does children's screen time vary according to the child's gender and parental education?
3. To what extent is children's screen time associated with their participation in extracurricular activities at early adolescence?
4. Does children's screen time relate to self-rated physical wellbeing and enjoyment of physical activities?

This chapter first introduces the data used (section 5.2). Then the overall patterns of screen time activities are described in section 5.3. This is followed by analyses of television viewing in section 5.4, and computer use and electronic games in section 5.5. Within these sections, the differences in children's time use according to the child's gender and parental education are examined. The relationship between children's screen time and their participation in extracurricular activities is explored in section 5.6. In section 5.7 associations between screen time and child-reported physical wellbeing and the level of enjoyment of physical activity are investigated. We conclude the chapter with a summary of the results and implications.

5.2 Data and measures

Information about children's screen-based activities has been collected at each wave of LSAC, and analysed here for the K cohort Waves 1 to 5, when children were aged 4–5 to 12–13 years old. Information presented here includes data gathered through parent reports and the children's time

use diary (TUD) for three types of screen-based activities (television viewing, computer use and electronic games). The parent-reported data varied a little over the waves, as will be described in the analytical sections below. One of the unique features of LSAC is the children's time use data, as collected through time use diaries. In Waves 1 to 3, the parents reported children's time use and, in Waves 4 and 5, the children reported their time use. These approaches, and the resulting data, are described in Box 1 (page 103). Using the children's time use data is especially valuable, as research has shown this methodology is able to produce valid and reliable estimates of time use (Juster & Stafford, 1985).

All children were in scope, and differences by child age were a key focus for the initial analyses of different types of screen-time activities. Within later sections, the focus of the analyses was on particular ages, to provide illustrations of some associations between screen time and other aspects of children's lives:

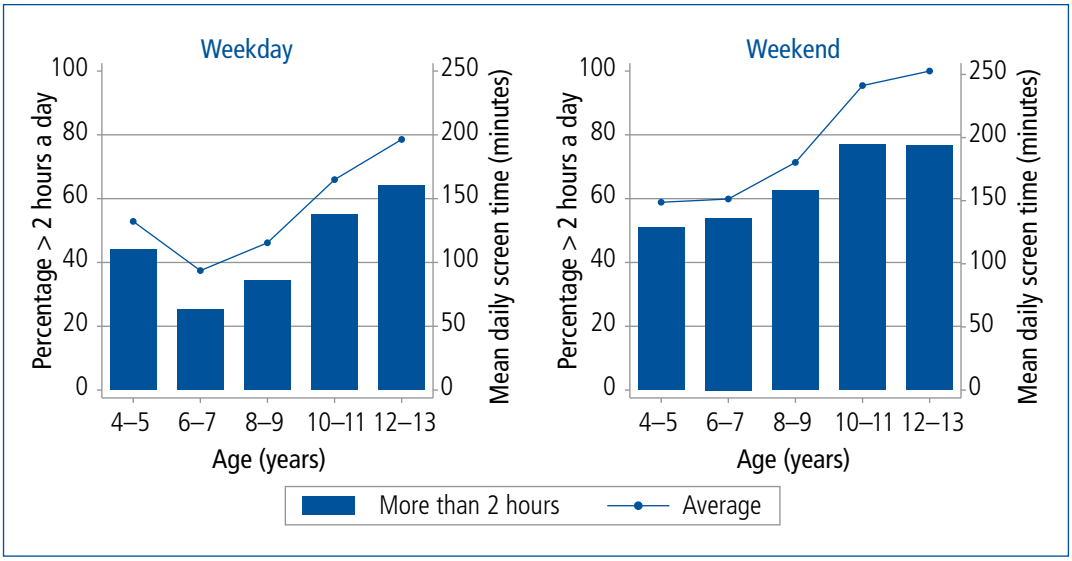
- For examination of the associations between screen time and participation in extracurricular activities we focus only on 12–13 year olds, using parent-reported survey data on their child's participation in extracurricular activities and child-reported TUD data on their screen time at Wave 5.
- For analyses of screen time and children's physical wellbeing and enjoyment of physical activities, we focus on data from Waves 4 and 5, when children were aged 10–11 and 12–13 years.

Details about the data analysed are described in full in those sections.

5.3 Overview of screen-time activities

Using the TUD data, television viewing, computer use and electronic gaming were combined to calculate the total screen time on the sampled day for Waves 1 to 5, as shown in Figure 5.1. On weekdays:

- children spent an average of 132 minutes (2.2 hours) on screen time activities on the sampled day at 4–5 years, 94 minutes (1.6 hours) at 6–7 years, 115 minutes (1.9 hours) at 8–9 years, 164 minutes (2.7 hours) at age 10–11 years and 196 minutes (3.3 hours) at 12–13 years;
- the percentage of children spending more than 2 hours on screen-based activities was 44% at 4–5 years. This proportion decreased to 25% at 6–7 years, then increased every 2 years after that, with 64% of children at age 12–13 spending more than 2 hours on screen-based activities on a weekday.



Note: See Table 5.1 and Table 5.2 for sample sizes.
Source: LSAC K cohort, TUD data Waves 1 to 5

Figure 5.1: Children's total screen time on weekdays and weekend days, 4–5 to 12–13 years

Box 1: Children's time use data

In Waves 1 to 3 of LSAC, parents completed a time use diary (TUD) to provide information on the activities of the study child for two randomly assigned days, one weekday and one weekend day. The diaries divided the 24-hour day into 96 15-minute time intervals. Children's activities were recorded by indicating whether they were doing any one or more of 26 activities listed (e.g., sleeping/napping, eating and drinking, walking). Relevant to this chapter, the list of activities included:[1]

- "Watching TV, video, DVD, movie" (described as television viewing); and
- "Using computer/computer game" (we assume this includes electronic games played on devices other than computers, as no other codes specifically captured this information).

In Waves 4 and 5, the children themselves provided details of their activities over one day (either a weekday or a weekend day, nominated as the day before the home visit for the main LSAC interview). Children completed a time use diary by recording their main activities, in sequence, from "awake" time to when they went to sleep at night. The activity data were later re-coded into a detailed classification of main activities. This new data collection process supported a more detailed classification of activities than in previous waves and, as a result, there were more specific categories for screen-based activities available from these data, which have been analysed using the following broad categories:[2]

- *television viewing* ("Watching TV, video, DVD, movie", as in the earlier waves);
- *computer use excluding games* (see below for details); and
- *electronic games* (includes from Wave 4: "Xbox, Playstation, Nintendo, Wii, etc.", "Computer games—not Internet", "Computer games—Internet" and from Wave 5: "Electronic devices: playing games").

Together, the sum of these three activities has been analysed as total screen time, and the last two combined into a total of computer use/computer games for comparison to the Waves 1 to 3 data. From these data, computer use could also be disaggregated into more detailed categories, although changes in the detailed classification from Wave 4 to Wave 5 produced some small inconsistencies:

- *homework* (includes from Wave 4: "Computer for homework—Internet", "Computer for homework—no Internet" and from Wave 5: "Electronic devices: doing homework");
- *social networking/online communication* (Includes from Wave 4: "Texting, email, social networking, such as Facebook or Twitter", "Skype or webcam" and from Wave 5: "Spending time on social networking sites", "Video chatting (e.g., Skype)", "Texting/emailing", "Online chatting/instant messaging");
- *downloading/creating website/application use* (not available at Wave 4, from Wave 5 includes "Downloading/posting media (e.g., music, videos, applications)", "Creating/maintaining websites", "General application use (e.g., Microsoft excluding homework)");
- *Internet browsing and shopping* (includes from Wave 4 "Internet not covered elsewhere" and from Wave 5 "General Internet browsing (excluding homework)" and "Internet shopping"); and
- *other* (includes from Wave 4 "Electronic media, games, computer use" and from Wave 5 "Electronic device use NEC").

From Waves 1 to 3, there were usually two diaries per responding family. Analyses at Wave 1 are based on 3,497 weekday and 3,380 weekend diaries. At Wave 2, we use 3,222 weekday and 3,143 weekend diaries. At Wave 3, we use 2,797 weekday and 2,783 weekend diaries. For Waves 4 and 5 there was only one diary per family, and there were more weekday diaries than weekend diaries at these two waves: 3,178 weekday and 816 weekend diaries in Wave 4; and 2,906 weekday and 740 weekend diaries in Wave 5. A significant proportion of the weekday diaries were not school days for children, as they were often completed during school holidays.

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[1] This chapter includes analyses of the amount of time, per day, children were said to have spent on these activities. For these calculations, it was assumed that the child spent the entire 15-minute period on any activity they were reported to do.

[2] Activities were described in words, and start and end times of each activity recorded. Children identified their main activities as well as what else they were doing at the time (that is, secondary activities). Interviewers went through the diaries with children to check the quality of data collected, and classified main and secondary activities. We have included main and secondary activities in the derivations shown here, unless otherwise stated. The days on which the diaries were completed in Waves 4 and 5 were spread relatively evenly across the weekdays. The weekend diaries more often referred to Sundays than Saturdays, with only 4% of all diaries at Waves 4 and 5 being for a Saturday. When children are in school, their main activity is generally listed as "school", so we do not tend to capture any screen-based activities during school time.

While we will not explore this further in this chapter, it is worth noting that many of the weekday diaries actually referred to days on which children were not at school and, not surprisingly, if we focus only on weekdays when children were in school, their time on screen-time activities was lower than for all weekdays. Looking only at school-day diaries (e.g., excluding data collected during school holiday periods across the various states/territories), for children aged 6–7 years and over:

- At age 6–7 years children spent an average of 81 minutes (1.4 hours) on screen time activities on the sampled *school* day. This increased at 8–9 years to 94 minutes (1.6 hours), at age 10–11 years to 105 minutes (1.7 hours) and at 12–13 years to 129 minutes (2.2 hours).

Compared to weekdays, children spent longer on screen time activities on weekends:

- Children spent approximately 2.5 hours per weekend day, on average, doing screen-based activities at ages 4–5 and 6–7 (149–151 minutes). After this, the average weekend screen time increased with age, with children spending an average of 253 minutes (4.2 hours) per day on screen-based activities at age 12–13.
- On weekends, half of the children at age 4–5 spent more than 2 hours per weekend day on screen time activities. This proportion increased to 77% at 10–11 years and 12–13 years.

In later sections, we explore these data in more detail to report separately on children's time spent watching television, playing electronic games and using the computer. Television is by far the greater contributor to screen time at all ages. For example:

- at 4–5 years, the weekday total screen time (132 minutes) includes 119 minutes of television viewing; and
- at 12–13 years, the weekday total screen time (196 minutes) includes 116 minutes of television viewing.

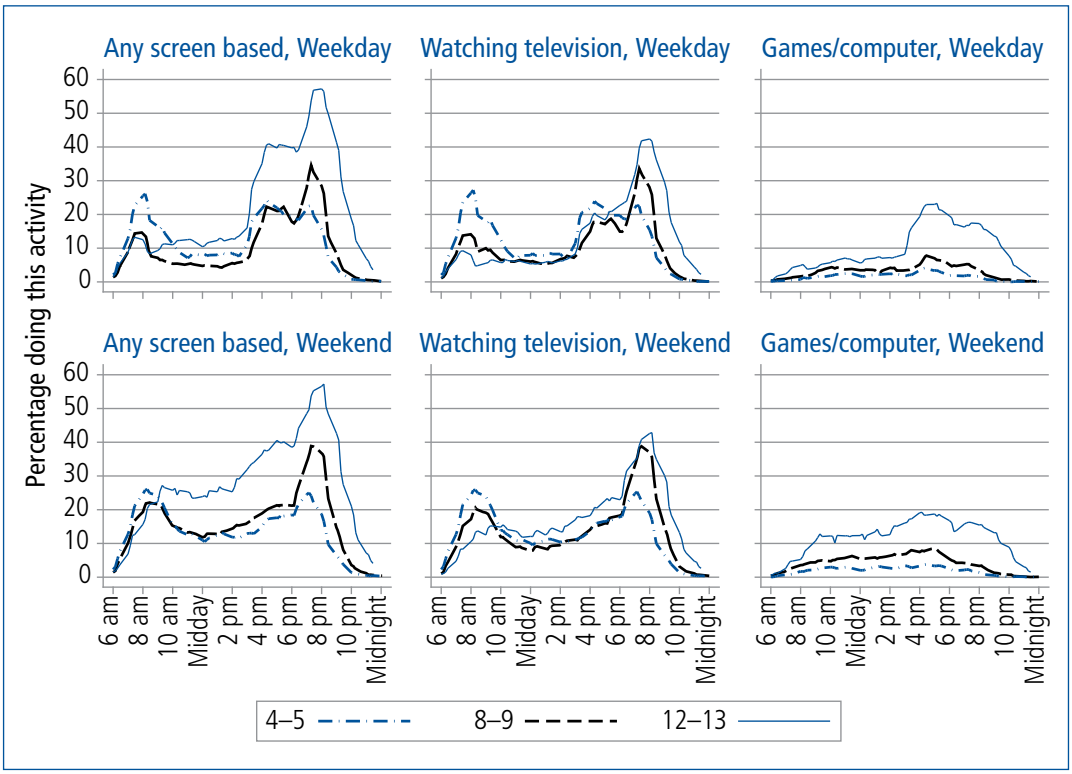
The children's time use diaries provide a unique opportunity to examine how children's screen time is distributed throughout the day. This information provides insights on the peak times of screen-based activities, and sheds light on the degree to which children undertake these activities at times that they might otherwise be engaged in active pastimes or perhaps even sleep. Figure 5.2 (page 105) shows, from 6 am to 12 am (midnight) on weekdays and weekends, the percentage of children who are at the time engaged in screen-based activities. The figure shows the percentage doing any screen-based activity, then separately shows the percentage watching television and the percentage using the computer (for any reason, including games). Data are shown for children at 4–5 years, 8–9 years and 12–13 years. Weekend and weekday patterns tend to differ, given that children are often in school on weekdays at ages 8–9 years and 12–13 years.

- The overall patterns on both weekdays and weekends are for screen-based activities to peak during the late afternoon, with a smaller peak for the younger children in the morning.
- Overall, at age 12–13 years, compared to younger ages, children more often engaged in screen-based activities during the daytime hours on weekend days or through the after-school hours and into the evening on weekdays. This largely reflects their being more likely to be engaged in games/computer activities, although in the evenings, the likelihood of children watching television to later times increased with age.
- The only time that the children at 12–13 years were less likely to engage in screen-based activities compared to when they were younger was in the morning. In particular, on weekday mornings, children were more often doing screen–based activities at 4–5 years than they were at older ages, due to a higher likelihood of watching television at this time.

The next two sections will focus specifically on children's time spent watching television and spent on electronic games and computers. Within each, we will draw upon these time use data, as well as parent-reported information about children's screen time.

5.4 Children's television viewing

As discussed above, a very large portion of children's screen time is spent watching television and this section explores that activity in more detail. We use data from the time use diaries as well as from parents' reports about children's television viewing on a typical weekday and weekend day. From Wave 2, parent-reported information has been captured in minutes per day, permitting averages to be calculated. In Wave 1, this information was collected in ranges so statistics



Note: The time use diary data were used to derive, for each 15-minute interval across the day, an indicator of whether or not children undertook this activity within that interval. This figure shows the percentage undertaking this activity within each 15-minute interval from 6am to midnight, for the ages of children indicated.

Figure 5.2: Children's screen-based activities over weekdays and weekend days, 4–5, 8–9 and 12–13 years

comparable to later waves could not be incorporated here. The tables below include a range of statistics from these two different sources.

Overall findings

Information about television viewing on a *weekday* is shown in Table 5.1 (page 106).

- From the time use diaries, it appears that after an average of two hours of television viewing at 4–5 years, children's average time spent watching television dips around 6–7 years, and increases but is still relatively low at 8–9 years. It then increases again at 10–11 and 12–13 years. The change from 4–5 years to 6–7 years likely reflects that at 6–7 years, and older, children's weekdays are more often taken up by school, perhaps limiting their time available for watching television (see also Figure 5.2).

- A majority of children watched television on the sampled weekday, with little variation over these ages, except that the proportion watching television is higher at 4–5 years than at older ages. Among children watching television, the duration spent doing this is also lowest at 6–7 years compared to the other ages.

- The parent-reported data yield somewhat different estimates of average time spent watching television at ages 6–7 and 8–9 years (resulting in higher estimates of television viewing time). For older children, however, the estimates are the same as given by the children. The trends in television viewing, by child age, follow a similar pattern to those seen with the time use data.

- The parent-reported data show that about one in five children watch more than 2 hours of television at 6–7 years and 8–9 years, with proportions higher at 10–11 and 12–13 years.

Table 5.1: Weekday television viewing, 4–5 to 12–13 years

Watching television	4–5 years	6–7 years	8–9 years	10–11 years[a]	12–13 years[a]
Time use diaries—sampled weekday					
Average time overall (minutes)	119	80	92	114	116
Percentage did this on diary day	90.3	82.2	82.4	86.1	82.3
Participants' average total time (minutes) [a]	132	98	111	132	141
Percentage > 2 hours (%)	*38.4*	*20.0*	*24.5*	*37.4*	*37.6*
No. of observations	3,497	3,222	2,792	3,174	2,906
Parent reports—typical weekday					
Average time overall (minutes)	n.a.	100	106	114	117
Percentage > 2 hours (%)	n.a.	*20.4*	*21.7*	*26.1*	*25.3*
No. of observations	n.a.	4,464	4,195	4,159	3,912

Notes: At Wave 1, television viewing was reported by parents in ranges. Overall, at this wave, on weekdays, 2% did not watch television, 15% watched for less than an hour, 64% watched for 1 up to 3 hours, 16% watched for 3 up to 5 hours and 4% watched for 5 hours or more. [a] While the mean times were virtually the same for parent-reported and time use data, the distribution was different within each, with a large number of parents reporting their children watched exactly 2 hours of television per day, which was not apparent in the time use data. This resulted in the two data sources producing very different proportions of children reported to watch more than 2 hours of television per day.

On average, children watched more television on a *weekend* day compared to a weekday. This is most apparent for age 6–7 years (see Table 5.2).

- According to the time use diaries, the average amount of time spent watching television on weekend days varied between 123 minutes (at 6–7 years) and 168 minutes (at 10–11 years), when all children were included in the estimates.
- The proportion of children watching television on a sampled weekend day remained quite steady at around 90% for ages 6–7 to ages 10–11, dropping slightly to 86% at 12–13 years.
- Estimates of time spent watching television on weekends, as reported by parents, were higher at all ages, but both parent reports and time use data showed significant proportions watching more than 2 hours of television on a weekend day, at less than 50% of children aged 4–5 years and 6–7 years, but more than 50% at older ages.

Table 5.2: Weekend television viewing, 4–5 to 12–13 years

Watching television	4–5 years	6–7 years	8–9 years	10–11 years	12–13 years
Time use diaries—sampled weekend day					
Average time overall (minutes)	131	123	139	168	151
Percentage did this on diary day	90.6	89.2	90.5	92.3	86.4
Participants' average total time (minutes) [a]	144	138	154	182	175
Percentage > 2 hours (%)	*43.2*	*41.9*	*47.4*	*59.9*	*51.1*
No. of observations	3380	3143	2777	815	740
Parent reports—typical weekend day					
Average time overall (minutes)	n.a.	147	160	181	185
Percentage > 2 hours (%)	*n.a.*	*44.0*	*49.1*	*59.5*	*62.4*
No. of observations	n.a.	4,464	4,195	4,159	3,912

Note: At Wave 1, television viewing was reported by parents in ranges. Overall, at this wave, on weekend days, 5% did not watch television, 17% watched for less than an hour, 57% watched for 1 up to 3 hours, 18% watched for 3 up to 5 hours and 5% watched for 5 hours or more.

We will focus in later analyses on the proportion of children watching more than 2 hours of television per day since it aligns with recommendations about 2 hours of screen time. We largely use the parent-reported information about children's television viewing in later sections. However, given that this could not be derived from parent reports at 4–5 years, we have used the time use data to calculate this variable for children at this age.

Television and the home environment

Parents can influence their children's screen time by practices such as having rules about watching television (e.g., which television programs children are allowed to watch and how much time they can spend watching television) and also by controlling their physical environment (e.g., not allowing a television in the child's bedroom).

The physical home environment was measured in LSAC with the number of televisions in the household at Wave 1 as well as measures of ease of access to televisions and rules about watching television.

When children were 4–5 years old, very few families (less than 1%) had no television at home, 40% had one television, 42% had two and 18% had at least three in the home. This information was not updated at later waves. The number of televisions was clearly related to children's television viewing, as shown in Table 5.3. In particular, a larger proportion of children watched less than 1 hour of television in households with only one television compared to households with two or more televisions. The proportion of children who watched 3 or more hours of television increased with more televisions in the home.

Table 5.3: Children's television viewing and number of televisions at home at age 4–5

Television viewing	One television	Two televisions	Three or more televisions
Weekday			
< 1 hour (%)	21.4	12.4	10.0
1 to < 3 hours (%)	61.9	67.5	63.4
3 or more hours (%)	16.7	20.1	26.6
Total	100.0	100.0	100.0
Weekend			
< 1 hour (%)	26.0	17.2	16.1
1 to < 3 hours (%)	55.9	60.0	54.1
3 or more hours (%)	18.1	23.0	29.7
Total	100.0	100.0	100.0
No. of observations	4,464	4,195	4,159

Notes: Due to low numbers of children who lived in a household with no television at home (< 1 %), this group is not included in the analysis. Weekday: χ^2 (4, n = 4,940) = 110.8, p < .001. Weekends: χ^2 (4, n = 4,940) = 91.3, p < .001. Percentages may not exactly total 100.0% due to rounding.
Source: LSAC K cohort, survey data, Wave 1

Whether children had a television in their bedroom was collected at Waves 2 to 4, showing that at 6–7, 8–9 and 10–11 years, approximately one in four children had a television in their bedroom (Table 5.4). In Wave 5, the question was changed to ask whether the child had capacity to watch television programs or movies in his/her bedroom, so may include watching television programs or movies using other media devices such as a laptop. At age 12–13, almost half of the children could watch television in their bedroom.

Table 5.4: Television access and family rules about television viewing, 6–7 to 12–13 years

Home environment for television viewing	6–7 years	8–9 years	10–11 years	12–13 years
Study child has television in his/her bedroom (%)	19.8	24.7	27.9	45.3 [a]
Family has rules about television programs (%)	91.2	91.1	90.0	84.1
Family has rules about quantity of television viewing (%)	52.9	51.2	52.9	58.3

Notes: [a] At 12–13 years, this indicates having a capacity to watch television or movies in the bedroom.
Source: LSAC K cohort, survey data, Waves 2 to 5

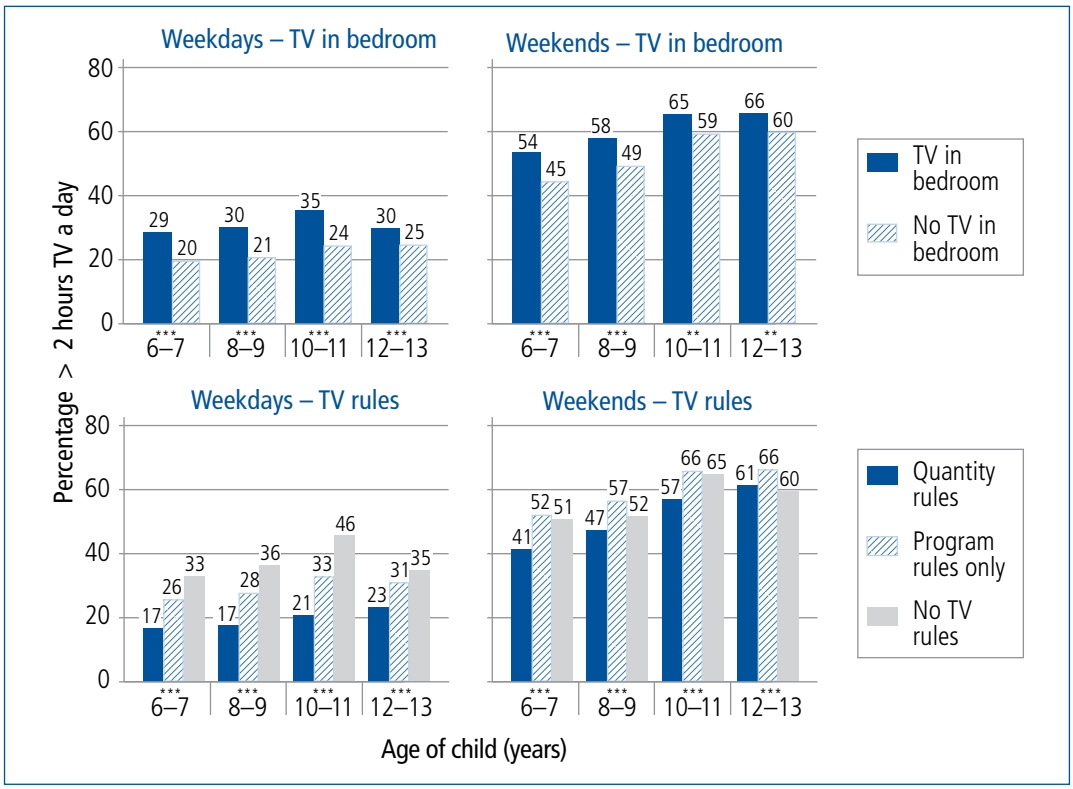
From Wave 2, parents also reported whether the family had rules about what television programs the child can watch and how long the child is allowed to watch television, although the study does

not collect information about the precise rules that are in place. Across all these ages of children, the vast majority of families had rules about television programs and more than 50% had rules about how long children could watch television. At age 12–13 years, slightly fewer families had rules about television programs (90% at 10–11 vs 84% at 12–13 years) and more families had rules about how long the child could watch television as compared to 10–11 years (53% at 10–11 vs 58% at 12–13 years). This may reflect changes in the nature of parents' concerns; for example, being less concerned about restricting access to particular types of programs but being more concerned about how much time children spend watching television rather than on other activities such as schoolwork or exercise.

As Figure 5.3 demonstrates, at 6–7 years through to 12–13 years, children who had a television (or, at 12–13 years, the *capacity* to watch television) in their bedroom were significantly more likely to watch television for more than 2 hours per day than children who did not have a television in their bedroom.

This figure also includes a comparison of the proportion of children watching more than 2 hours television per day according to the rules their family has about television viewing. Rules were grouped as those with rules about the amount of television they can watch (regardless of whether they have rules about the program content, since almost all have such rules), those with only rules about program content, and those with no rules at all. We excluded children watching no television from these analyses.

- On weekdays and weekend days, children in families with *rules* about the amount of television they can watch were the *least* likely to watch more than 2 hours of television per day (except at age 12–13 years, on weekends).
- On weekdays, children in families with *no rules* were *most* likely to spend more than 2 hours watching television.



Note: At 12–13 years, "TV in bedroom" indicates having a capacity to watch television or movies in the bedroom. Wave 2 (6–7 years): n = 4,464; Wave 3 (8–9 years): n = 4,195; Wave 4 (10–11 years): n = 4,159; Wave 5 (12–13 years): n = 3,905. *** $p < .001$; ** $p < .01$; * $p < .05$. Analyses were restricted to children who watched some television.

Source: LSAC K cohort, survey data, Waves 2 to 5

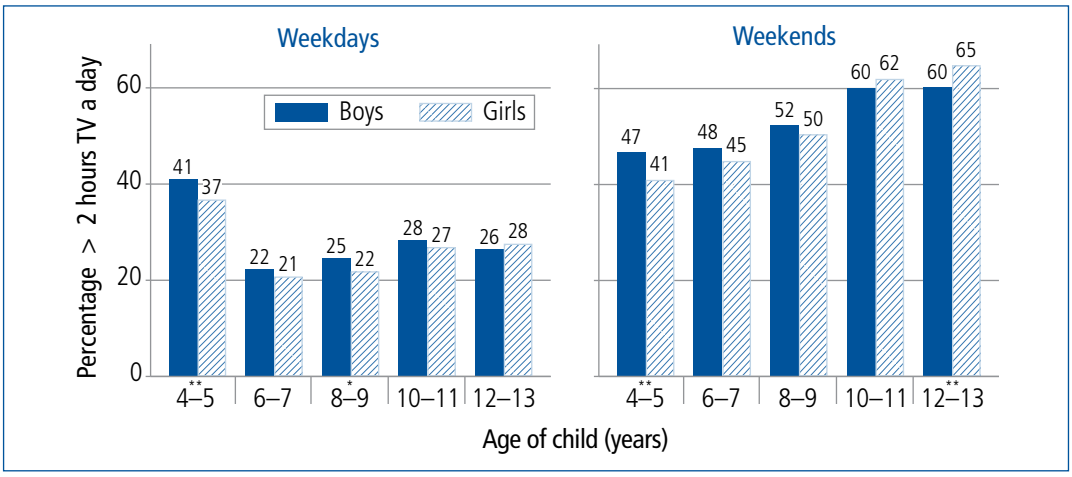
Figure 5.3: Proportions of children watching television for more than 2 hours on weekdays and weekend days by television home environment, 6–7 to 12–13 years

- On weekend days, compared to children in families with no rules about television viewing, children in families who had rules about which television programs they can watch were actually more likely to spend more than 2 hours watching.

Child gender and television

Here we examine whether children's television viewing varies by child gender. The analyses focus on the percentage of children watching more than 2 hours of television per day. Figure 5.4 shows that the difference between boys and girls in the percentage watching more than 2 hours per day was not consistent across ages, for weekdays and weekend days.

- On weekdays, girls were significantly less likely to watch more than 2 hours of television than boys only at 4–5 years and 8–9 years.
- On weekend days, significant gender differences were apparent at 4–5 years and 12–13 years, with boys watching more television at 4–5 years but girls watching more television at 12–13 years.



Notes: Wave 1 (4–5 years): n = 3,497 for weekdays and n = 3,380 for weekends; Wave 2 (6–7 years): n = 4,464; Wave 3 (8–9 years): n = 4,195; Wave 4 (10–11 years): n = 4,159; Wave 5 (12–13 years): n = 3,905. Statistically significances are noted: *** $p < .001$; ** $p < .01$; * $p <. 05$.

Source: LSAC K cohort, survey data, Waves 2 to 5 and time use diaries, Wave 1

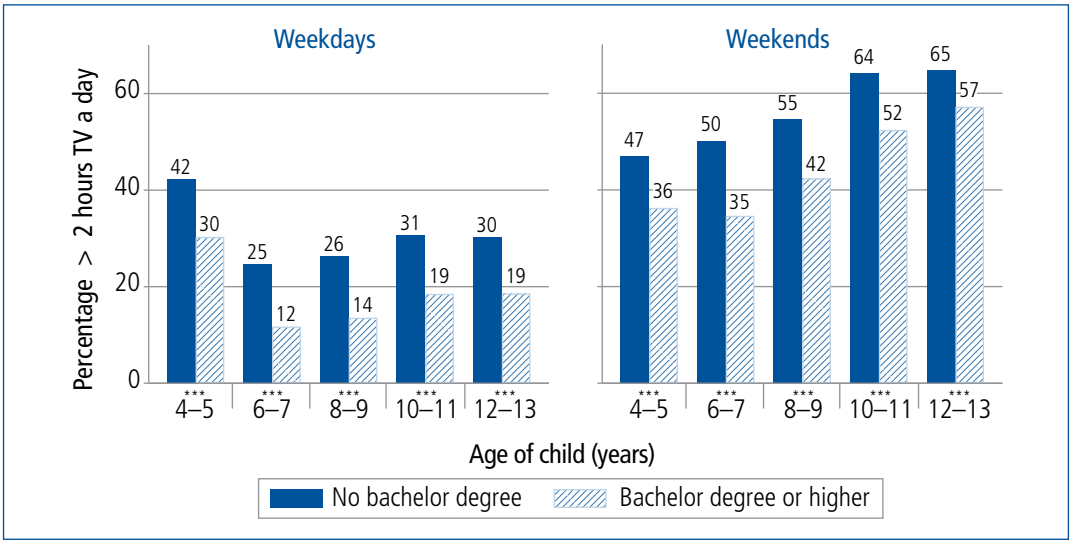
Figure 5.4: Proportions watching more than 2 hours television on weekdays and weekend days by gender, 4–5 to 12–13 years

Overall, these findings suggest that gender differences in television viewing at these ages of children are not particularly marked, at least as indicated by the percentage watching more than 2 hours of television per day. In a later section (see Table 5.8) we present details of screen time of 12–13 year olds, from the time use diaries, and those data also show no significant differences between boys and girls in the amount of time spent watching television.

Parental education and television

To examine differences by parental education, at each of the waves, information about the highest educational qualification of parents within the household was used. When there were two parents in the household, this was the highest qualification of these two parents, and when there was only one parent in the household (usually this was the mother), it was equal to the highest qualification of this parent. Qualifications were coded into a binary classification of "No bachelor degree" and "Bachelor degree or higher". As with the above analyses by child gender, these analyses focus on the percentage of children watching more than 2 hours television per day.

Figure 5.5 (page 110) indicates that, within each age category, there are significant differences in children's time spent watching television by level of parental education. Across all age groups, a lesser proportion of children spent more than 2 hours per day watching television when their



Notes: Parental education is the educational attainment of single parents or, in couple families, the highest qualification of the two parents in the household. Wave 1 (4–5 years): n = 3,497 for weekdays and n = 3,380 for weekends; Wave 2: n = 4,464; Wave 3: n = 4,195; Wave 4: n = 4,159; Wave 5: n = 3,905. $^{***}p < .001$; $^{**}p < .01$; $^{*}p < .05$.
Source: LSAC K cohort, survey data, Waves 2 to 5 and time use diaries, Wave 1

Figure 5.5: Proportions of children watching television for more than 2 hours on weekdays and weekend days by parental education, 4–5 to 12–13 years

parent/s were more highly educated. The differences in the proportion of children spending more than 2 hours per day watching television were substantial on weekdays as well as weekend days.

The analyses of 12–13 year olds' screen time, from the time use diaries (see Table 5.8) revealed that on weekdays, children of higher educated parents watched less television, on average, but that on weekends, the average time spent watching television did not vary significantly by level of parental education.

Summary: Children's television viewing time.

In summary, we found that:

- Television viewing remains the screen-time activity that contributes most to children's total screen time compared to other screen-time activities.
- Children watched more television on weekends than on weekdays from ages 4–5 to 12–13.
- Children's television viewing on weekdays was high at age 4–5, decreased at age 6–7 and increased thereafter with age.
- The proportion of children watching television for more than 2 hours:
  - was higher in households with a large number of televisions at home, a television in the child's bedroom or no rules limiting the amount of television that children can watch;
  - did not vary significantly by gender, except for some small differences at particular ages; and
  - was related to lower levels of parental education.

5.5 Children's electronic games and home computer use

This section focuses on children's time spent on electronic games and computers. At the older ages explored here, a majority of children have access to games and computers at home. This increased with age, which may be a factor of age itself, or related to trends in the availability (cost and popularity among children and families) of different devices.[3] The trends by age showed:

[3] For example, some evidence of this is that the B cohort of LSAC, when aged 6–7 years and 8–9 years, were much more likely to have electronic game access at these ages compared to the K cohort at the same ages. At 6–7 years, 56% of the K cohort and 81% of the B cohort had access to electronic games; at 8–9 years the percentages were 78% for the K cohort and 95% for the B cohort.

- For electronic games, access at home increased from 56% at 6–7 years to 78% at 8–9 years, 92% at 10–11 years and 96% at age 12–13.

- For computers, access at home increased from 75% of children at 4–5 years to 87% at 6–7 years, 91% at 8–9 years and 95% at 10–11 years.

Estimates of the amount of time children spent on electronic games and on computers is presented here, drawing upon children's time use data (described in section 5.2) and parent-reported information about these activities. All children are included in the estimates below, including those who do not have electronic games or computer access at home. The time use data have initially been presented as the aggregate amount of time children spend on either games or computers, as this could not be disaggregated further at all ages. This is explored in more detail for older children later in this section. For the parent-reported data, we have separate information about children's time spent on a typical weekday and weekend day on electronic games and on computers. The question about electronic games was introduced in Wave 2 when the children were aged 6–7 years, and continued to Wave 5 when children were aged 12–13 years.[4] In collecting information about computer use in Waves 2 to 4, parents were asked about computer use *at home*, and were specifically told that these questions did not refer to devices such as handheld or TV plug-in computerised games (e.g., Playstation, Wii, Xbox, Nintendo DS, PSP). Parent-reported information about children's computer use will include children's time doing various activities on the computer, including playing games. New questions about computer use were introduced in Wave 5 but they have not been analysed in this chapter.

Overall findings

Children's time spent on games and computers on weekdays is presented first, in Table 5.5.

Table 5.5: Weekday children's games/computer screen time activities, 4–5 to 12–13 years

Games/computer	4–5 years	6–7 years	8–9 years	10–11 years	12–13 years
Time use diaries—sampled day—electronic games or computer					
Average time overall (minutes per day)	14	14	25	55	88
Percentage did this on diary day	23.5	24.6	37.0	54.3	68.9
Percentage > = 1 hour (%)	6.5	5.7	11.5	29.1	45.1
Participants' average total time (minutes per day) [a]	59	57	67	101	127
No. of observations	3,436	3,035	2,572	3,168	2,864
Parent reports—typical day—electronic games or computer (aggregated)					
Average time overall (minutes per day)	n.a.	32	46	64	n.a.
Percentage > = 1 hour (%)	n.a.	24.8	36.3	53.2	n.a.
No. of observations	n.a.	4,464	4,195	4,159	n.a.
Parent reports—typical day—electronic games					
Average time overall (minutes per day)	n.a.	11	19	22	53
Percentage > = 1 hour (%)	n.a.	9.5	15.5	18.8	43.7
Parent reports—typical day—computers					
Average time overall (minutes per day)	n.a.	21	27	42	n.a.
Percentage > = 1 hour (%)	n.a.	15.1	20.5	37.2	n.a.
No. of observations	n.a.	4,464	4,195	4,159	3,912

Notes: [a] Particpants' average total time is calculated only for those who participated in this activity.
Source: LSAC K cohort, TUD and survey data from Waves 1 to 5

[4] In Waves 2 and 3, this question included "such as Nintendo, Gameboy or Playstation?" and in Wave 4, this included "such as Playstation, Wii, Xbox, Nintendo DS, PSP". These activities were popular and available at the time of data collection. In Wave 1, a question about electronic games was not asked, and use of computers was collected in ranges, and so does not allow for average time to be computed.

- The *proportion* of children who played electronic games or used the computer *increased with age*—according to the time use data, the percentage spending some time on this activity increased from 24% up to 69% for the ages 4–5 years through to 12–13 years.
- The average *time spent* on this activity *increased with age* also, according to the time use data and the parent reports.
  - The percentage spending one or more hours in total per weekday, on games or the computer, according to parent reports, was 25% at age 6–7 years, 36% at 8–9 years and 53% at 10–11 years.
  - The percentages reporting spending one or more hours per day on these activities in the time use diaries were smaller, but likewise showed increases from 6–7 years up to 12-–13 years.
- When disaggregated into "electronic games" and "computers", both types of screen time took up more of children's time as they grew. Of the two of these, children spent more time on computers, at least up until 10–11 years. From parent reports, this information is not available at 12–13 years. (See later analyses of time use data to explore this further.)

Table 5.6: Weekend children's games/computer screen time activities, 4–5 to 12–13 years

Games/computer	4–5 years	6–7 years	8–9 years	10–11 years	12–13 years
Time use diaries—sampled day—electronic games or computer					
Average time overall (minutes per day)	19	30	43	77	107
Percentage did this on diary day	28.0	39.0	49.5	66.6	71.8
Percentage > = 1 hour (%)	10.0	15.3	22.7	42.0	51.7
Participants' average total time (minutes per day) [a]	69	76	87	115	149
No. of observations	3318	2,956	2,569	795	748
Parent reports—typical day—electronic games or computer					
Average time overall (minutes per day)	n.a.	68	102	136	n.a.
Percentage > = 1 hour (%)	n.a.	52.8	69.7	82.9	n.a.
Parent reports—typical day—electronic games					
Average time overall (minutes per day)	n.a.	32	55	64	113
Percentage > = 1 hour (%)	n.a.	27.8	46.7	55.9	72.3
Parent reports—typical day—computers					
Average time overall (minutes per day)	n.a.	36	47	72	n.a.
Percentage > = 1 hour (%)	13.6	33.5	42.6	61.2	n.a.
No. of observations	n.a.	4,464	4,195	4,159	3,912

Notes: [a] Participants' average total time is calculated only for those who participated in this activity.
Source: LSAC K cohort, TUD and survey data from Waves 1 to 5

Not surprisingly, children spend more time on games and computers on weekend days, compared to weekdays (Table 5.6).

- Increases were also apparent by child age, as for weekdays.
- As with the weekday data, the time use estimates are somewhat lower than the parent-reported estimates. It is unclear whether differences are due to over-estimation of screen time by parents, or under-reporting of the screen time activities within the time use diaries.

The more detailed time use data collected at Waves 4 and 5 (for children at 10–11 and 12–13 years) allow us to examine the types of activities undertaken by children while they are using the computer. This information is particularly important—while there might be concerns about children's excessive time spent on screen time activities, certain aspects of using a computer or other media devices may actually be advantageous to the development (and application) of skills that are relevant to children's educational (and possible future labour market) outcomes (Bavelier, Green, & Dye, 2010; Durkin & Barber, 2002; Malamud & Pop-Eleches, 2010).

These data, along with the other screen time activity data, are presented in Table 5.7 (page 113) for weekdays and weekend days. Note that time spent playing electronic/computer games reported

here combines time spent on activities such as games consoles with time spent using the computer for games. The parent-reported information about children's time spent using the computer reported above does not disaggregate the activities done on the computer, so will include games as well as the types of activities explored with the time use data below.

- A significant contributor to children's screen time is the amount of time spent playing electronic/computer games, although much more time is spent watching television, at both ages and on weekdays and weekends. Children's time spent playing computer/electronic games does not vary much by age but is higher on weekends than weekdays.
- At 10–11 years, very little time was spent using the computer for reasons other than playing games, this averaging just 9–10 minutes per day across all children. More of this time was spent doing homework than other activities.
- At 12–13 years, children devoted more time to using the computer for reasons other than playing games. Compared to when they were 10–11 years, more time was spent doing homework (16–17 minutes, on average) and also on social networking and online communication (17 minutes, on average). Patterns of computer use for these activities were similar for weekends and weekdays.

Table 5.7: Children's average weekday and weekend time on screen-based activities at 10–11 and 12–13 years (Average minutes/day)

Activity	10–11 years Weekday	10–11 years Weekend day	12–13 years Weekday	12–13 years Weekend day
Computer/electronic games	45	68	46	63
Any use of computer excluding games	10	9	43	46
Homework	5	3	16	17
Social networking/online communication	2	2	17	17
Downloading/creating website/application use	NA	NA	2	2
Internet shopping and browsing	2	2	6	6
Other	2	2	6	7
Watching television	*114*	*168*	*116*	*151*
Any screen time	*167*	*242*	*196*	*253*
No. of observations	3,178	816	2,906	740

Notes: Children who did not participate in a particular screen-based activity are included in the calculations, with a zero value for the time spent on that activity. Estimates include screen time as main or secondary activities. Most computer-based screen time was a main activity.

Source: LSAC K cohort, TUD data from Waves 4 and 5

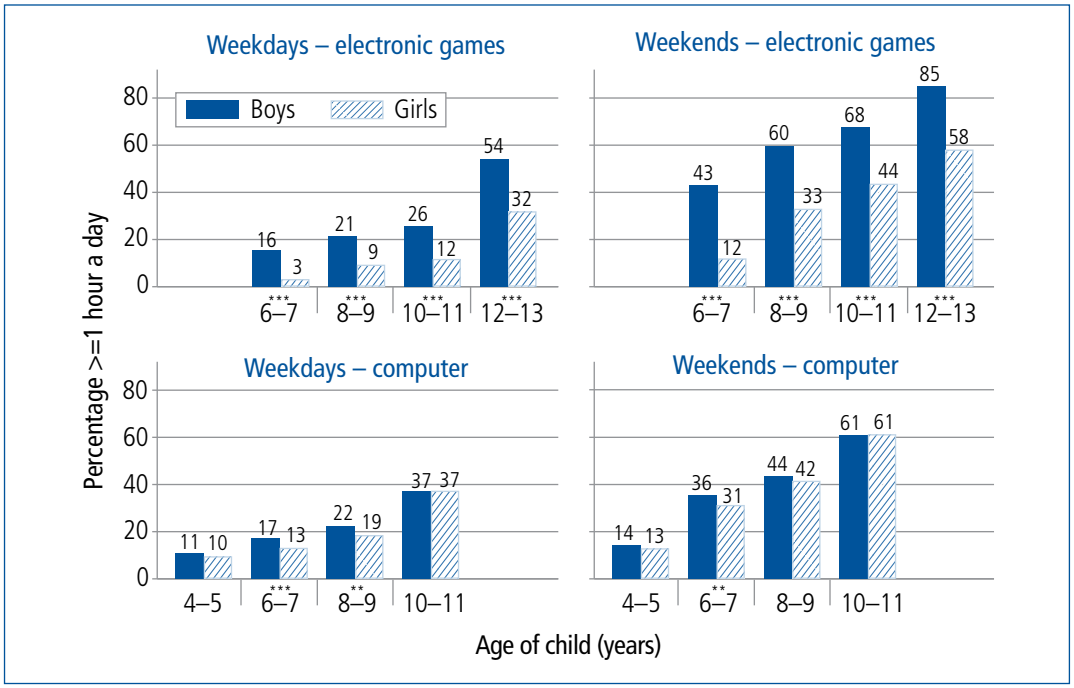
In Figure 5.1 we presented estimates of the proportion spending more than 2 hours on screen time activities, by age. These estimates included all screen-based activities, while national guidelines actually refer to the time spent on screens for entertainment reasons. If we use this more detailed activity data, we can calculate estimates just for *entertainment* screen time activities (television or games) for children at 10–11 and 12–13 years.

- At 10–11 years, the proportion spending more than 2 hours on *entertainment* screen-time activities was 51% on weekdays and 75% on weekends—only marginally lower than the 55% and 78%, respectively, spending more than 2 hours on any screen activities.
- At 12–13 years, the proportion spending more than 2 hours on entertainment screen activities was 51% on weekdays and 68% on weekends, compared to 64% on weekdays and 77% on weekends on any screen-based activities for a total of more than 2 hours. The differences between these estimates were greater at this age, as children were more likely to be using computers for homework and for social networking, which were not included in summing total entertainment time on screens.

Child gender and time spent on games and computers

Here we explore how children's time spent on games and computers varies by child gender. Figure 5.6 shows, for girls and boys on weekdays and weekends, the percentage spending one hour or more on games and the percentage spending one hour or more per day using the computer.

Boys were significantly more likely than girls to have spent at least an hour per day on electronic games within each age category. These differences were quite marked, with the increased likelihood of spending at least one hour on electronic games at older ages (as shown in Tables 5.5 and 5.6) apparent for girls as well as boys.



Note: Wave 1: n = 4,982; Wave 2: n = 4,464; Wave 3: n = 4,195; Wave 4: n = 4,159; Wave 5: n = 3,905. Chi-square tests were used to test for differences. Significant differences are noted: *** $p < .001$; ** $p < .01$; * $p < .05$.
Source: LSAC K cohort, survey data from Wave 1–5

Figure 5.6: Proportions spending one hour or more on games and on computers on weekdays and weekend days by gender, 4–5 to 12–13 years

Gender differences in time spent using the computer were much smaller. At 6–7 and 8–9 years, the proportion of boys who used a computer for more than one hour per day on weekdays was significantly higher than that for girls, although the percentages only differed by a few percentage points. Significant differences were not apparent for weekdays at 4–5 years and 10–11 years. On weekend days, the only significant gender difference was observed at age 6–7, again with more boys using computers for 1 hour or more (36%) than girls (31%).

While the analysis above showed little difference between boys and girls in the proportion spending one hour or more using the computer each day, previous research suggests that gender differences may be more apparent if exploring the nature of activities undertaken with the computer (Houghton et al., 2015). We explore this using the time use data for 12–13 year olds, since children at younger ages spend little time using the computer for reasons other than playing games (Table 5.7). Table 5.8 (page 115) includes children's time spent watching television and total screen time, but below we focus on the findings as it relates to specific computer activities.

- On weekdays and weekends boys spent much more time playing computer/electronic games compared to girls. This is consistent with the parent-reported information about electronic game use presented above but combines electronic game use with games played on computers.
- Overall, these data show girls spending more time than boys using the computer for reasons other than games. This was true on weekdays and weekends.
- On weekdays, girls spent more time using the computer for homework compared to boys, and more time using the computer for social networking and online communication.
- Girls spent a little less time than boys on "other" activities, which includes downloading/creating websites/using computer applications, Internet shopping and browsing and other unspecified activities.

Table 5.8: Children's average weekday and weekend time on screen-based activities by gender at 12–13 years

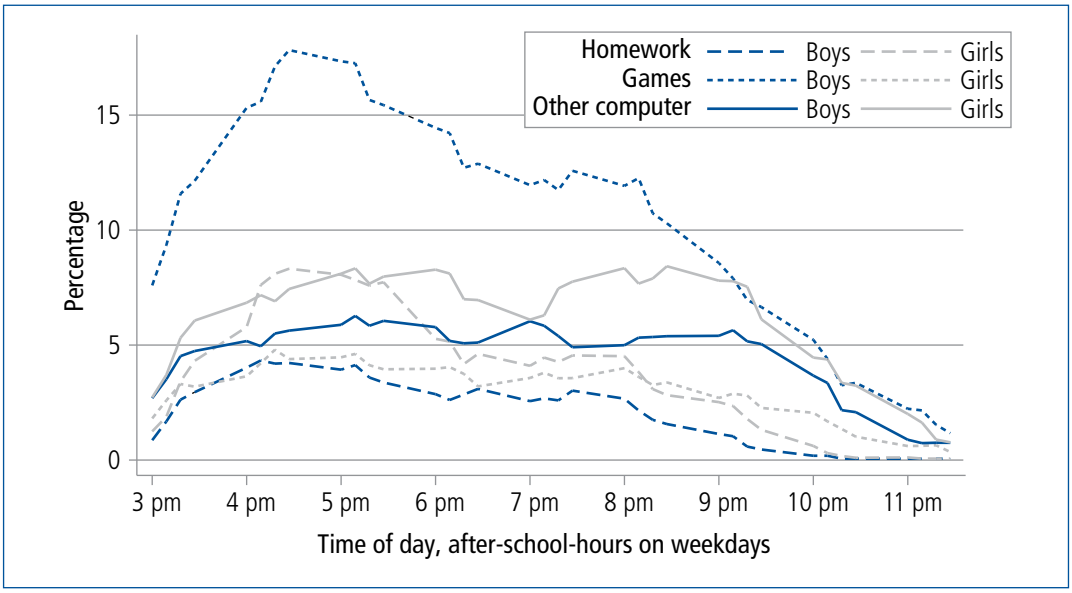
	Weekday Average minutes/day			Weekend day Average minutes/day		
Activity	**Boys**	**Girls**	***p***	**Boys**	**Girls**	***p***
Computer/electronic games	73	19	***	88	37	***
Any use of computer excluding games	36	51	***	38	55	**
Homework	12	21	***	12	24	*
Social networking and online communication	11	24	***	12	22	*
Other activities	14	9	**	15	10	
Watching television	118	114		150	152	
Any screen time	*217*	*175*	***	*268*	*236*	*
No. of observations	1,460	1,446		380	360	

Notes: Children who did not participate in a particular screen-based activity are included in the calculations, with a zero value for the time spent on that activity. Differences in duration were tested with a regression that included only an indicator for child gender. *** $p < .001$; ** $p < .01$; * $p <. 05$.
Source: LSAC K cohort, TUD, Wave 5

- The gendered differences in time spent using the computer were also apparent on weekend days, but this difference was not statistically significant in regard to the "other" activities.

We can also explore gender differences further, by looking at the proportion of girls and boys doing these activities by time of day. Figure 5.7 presents, for boys and girls, for the weekday after-school hours (from 3pm onwards), the proportion spending time doing computer/electronic games, the proportion using the computer for homework and the proportion using the computer for other reasons (including social networking and online communication as well as other activities).

The gender differences in playing electronic games is the most obvious aspect of these data with boys being more likely than girls to be playing games through to the evening hours. The peak time for 12–13 year old boys to be playing games was between 4 pm and 5 pm, when about 15–18% of boys were doing this. In comparison, fewer than 5% of girls were playing electronic games at this time. About 5% of boys were still playing electronic games at 10pm.



Notes: The time use diary data were used to derive, for each 15-minute interval across the day, an indicator of whether or not children undertook specified activities within that interval. This figure shows the percentage of boys and girls undertaking these activities within each 15-minute interval from 3pm to midnight.
Source: LSAC K cohort, TUD data at Wave 5

Figure 5.7: Details of screen-based activities over the day, 12–13 year olds on weekdays

Gender differences are also apparent for doing homework on the computer, although the differences are less marked than for playing games. Consistent with overall averages, girls were more likely to be using the computer for homework in the afternoon, especially in the hours shortly after school. For example, within each 15-minute period between about 4.15 pm and 5.45 pm, about 8% of girls were doing homework on the computer, compared to about 4% of boys. This was the peak time for doing homework with the computer.

For other computer-based activities, the patterns are less apparent by time of day and gender, except for the decline in this activity (and other computer-based activities) as the day progressed.

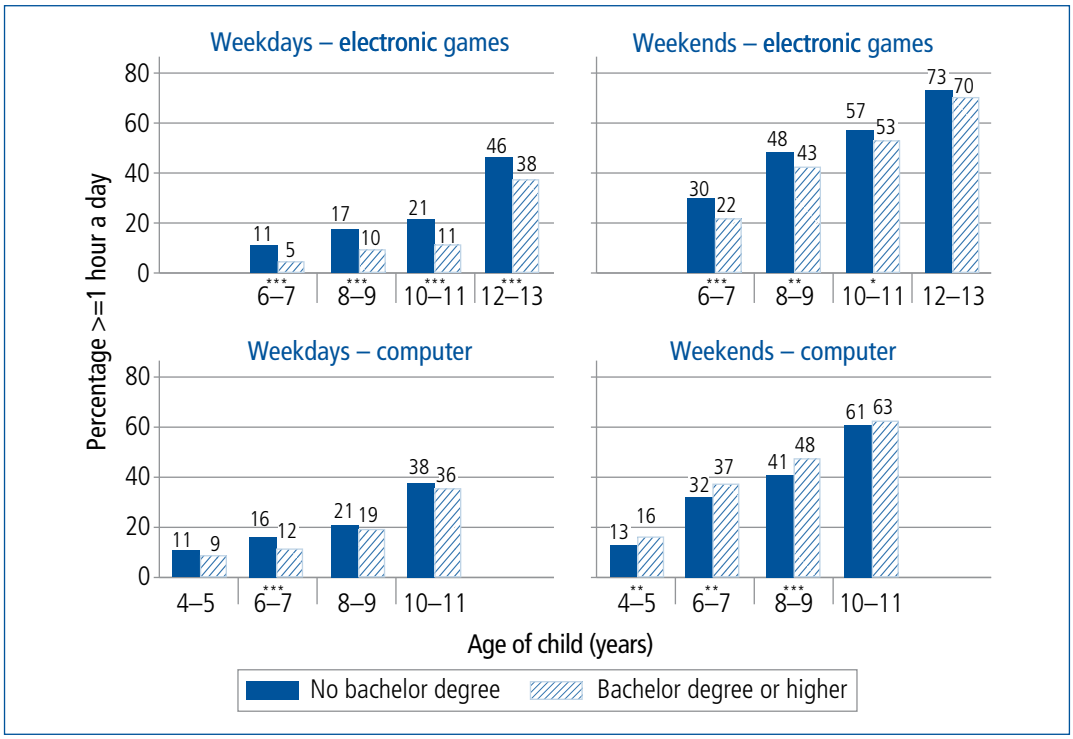
Parental education and time spent on games and computers

We explore here how children's games/computer use varies with level of parental education.

As seen in Figure 5.8, parental education was negatively related to the amount of time children spent playing electronic games. For weekdays, compared to children whose parents did not have tertiary-level qualifications, children of more highly educated parents were consistently *less* likely to spend 1 hour or more on this activity from 6–7 years through to 12–13 years. For weekends, findings were similar, although not statistically significant at 12–13 years.

Figure 5.8 shows that the proportion of children spending 1 hour or more using the computer on weekdays varied little according to parents' educational level, although there was a statistically significant difference at 6–7 years. At this age, children whose parents did not have a bachelor degree or higher were most likely to spend 1 hour or more using a computer. On weekends, for children at 4–5 years, 6–7 years and 8–9 years, compared to children whose parents did not have a bachelor degree, children of more highly educated parents were *more* likely to spend 1 hour or more using a computer. A statistically significant difference was not observed at age 10–11.

Differences by parental education are also explored below looking at specific activities from the time use data for children age 12–13 years. Table 5.9 (page 117) shows:



Note: Wave 1: n = 4,982; Wave 2: n = 4,464; Wave 3: n = 4,195; Wave 4: n = 4,159.Chi-square tests were used to test for differences. Significant differences are noted: *** $p < .001$; ** $p < .01$; * $p < .05$.

Source: LSAC K cohort, survey data, Waves 1–4

Figure 5.8: Proportions spending one hour or more on computers and on games on weekdays and weekend days by parental education, 4–5 to 10–11 years

- None of the measures of *weekend* screen time varied significantly by parental education. Analyses of weekend time use are based on smaller sample sizes, which may contribute to differences found to be non-significant.
- At this age the amount of time children spent playing games on the computer or other electronic devices was not significantly different by parental education. Also, the overall amount of weekday time children spent on the computer for reasons other than games did not vary by parental education.
- Differences according to parental education were significant for the amount of weekday time spent using the computer for homework, with average time spent on this being higher when parents were more highly educated.
- Some differences in time spent social networking/online communication were apparent, with higher amounts of weekday time spent on this, on average, by children with parents whose educational attainment was lower than a bachelor degree.

Table 5.9: Children's average weekday and weekend time on screen-based activities by parental education, 12–13 years

	Weekday (Average minutes/day)			Weekend day (Average minutes/day)		
Activity	Less than degree	Degree or higher	*p*	Less than degree	Degree or higher	*p*
Computer/electronic games	48	42		66	57	
Any use of computer excluding games	42	48		46	48	
Homework	14	21	***	16	21	
Social networking and online communication	19	14	*	17	16	
Other activities	11	13		13	10	
Watching television	121	104	***	155	141	
Any screen time	*201*	*187*	*	*258*	*239*	
No. of observations	1,855	1,045		498	241	

Notes: Children who did not participate in a particular screen-based activity are included in the calculations, with a zero value for the time spent on that activity. Differences in duration were tested with a regression that included only an indicator for the education variable. *** $p < .001$; ** $p < .01$; * $p <. 05$.

Source: LSAC K cohort, TUD, Wave 5

Summary of findings about children's time playing games and using computers

This analysis of children's computer and game use showed that:

- Children's computer or game time increased from ages 4–5 to 12–13 years. This increase may partly reflect the greater availability of different devices across these years, but increased use of computers for homework highlights the changing nature of screen time as children grow.
- Children spent more time on computer use and electronic games on weekends than on weekdays at all ages.
- Gender differences were not generally apparent when comparing the proportion of children spending an hour or more using the computer. When we looked at how children used the computer for reasons other than games, some small gendered differences emerged; for example, with girls spending more time using computers for homework compared to boys.
- Gender differences were quite marked in exploring children's time spent playing electronic games, including playing games on the computer. Boys tended to spend more time on this activity than girls. This was especially apparent on weekdays in the hours after school.
- Looking at differences by parental education there were only small differences in respect to children's use of the computer, although on weekdays differences in use of the computer to do homework were apparent, with children of more highly educated parents spending more time on this.

5.6 Screen time and extracurricular activities

A concern about children spending excessive amounts of time on screen-based activities is that these activities may substitute for other activities that may be more beneficial to children's wellbeing. Here we explore associations between children's participation in extracurricular activities and screen time, for boys and girls at ages 12–13 years. Children's extracurricular activities include physical activities such as team and individual sports, as well as art and music classes and community activities. Participation in activities such as these is generally linked to more positive outcomes for children (Simoncini & Caltabiano, 2012).

Previous research leads us to expect that children who are engaged in extracurricular activities may spend less time on screen-based activities. For example, Carlson and Berger (2010) showed that children in more organised out-of-school physical activity sessions per week were less likely to exceed 2 hours of screen time. In this section, we examine how children's time spent on screen-based activities (from the children's time use diaries) varies according to their participation in extracurricular activities, as reported by parents. This is only descriptive analysis, so does not take into account that participation in extracurricular activities is more likely for certain children (e.g., those who enjoy particular activities) and children from certain types of families (e.g., higher socio-economic families) (Covay & Carbonaro, 2010; Mullan & Maguire, 2012).

In Wave 5, when children were aged 12–13 years, parents were asked whether their child had, in the previous week, participated in a range of extracurricular activities. We explore the following:

- community group or club (e.g., scouts, guides or cultural group) (10% of boys and girls participated);
- team sport (e.g., football, cricket or netball) (52% of boys and 42% of girls participated);
- individual sport (e.g., swimming, tennis, karate or gymnastics) (27% of boys and 26% of girls participated); and
- art, music, dance, performance lessons (e.g., piano, dance, choir or drama) (25% of boys and 43% of girls).

Parents were asked about other extracurricular activities that we have not included here (e.g., academic lessons and religious activities), but we focus on just the above to provide some initial insights on the associations with children's screen time. Our analyses only include those children who completed a weekday diary. While we do not know whether or not the extracurricular activities occurred on weekends, the focus on only weekday diaries allows easier interpretation of the findings. Findings are presented in Table 5.10 (page 119).

For both boys and girls, the proportion of children exceeding 2 hours of cumulative screen time on the sampled weekday was significantly lower among those who participated in a team sport or an art/music activity. For girls, it was also lower for those who participated in an individual sport. This proportion did not vary significantly for girls' or boys' participation in a community group. The average screen time was lower among those children who participated in each of the extracurricular activities, except it was not statistically significant for boys according to their involvement in community groups.

Statistically significant differences by extracurricular participation were generally apparent for total time screen time and for time spent watching television, but for other screen-based activities, the differences were not as marked.

- The average time viewing *television* was lower among those children who participated in community groups (only significant for girls), team sports (only significant for boys), individual sports and art or music activities.
- For boys, the average amount of time spent on *computer use* excluding games did not vary significantly according to whether children participated in any of the extracurricular activities. For girls, the average time spent on computer use excluding games was significantly lower among those who participated in individual sports.
- Time spent playing *electronic/computer games* did not vary significantly according to children's participation in community groups or art/music activities. Boys spent significantly less time playing games if they participated in team sports or individual sports, and girls spent less time playing games if they participated in individual sports.

To fully understand the mechanisms that underlie these associations we would need to understand more about how children's time is allocated to different activities. It may be that screen time is a default activity for many children who do not have other organised activities. However, family characteristics as well as children's own interests and parents' views about appropriate patterns of time use no doubt contribute to their engagement in different types of extracurricular activities and their time use at home.

Table 5.10: Boys' and girls' weekday time spent on screen time by their regular participation in selected extracurricular activities at 12–13 years

Gender and screen time	Community group			Team sport			Individual sport			Art and music		
	Yes	No	*p*	Yes	No	*p*	Yes	No	*p*	Yes	No	*p*
Boys												
> 2 hrs total screen time (%)	63	68	ns	61	74	***	63	69	ns	62	70	*
Total screen time (minutes per day)	**202**	**218**	**ns**	**196**	**236**	***	**193**	**224**	***	**193**	**224**	**
TV viewing	106	119	ns	111	124	*	101	124	***	100	124	***
Computer use (excl. games)	33	37	ns	31	41	*	40	35	ns	43	34	ns
Play games	73	73	ns	62	84	***	62	77	*	63	76	ns
N	160	1,299	-	749	710		397	1062		378	1081	
Girls												
> 2 hrs total screen time (%)	54	61	ns	56	64	**	52	63	***	55	65	***
Total screen time (minutes per day)	**153**	**178**	*	**163**	**184**	**	**147**	**186**	***	**153**	**193**	***
TV viewing	93	116	*	108	118	ns	94	121	***	97	127	***
Computer use (excl. games)	47	51	ns	47	53	ns	44	53	*	47	54	ns
Play games	19	19	ns	17	20	ns	14	20	**	16	21	ns
N	154	1287		621	820		381	1060		653	788	

Notes: Children who did not participate in a particular screen-based activity are included in the calculations, with a zero value for the time spent on that activity. *** $p < .001$; ** $p < .01$; * $p < .05$; ns = not significant.

Source: LSAC K cohort, survey and TUD data, Wave 5

5.7 Children's screen time, enjoyment of physical activities and physical wellbeing

A key area of research concerning children's screen time has been in relation to the implications for children's physical wellbeing, given concerns about the typically sedentary nature of such activities, and rising concern about childhood obesity. In this section, we examine how children's screen time varies according to their enjoyment of physical activity and their own assessments of their physical wellbeing. We have focused on these self-reported measures because measures such as these have elsewhere been associated with children's participation in physical activities (Mullan & Maguire, 2012; Sallis, Prochaska, & Taylor, 2000).

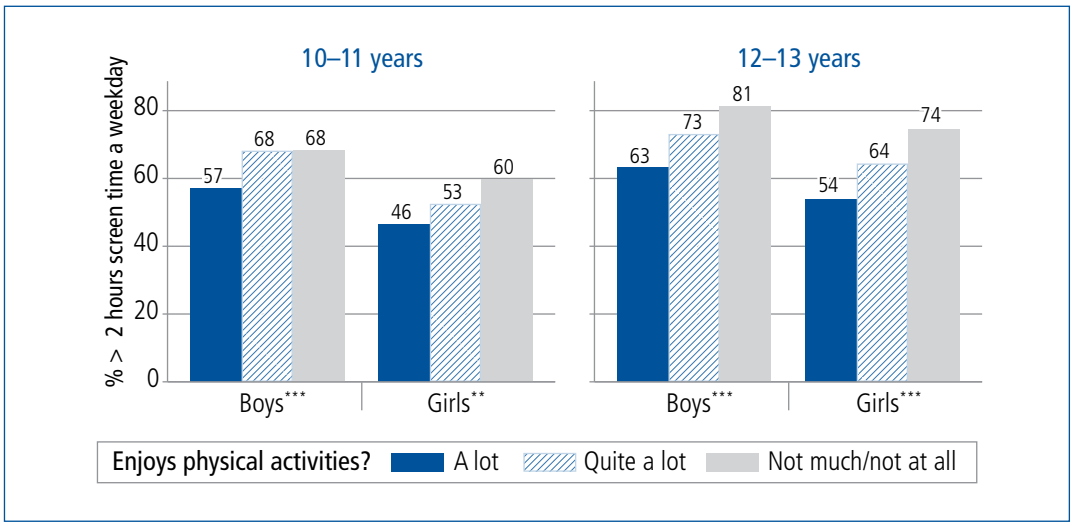
The children's time use data are again used, focusing on those who spent more than 2 hours on the sampled day on screen-time activities. These data are related to child reports at Waves 4 and 5 (10–11 and 12–13 years) on one item about enjoyment of physical activities and two about physical wellbeing. These items are described below.

Children's enjoyment of physical activities was captured with the question, "How much do you enjoy being physically active (doing things like sports, active games, walking or running, swimming)?" on a 4-point scale ("A lot", "Quite a lot", "Not very much" or "Not at all"). The last two categories were combined as very few answered "Not at all".

- Among boys at 10–11 years, 69% enjoyed physical activities a lot, 24% quite a lot and 6% not much/at all. At 12–13 years the percentages were 59% liked physical activities a lot, 32% quite a lot and 8% not much/at all.
- Among girls at 10–11 years, 59% enjoyed physical activities a lot, 33% quite a lot and 7% not much/at all. At 12–13 years the percentages were 54% liked physical activities a lot, 34% quite a lot and 12% not much/at all.

Figure 5.9 shows some significant differences in the percentage spending more than 2 hours on screen-based activities, according to enjoyment of physical activities.

- At 10–11 years, boys who enjoyed physical activity "a lot" were significantly less likely to exceed 2 hours of weekday screen time (57%), compared to boys who enjoyed physical activity "quite a lot" or "not much/at all"(68%).
- For boys at 12–13 years, and girls at both ages, there was a clearer relationship between screen time and enjoyment of physical activities, as those who enjoyed physical activity more were the least likely to spend more than 2 hours on screen-time activities, and those who enjoyed it the least, the most likely to spend more than 2 hours per weekday on screen-time activities.



Notes: Wave 4: boys (n = 2,026), girls (n = 1,952). Wave 5: boys (n = 1,801), girls (n = 1,936). *** $p < .001$; ** $p < .01$; * $p <$ .05.

Source: LSAC K cohort, survey and TUD, Waves 4 and 5

Figure 5.9: Proportion of children spending > 2 hours screen time per weekday by enjoyment of physical activities of boys and girls, 10–11 and 12–13 years

To assess relationships between screen time and children's perceptions of their physical wellbeing, we use information collected in Wave 4 from children's responses to two questions.

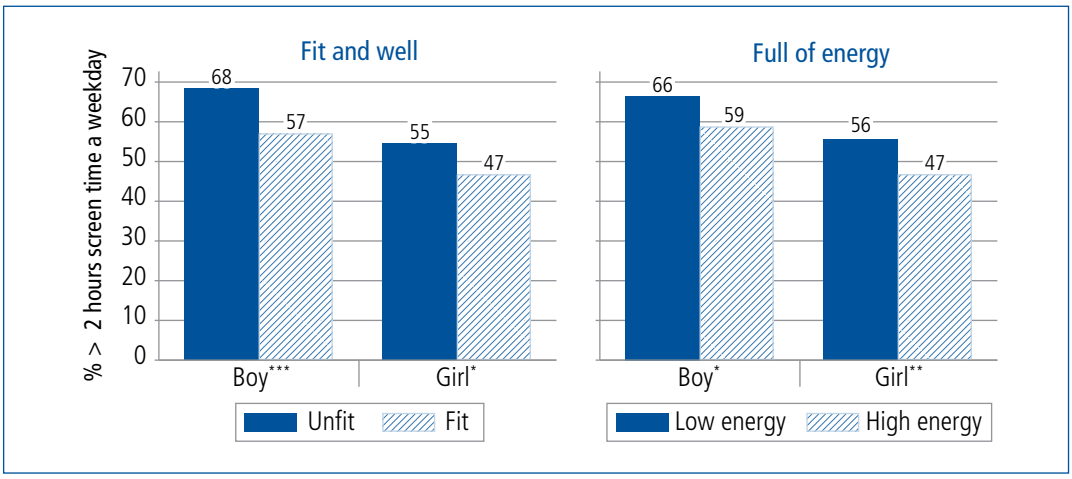
- One question asked, "Have you felt fit and well over the last week?" Responses were grouped into categories "Fit" (including those who responded "extremely" or "very" to this question) and "Unfit" (including those who responded "not at all", "slightly" or "moderately"). Overall, 68% of boys and 67% of girls were classified as "Fit".
- The other question asked, "Have you felt full of energy over the last week?" Responses were classified as "High" (including those who responded "extremely" or "very") and "Low" (including those who responded "not at all", "slightly", "moderately"). Overall, 77% of boys and 70% of girls were classified as "High" energy.

Figure 5.10 shows that:

- Boys and girls who were classified as "Fit" were significantly less likely to spend more than 2 hours in screen time activities on the sampled weekday, compared to those classified as "Unfit". The differences were a little more marked for boys than for girls.

- Compared to children classified as "Low" energy, boys and girls classified as "High" energy were significantly less likely to exceed 2 hours per day of screen time.

The findings here indicate that children's time spent on screen-based activities does vary according to children's assessments of their enjoyment of physical activities and their sense of physical wellbeing. What drives these associations is clearly important. One possible explanation for this result is that children who have a higher preference for physical activities and feel fit and well have a lower preference for screen-based activities. Another possible explanation is that more of their time may be allocated to physical activities, leaving less time for screen-based activities. These associations may also reflect that children who spend more time doing sedentary, screen-based activities feel less energetic and less fit. There may be other considerations also, such as children having a health limitation or medical condition that might mean they are less likely to enjoy physical activity and more likely to spend more time on screen-based activities. Further analyses of these data would be needed to better understand these associations.



Notes: Boys (n = 2,026), girls (n = 1,952). *** $p < .001$; ** $p < .01$; * $p <. 05$.
Source: LSAC K cohort, Wave 4 survey and TUD data

Figure 5.10: Proportion of children spending > 2 hours total screen times per day by physical wellbeing of boys and girls, 10–11 years

5.8 Summary and discussion

Overview of children's screen time

This chapter described Australian children's screen time as they moved from early childhood to the late primary school years. A majority of Australian children at all ages spent some time on screen-based activities, when captured to include any television viewing, computer use and electronic gaming.

These data were collected from Wave 1 (in 2004) to Wave 5 (in 2012) of the Longitudinal Study of Australian Children. We note that even over this period of data collection there was significant change in the availability of technology. These changes may mean we have not captured all of children's screen-based activities, especially those undertaken through the more portable and accessible media devices such as smartphones and tablets that have become more accessible in recent years. How and where children spend time on these new media (e.g., home, school, transport) will be an important direction for future research.

Throughout this chapter we referred to findings derived from children's time use diaries and to findings from parents' reports about children's screen time. On the whole, the trends and patterns that emerged from these different data sources were consistent. However, in places we saw that the estimated time spent on screen-time activities differed considerably from these different sources. This was especially the case for estimates of children's time spent playing electronic games or using

the computer on weekends, for which estimates were considerably higher according to parents' reports. Further analyses of these data may be needed to understand whether estimates based on parent reports of screen time on a typical day are over-estimates, or from time use diaries under-estimates, of the true measure of children's time use. In the parent-reported data, we were unable from these data to ascertain what a "typical" day meant to parents, and whether this likely reflected daily exposure to screen time over a week, or only over selected days of the week. Further, as these analyses only drew upon the reports of parents in the LSAC primary household, we have not taken into account whether screen time behaviours differ when children are spending time in another household, most notably, when they are staying with a parent living elsewhere.

Australian children's screen time increased from ages 4–5 to 12–13 years. On average, by 12–13 years, children spent 3 hours per weekday and almost 4 hours per weekend day using screens, which equates to around 20% of their waking time on weekdays and 30% on weekends. The increase in screen time as children grew may be partly due to the rapid development of technology in the past decade, along with the growing availability of portable and affordable media devices. It is also likely to reflect children's needs and desires for exploration and acquisition of new knowledge and skill as they grow older. Throughout this chapter we compared children's total screen time to the recommended limit of no more than 2 hours per day screen time for entertainment. Consistent with other Australian and international studies, the analyses of LSAC presented here showed that children very often exceed the recommended amount of screen time (see Houghton et al., 2015; Melkevik et al., 2010).

Television viewing was the most common screen-based activity, with most children watching some television on weekdays and weekend days. Spending time using a computer was less common but increased with age. For some children, computer use was for playing games, perhaps supplementing playing games on other electronic devices. Also, and increasingly at 12–13 years, the computer was used for activities such as homework and social networking.

Children's screen time differed according to their gender. Consistent with other studies, we found boys spent more time than girls playing electronic games on both weekdays and weekends. This was especially apparent during the after school hours on weekdays.

Some differences in children's screen time were found according to parents' education levels with higher levels of parental education associated with less time watching television and more time using computers for homework. According to parents' reports of children's time spent on electronic games, the likelihood of spending one hour or more on this activity was negatively related to parental education. These educational differences may reflect inherent differences in children's own preferences for types of activities (e.g., reading), or they may reflect differences in parental regulation, investment in extracurricular activities and attitudes towards screen time.

The home environment and children's screen time

An important focus of the Australian (and US) guidelines about children's screen time is the advice to parents about providing an environment that minimises children's screen time and encourages greater parental participation in the screen time that occurs. One suggestion in the Australian guidelines is to make children's bedrooms a television/computer-free zone. In the current sample, a quarter of children at 6–7 through to 10–11 years had televisions in their bedrooms, and almost half of children at age 12–13 years were able to watch television programs in their bedroom. Another suggestion concerned setting rules; for example, to have no screen time at certain times of day. With regard to television viewing, a majority of children (84–91%) at all ages had rules about what television programs they could watch, while 50–60% had rules about how much television they could watch. Clearly, it is also important to understand to what extent children had rules about other forms of screen time, but we did not explore this here. Consistent with previous studies (De Jong et al., 2013; Veldhuis, van Grieken, Renders, HiraSing, & Raat, 2014), we generally found that children watched less television if they did not have a television in their bedroom or when families had rules about television viewing. However, our results suggested that as children get older, rules may be less effective, with nearly half of the 12–13 year olds who had rules about television viewing exceeding 2 hours of television on weekends. This highlights the importance of developing effective and age-appropriate strategies to reduce children's time spent on screen-based activities.

Alternative activities and screen time

The analysis presented here showed that engaging in certain extracurricular activities is associated with lower volumes of screen-time use at 12–13 years. However, from these analyses we cannot say whether children participating in extracurricular activities have different preferences about how they spend their time, are more constrained in the time they have available for screen time activities or have different patterns of time use due to other family characteristics (or vice versa). Nevertheless, increased availability of and child participation in extracurricular activities may be one strategy that could help reduce children's allocation of time to screen time activities, especially if screen time activities are largely done to fill in time that is not taken up by more structured activities.

Children's self-reported enjoyment of physical activity and physical wellbeing were also related to their screen-based behaviours, although the descriptive analyses likewise cannot be used to explain the mechanisms underlying this relationship. While these analyses do not provide evidence of a causal relationship, it may be that if children are provided with opportunities to engage in physical activities that they enjoy, that promote their feelings of wellbeing and fitness, a consequence may be that they will engage in these activities and reduce their screen time.

Implications of these findings

Time spent by children in front of screens has been found to be a significant factor in explaining differences in children's health problems such as obesity (Caroli et al., 2004; Fairclough et al., 2009; Hancox & Poulton, 2005; Hardy, Dobbins, Denney-Wilson, Okely, & Booth, 2009; Laurson et al., 2014). Therefore, guidelines concerning limits on the amount of time children spend using screens for entertainment are important. However, as children's access to screens through television, computers and mobile devices becomes more ubiquitous, it may be expected that achieving a maximum of 2 hours of screen time for entertainment will become more and more unrealistic, and certainly, more difficult for parents to manage. It will be interesting to see whether these guidelines are revised as screen time becomes more a part of everyday life, for children as well as adults.

Guidelines about screen time currently state a proposed limit on children's screen time for entertainment reasons. Of course, children are also exposed to screens more and more through school and outside school, for social reasons and homework. To the extent that these activities also are limiting children's time spent on active pastimes, consideration of this screen time may need to be taken into account.

Despite concerns about children's screen time, it is important to acknowledge that there are positive aspects to this time. Digital technology is an essential part of children's lives in today's world and the effective use of computing technology is key to unlocking new professions and prosperity for the future. As results presented here suggest, children are using computers for schoolwork, gathering information and socialising with others. Such screen-based activities have value in that they enable children to develop digital skills and progress towards becoming expert users (Bavelier et al., 2010).

As has been identified in relation to television programming, understanding the implications of screen time for children's wellbeing needs to take account of content and context, not just the amount of exposure (Bavelier et al., 2010). Here we have explored this to some extent, by reporting on the different types of screen-based activities undertaken by children. Nevertheless, we were unable to explore the content of television or of games, and did not explore whether parents or others were involved in these screen-based activities with children. Aspects such as these are among those identified as being important for parents to consider when managing their children's screen time to ensure children use screens in a safe and beneficial manner. Expanding research to gain greater insights on these aspects of children's screen time will be important in the future, especially considering that screens are only likely to become more prevalent as vehicles of children's entertainment, schooling and communication.

Children are clearly spending a large amount of time on screen time activities, with a majority of children spending more than 2 hours per day on these activities. Regardless of there being questions about whether or not the recommended 2 hour limit on screen time for entertainment is realistic, it is still important that children's screen time is managed to ensure that time involves quality engagement with television, computers or games, and to ensure that children do not undertake these activities to the detriment of other activities that may be essential for their wellbeing. Finding

effective mechanisms to inform and assist parents to manage children's screen time is needed, especially in the current environment in which screens are integral to many facets of children's and adults' lives.

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Pubertal status and emotional, school and social functioning

6

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6.1 Introduction

Puberty is a major developmental milestone involving the physical changes whereby a child's body matures into an adult body physiologically capable of sexual reproduction. The onset of puberty marks the transition from childhood to adolescence. The beginning of adolescence involves rapid physical growth, changes in body composition and changes in most body systems—including the neuroendocrine axis, bone size and mineralisation, and the cardiovascular system—along with emotional and cognitive changes (Dubas, Graber, & Petersen, 1991). A better understanding of the factors associated with the timing of the onset of puberty is not only important for understanding variable patterns of physical development but also has important clinical, health and educational implications.

Factors influencing pubertal timing

Pubertal timing, defined by Marshall and Tanner (1969, p. 291) as "the variation in the chronological age at which adolescence begins and different stages of physical maturity are reached", has been shown to vary according to many factors, including gender, genetics, nutrition, ethnicity, health status and activity level, household structure and family functioning, and environmental exposures (Ellis & Essex, 2007; Maisonet et al., 2010; Mensah, Bayer, Wake, Carlin, Allen, & Patton, 2013; Towne, Czerwinski, Demerath, Blangero, Roche, & Siervogel, 2005).

Over the past 150 years, the age at onset of puberty has fallen substantially across many developed countries. Bellis, Downing, and Ashton (2006) found that in northern Europe, the average age at menarche has fallen by up to 3 years over the last century. The major factors that have been shown to accelerate the onset of puberty are a combination of improvements in public health, such as improved childhood nutrition and reduction in the incidence of childhood infections; and higher stress levels among adolescents resulting from changes in social structures such as increasing levels of divorce, single-parent families and father absenteeism (Bellis et al., 2006). On average, girls begin puberty around age 10–11 and boys start at age 11–12 (Kail & Cavanaugh, 2010; Mensah et al., 2013). However, the timing of puberty varies by 4 to 5 years among healthy children, with the normal ages ranging from 8–13 years for girls and 9–14 for boys (Mensah et al., 2013).

Parental separation has been shown to be associated with earlier reproductive development, while the presence of the child's biological father in the home has been found to predict later pubertal timing, especially among daughters (Quinlan, 2003). Using a British national sample of 5,913 women, Bogaert (2008) reported that an absent father during childhood predicted early menarche in adolescent girls. Similarly, James, Ellis, Schlomer, and Garber (2012) found that father absence had a significant influence on the early maturation of daughters but not sons. Other studies suggest that it is not only the absence of the biological father, but the household structure that influences pubertal timing. For example, Kim and Smith (1998) found that living in a single-parent family was associated with earlier pubertal onset in both girls and boys; Ellis and Garber (2000) found that a step-father presence was a stronger predictor of early pubertal timing in girls than a biological father's absence; and Arim, Shapka, Dahinten, and Willms (2007) reported that the presence of a step-father predicts more advanced pubertal development status for both genders.

A mother's pubertal timing has been shown to have a strong influence on her daughters' pubertal timing. Ellis and Essex (2007) found that an older age at menarche in mothers significantly predicts the pubertal timing of their daughters. Similarly, a study of 4,000 British girls aged 8–14 years found that a maternal age at menarche of under 12 years old was associated with earlier onset of puberty among daughters (Maisonet et al., 2010). Using data collected from the Fels Longitudinal Study in the United States, Towne et al. (2005) estimated the correlations of ages at menarche between daughters and mothers, sisters and other relatives (e.g., an aunt and niece). Results from this study showed that approximately half of the variation in menarche timing was attributable to genetic factors. To the best of our knowledge, there is no existing evidence about the association between parents' pubertal timing and their sons' pubertal development. This lack of evidence is presumably due to a lack of available data about the pubertal timing of mothers and their sons, and fathers and their children.

Many other factors have been shown to influence pubertal timing. For example, studies have shown that children who were overweight or obese in the early years of childhood tended to experience the onset of puberty at an earlier age (Davison, Susman, & Birch, 2003; Lee, Kaciroti, Appugliese, Corwyn, Bradley, & Lumeng, 2010; Staiano, Broyles, Gupta, Malina, & Katzmarzyk, 2013). On the other hand, body fat in the later years of childhood has been found to delay puberty in boys. For example, boys with a higher body mass index (BMI) tended to have later onset of puberty compared to boys with a lower BMI (Lee et al., 2010). Exclusive breastfeeding has been found to be negatively associated with early menarche after adjusting for a range of confounders such as socio-economic position, urban residence, mothers' educational level and postpartum BMI (Al-Sahab, Adair, Hamadeh, Ardern, & Tamim, 2011). Similarly, Kale et al. (2014) found that mixed-fed or predominantly breastfed girls showed later onset of breast development than formula-fed girls. First-born birth order has been shown to be associated with faster infancy weight gain (Ong et al., 2009), which is associated with early puberty of both genders (Kuzawa, McDade, Adair, & Lee, 2010; Terry, Ferris, Tehranifar, Wei, & Flom, 2009).

According to life history theory, pubertal timing is partly a result of environmental factors early in life, which lead to different developmental trajectories (Ellis, 2004). That is, early puberty may be a result of a child's adaptation to life adversities (e.g., a stressful family environment) and, in turn, may be related to anxiety and aggression (Del Giudice, 2009; Mustanski, Viken, Kaprio, Pulkkinen, & Rose, 2004). Higher levels of parental investment from both parents, maternal support and lower levels of father-reported marital conflict have also been found to be associated with later physical maturation (Ellis & Essex, 2007; Marshall, Gorely, & Biddle, 2006).

Pubertal timing and social outcomes

Changes in physical development during puberty are often accompanied by major changes in interpersonal relationships; and both early and late pubertal onset have been found to be associated with a variety of negative social-behavioural outcomes such as depression, aggression, delinquency, substance abuse, relationship problems and adolescent pregnancy (Mendle, Turkheimer, & Emery, 2007).

The amount of time that children spend with their friends increases during adolescence; and it is also a time when adolescents become more independent from their parents (Savin-Williams & Berndt, 1990). The rapid physical changes in puberty are accompanied by substantial changes in social roles and relationships (Paikoff & Brooks-Gunn, 1991), which influence adolescents' interactions with their peers.

Previous studies have suggested that variation in physical maturation can create difficulties in children's friendships (Conley & Rudolph, 2009). Developmental readiness theory suggests that early-maturing adolescents are more likely to have psychological and behavioural problems because these individuals are not emotionally or cognitively ready for the physical and social changes accompanying puberty (Ge, Conger, & Elder, 2001a). Mensah et al. (2013) used LSAC data to explore how the early onset of puberty related to children's social and behavioural adjustment. Results from this study revealed that both boys and girls who entered puberty early (at age 8–9 years) had poorer psychosocial adjustment from early childhood through to early adolescence.

"Off-time" puberty (i.e., early or late) is also associated with both internalised and externalised distress (Mendle et al., 2007), which have been shown to lead to behavioural disaffection in the

classroom (i.e., withdrawal behaviours such as attempting to "lay low" and not participate in class; refusal behaviours including refusing to do classwork, study for tests or come to class; and disruptive aggressive behaviours such as yelling at the teacher in the classroom) (Roeser, van der Wolf, & Strobel, 2001). In a UK study, girls with the early onset of puberty were also found to be more likely to be bullied and take time off from school during early adolescence (Downing & Bellis, 2009). Therefore, pubertal timing may have an indirect influence on adolescents' school performance via changes in their mental health and relationships with their peers.

For boys, pubertal development and the associated changes in hormone levels have been shown to be related to increased levels of physical aggression and antisocial behaviour (Rowe, Maughan, Worthman, Costello, & Angold, 2004). A study of 128 boys in the United States showed that early-maturing boys experienced decrements in the quality of their peer relationships as they moved out of childhood and into early adolescence, whereas boys with more typical pubertal development experienced improvements in peer relationships (Mendle et al., 2012).

Among girls, early pubertal development has been found to be associated with disapproval and negative social reputations among their peers, as well as peer victimisation and exclusion (Conley & Rudolph, 2009). Compared to those who experienced late puberty, girls who experienced early puberty had higher levels of both internalising (e.g., depression, anxiety, bulimia nervosa) and externalising (e.g., drinking, substance abuse) problems (Kaltiala-Heino, Marttunen, Rantanen, & Rimpelä, 2003). Early-maturing girls were found to be more susceptible to peer influence with respect to risk-taking (Kretsch, Mendle, & Harden, 2014) and were more likely to develop depression if they experienced stressful peer relationships (Conley & Rudolph, 2009).

Although variations in pubertal timing have been linked to mental health and behavioural problems—both concurrent (Huerta & Brizuela-Gamiño, 2002) and subsequently (Copeland, Shanahan, Miller, Costello, Angold, & Maughan, 2010)—researchers also argue that the relationship between puberty and developmental outcomes may be bi-directional. That is, early childhood environmental stressors and anxiety early in life increase the likelihood of early puberty (Belsky, Steinberg, & Draper, 1991; Scarpa, 2004) and this, in turn, may contribute to adjustment problems in adolescence (Caspi & Moffitt, 1991; Ge, Conger, & Elder, 2001b; Reardon, Leen-Feldner, & Hayward, 2009).

In this chapter, we describe children's patterns of pubertal timing and examine the association between household structure and pubertal maturation; and the associations between pubertal development and psychosocial outcomes. This chapter aims to build on previous research and, using longitudinal data from a large nationally representative sample of Australian children aged between 8 and 13, address the following questions:

1. What are the patterns of pubertal timing among Australian adolescents?
2. Does pubertal timing relate to family factors such as household structure, absence of the biological parents and pubertal timing of parents?
3. To what extent is pubertal development related to children's mental health, school functioning and relationships with their peers?

The chapter is structured as follows. The frequency of specific indicators of the onset of puberty at ages 8–9, 10–11 and 12–13 are presented. We then examine factors such as household structure and the pubertal timing of parents that may be associated with children's pubertal timing. Finally, we examine the association between pubertal status and children's emotional functioning, school functioning and relationships with peers.

6.2 Data and measurement

Sample

This chapter uses data from K-cohort children when they were aged 8–9 (Wave 3), 10–11 (Wave 4) and 12–13 years (Wave 5). There were 4,331 children aged 8–9 years; 4,169 children aged 10–11 years and 3,956 children aged 12–13 years who participated in the data collection at Waves 3, 4 and 5 respectively. All analyses presented in this chapter were conducted separately for boys and girls.

Measurements of pubertal status

Pubertal status refers to the physical and physiological maturational levels of children at a given point in time (Huddleston & Ge, 2003). A variety of methods have been used to evaluate pubertal development in adolescents. For girls, the most commonly used markers of pubertal timing are breast development, pubic hair development and age at menarche (Kaltiala-Heino et al., 2003; Natsuaki, Klimes-Dougan, Ge, Shirtcliff, Hastings, & Zahn-Waxler, 2009). For boys, measures of pubertal timing are commonly based on physical signs including voice deepening, facial hair and pubic hair development (Parent, Teilmann, Juul, Skakkebaek, Toppari, & Bourguignon, 2003). Other commonly used measures of pubertal development are Tanner Staging (Marshall & Tanner, 1969, 1970) and the Pubertal Development Scale (PDS; Crockett & Petersen, 1987). Tanner Staging is a widely used rating scale for sexual development with a range from Stage 1 (pre-pubertal) to Stage 5 (adult). For females, the Tanner scale is based on the assessment of breast and pubic hair development; and males are rated based on genital development and pubic hair growth. The PDS assesses the pubertal stage based on a number of typical physical indicators of puberty for boys and girls. Adolescents (or their parents) are asked to rate the amount of change or development the young person has experienced with respect to several physical characteristics associated with pubertal maturation. All adolescents are asked whether they have experienced a growth in height; growth in body hair; and skin changes such as pimples. Boys are asked about voice deepening and facial hair; and girls are asked about breast growth and whether they have started to menstruate. The PDS has been used in a variety of ways in studies of pubertal development. For example, Mensah et al. (2013) define early puberty as showing at least one indicator of puberty at an early age. Yousefi et al. (2013) used the PDS to determine pubertal timing according to the age when the first pubertal indicator was experienced, and Mustanski et al. (2004) used PDS scores at two time points (ages 11 and 14) to assesss pubertal development. Based on reported levels of development on the components of the PDS scale, Crockett and Petersen (1987) developed a classification for pubertal development in terms of five pubertal status categories: pre-pubertal, early pubertal, mid-pubertal, late pubertal and post-pubertal.

Several other methods have been used to define "early", "on time" or "late" pubertal timing. Some studies use perceived timing of puberty reported by the parent (e.g., Is your child early, on-time or late with respect to their peers?). Others have used self-reported stages of puberty, which are then categorised into a timing variable based on sample characteristics or population norms (Natsuaki et al., 2009). Given the variety of methods used to measure pubertal development, it is important to keep these differences in mind when comparing the findings of different studies.

From Wave 3 of LSAC, parents of children in the K cohort were asked to rate the amount of change or development the study child experienced with respect to several physical signs associated with pubertal maturation. Parents were asked to rate each of these signs of puberty on a scale of 1 to 4, with 1 meaning "has not yet started", 2 "has barely started", 3 "has definitely started" and 4 meaning "seems complete". Not all signs of puberty were asked about in every wave, as shown in Table 6.1. At Waves 4 and 5, parents of girls were also asked if their daughter had ever menstruated.

Table 6.1: Measures of the physical signs of puberty

		Age		
Measure	**Gender**	**8–9 (Wave 3)**	**10–11 (Wave 4)**	**12–13 (Wave 5)**
Skin change (acne, pimples or blackheads)	Both	✓	✓	✓
Adult-type body odour	Both	✓		
Body hair (armpits and/or dark pubic hair)	Both	✓	✓	✓
Growth in height (growth spurt)	Both		✓	✓
Breast growth	Girls	✓	✓	✓
Menstruation	Girls		✓	✓
Deepening voice	Boys		✓	✓
Begin to grow hair on the face	Boys		✓	✓

In order to examine the association between pubertal timing and emotional functioning, school functioning and peer relationships, Puberty Category Scores were computed by totaling the PDS

scores using the criteria developed by Crockett and Petersen (1987). For boys, parents' ratings of the signs of body hair growth, deepening voice and facial hair growth were summed to create a total score ranging from 3 to 12. For girls, parents' ratings of the signs of body hair growth and breast development were summed to create a scale ranging from 2 to 8. For girls, this scale was combined with parents' responses about whether their daughters experienced menarche or not, as shown in Table 6.2.

Table 6.2: Pubertal status categories, by gender

	Boys	Girls
Pre-pubertal	3 points	2 points and no menarche
Early pubertal	4–5 points	3 points and no menarche
Mid-pubertal	6–8 points	> 3 points and no menarche
Late pubertal	9–11 points	< or = 7 points and menarche
Post-pubertal	12 points	8 points and menarche

Notes: For boys, the total score is the sum of parents' responses (on a 1 to 4 scale with 1 meaning "not started" and 4 meaning "seems complete") to questions about body hair growth, deepening voice and facial hair growth. For girls, the total score is the sum of parents' responses to questions about body hair growth and breast development.

Measures of household structure and the timing of parents' puberty

The LSAC data can be used to explore whether there is a relationship between the timing of children's puberty, household structure and parents' retrospective self-reports of pubertal timing. We first examine the proportion of children showing signs of puberty according to whether they are living with their biological mother and their biological father. Then, the proportion of children showing signs of puberty is compared according to a more detailed measure of household structure—that is, whether the child is living with both their biological parents, only one parent (lone mother or lone father), their mother and step-father, father and step-mother or with neither biological parent.[1]

Because children's pubertal development has been shown to be associated with their parents' pubertal timing, we also examine the proportion of children showing signs of puberty at specific ages according to their parents' responses to questions about their own pubertal timing. At Wave 5, parents were asked to think of the age at which their own puberty began and to rate on a scale of 1 to 5 whether they felt that, in comparison to their peers, they were 1 "Way ahead of most other kids", 2 "Ahead", 3 "About the same age as other kids", 4 "Behind" or 5 "Way behind most other kids". Female parents were also asked the age at which their own periods started.

Measures of emotional functioning, school functioning and peer relationships

Children's emotional functioning, school functioning and peer relationships were measured using the Parent 1-reported Pediatric Quality of Life (PedsQL) inventory (Varni, Burwinkle, & Seid, 2006) from Waves 3 to 5. The three subscales of PedsQL used in this chapter were as follows:

1. *Emotional functioning* (5 items) assesses the frequency that the child displays negative emotional states such as sadness and anxiety. Parents were asked how often the study child had the following problems in the past month:
   - feeling afraid or scared;
   - feeling sad or blue;
   - feeling angry;
   - trouble sleeping; or
   - worry about what will happen to him/her.
2. *School functioning* (5 items) measures children's school adjustment and performances. Parents were asked how often the study child had the following problems in the past month:

[1] For children whose parents have separated, who spend time in two households, this measure is based on the household in which the child lives most of the time (i.e., the household of P1).

- trouble paying attention in class;
- forgetting things;
- trouble keeping up with school activities;
- missing school because of not feeling well; or
- missing school to go to the doctor or hospital.

3. *Social functioning* (5 items) assesses children's relationship with their peers. Parents were asked to rate how frequently the study child had the following problems in the past month:
   - not getting along with other children;
   - other kids not wanting to be his/her friend;
   - getting teased by other children;
   - not being able to do things that other children his/her age can do; or
   - not keeping up when playing with other children

The study child's main carer was asked to rate each item on a 5-point scale, ranging from 1 (Never) to 5 (Almost always). Items were reverse-scored and transformed to a 0 to 100 scale (1 = 100, 2 = 75, 3 = 50, 4 = 25, 5 = 0), so that higher scores indicate a higher level of functioning. Average scores were then calculated for the emotional, school and social functioning subscales.

Methodology

This chapter will provide descriptive evidence of the proportion of children showing physical signs of the onset of puberty. We begin by providing an overview of the percentage of boys and girls showing specific signs of puberty at ages 8–9, 10–11, and 12–13 years. Based on these individual, specific signs of puberty, we then compare the percentage of children whose parents reported that they were showing at least one sign of puberty (including those who were reported as "barely started"), with the percentage who were showing at least one definite sign of puberty. By age 12–13, almost all children were showing some signs of the onset of puberty. For this reason, for our analysis of the association between pubertal timing, household structure and parents' pubertal timing, the indicator of whether a child was showing definite signs of puberty was used. Logistic regression models were used to estimate the association between household structure and parents' pubertal timing on the likelihood of showing definite signs of puberty. The explanatory variables used in the multivariate analyses capture a range of factors that are known to impact upon child development and developmental outcomes. In the estimates of the relationship between household structure, inherited factors and the likelihood of showing signs of puberty, we control for age (in weeks), birth order, birth weight, whether the child was underweight or overweight in the previous wave, whether the child has a long-term health condition and whether the child was breastfed until at least 6 months of age.

For our analysis of the association between socio-emotional outcomes and pubertal status, more detailed measures of pubertal status (based on the puberty category scores developed by Crockett and Petersen (1987)) were used to differentiate between those in the early and later stages of puberty. We also examine the association between age at onset of puberty and social-emotional outcomes. In the multivariate analysis of the association between pubertal status and social-emotional outcomes, we use linear regressions and control for child age (in weeks), household structure, birth order, household size, number of siblings, birth weight, whether the child was breastfed until 6 months old, whether the child has a long-term health condition or disability, whether the child was under or overweight, parental education, and equivalised parental income.

6.3 Patterns of children's pubertal timing

The percentages of boys and girls showing specific signs of puberty are shown in Tables 6.3 and 6.4 respectively. Although the age at onset of puberty varied among children, most girls had not yet started showing any signs of puberty at the age of 8–9 years. For most girls, one of the first signs of puberty is the beginning of breast growth. Only 7% of girls had definitely started breast development by the age of 8–9; and a further 16% had barely started. Less than 20% of 8–9 year old girls were showing any signs of skin changes or adult-type body odour; and less than 10% had started growing body hair.

By the age of 10–11 years, the proportion of girls showing signs of puberty had increased substantially. More than half (54%) were showing some signs of skin changes; almost 60% had body hair; more than three-quarters (76%) had started breast development; and the majority (87%) had experienced a growth spurt. However, only 6% of 10–11 year old girls had experienced menarche. At the age of 12–13 years, 86% of girls had experienced skin changes, with 54% of parents saying that this had definitely started; 93% had body hair (61% definitely started and 15% complete); almost all girls (96%) had experienced a growth spurt (73% definitely started); 97% had begun breast development (76% definitely started) and 57% had experienced menarche.

Table 6.3: Proportion of girls showing specific physical signs of puberty, by age group

Puberty indicator	Not started (%)	Barely started (%)	Definitely started (%)	Seems complete (%)	Total (%)
Adult-type body odour [a]					
Age 8–9 years	83.8	8.1	7.9	0.2	100.0
Skin changes (acne, pimples or blackheads)					
Age 8–9 years	81.7	13.3	5.1	–	100.0
Age 10–11 years	46.4	32.0	21.4	0.3	100.0
Age 12–13 years	14.4	29.0	53.6	2.9	100.0
Body hair (armpits and/or dark pubic hair)					
Age 8–9 years	91.3	5.1	3.5	0.1	100.0
Age 10–11 years	41.8	25.0	31.1	2.1	100.0
Age 12–13 years	7.1	17.2	60.9	14.8	100.0
Growth in height (growth spurt) [b]					
Age 10–11 years	12.7	25.6	60.6	1.1	100.0
Age 12–13 years	4.4	17.1	73.3	5.3	100.0
Breast growth					
Age 8–9 years	77.1	16.3	6.7	–	100.0
Age 10–11 years	23.6	33.1	42.9	0.5	100.0
Age 12–13 years	3.1	15.8	76.1	5.0	100.0
Menarche [c]					
Age 10–11 years	94.3	n.a.	5.7	n.a.	100.0
Age 12–13 years	43.0	n.a.	57.0	n.a.	100.0

Notes: Percentages based on weighted data. [a] This question was only asked at age 8–9. [b] This question was not asked at age 8–9. [c] At ages 10–11 and 12–13, mothers were asked about whether their daughter had experienced menarche.

Source: LSAC K cohort, Waves 3, 4 & 5

On average, the onset of puberty occurs later for boys than for girls. Table 6.4 shows that the vast majority of boys were not showing any signs of pubertal development at the age of 8–9 years. Around 12% of 8–9 year old boys were reported as having adult-type body odour; and a similar proportion (11%) had started showing signs of skin changes, while very few (4%) had any signs of body hair.

For boys, a rapid increase in height is one of the first signs of the onset of puberty. At the age of 10–11 years, just over 80% of boys were reported as having experienced a growth spurt, with 47% of parents saying that a rapid increase in height had definitely started. Other signs of puberty were much less common for boys at this age, with 35% of parents reporting that their sons had body hair (only 11% definitely started); 31% reporting their sons had started having skin changes (7% definitely started); 10% reporting a deepening voice (less than 2% definitely started) and 6% reporting that their son had begun to grow facial hair (less than 1% definitely started).

By the age of 12–13, almost 90% of boys had experienced a growth spurt; over 70% had body hair and almost 70% had experienced skin changes. Almost half of 12–13 year old boys were reported as showing signs of a deepening voice, with 23% of parents saying this had definitely started. Most boys still had not begun to grow facial hair when they were 12–13 years old. Only 12% of parents

reported that this had definitely started. Furthermore, at the age of 12–13, very few parents reported that any of the signs of puberty seemed complete.

Table 6.4: Proportion of boys showing specific physical signs of puberty, by age group

Puberty indicator	Not started (%)	Barely started (%)	Definitely started (%)	Seems complete (%)	Total (%)
Adult-type body odour [a]					
Age 8–9 years	87.7	8.6	3.7	–	100.0
Skin change (acne, pimples or blackheads)					
Age 8–9 years	88.9	8.2	2.9	–	100.0
Age 10–11 years	68.8	23.9	7.2	–	100.0
Age 12–13 years	31.6	35.7	32.2	0.4	100.0
Body hair (armpits and/or dark pubic hair)					
Age 8–9 years	96.1	2.9	1.0	–	100.0
Age 10–11 years	64.6	24.1	10.7	0.6	100.0
Age 12–13 years	28.9	32.5	37.8	0.9	100.0
Growth in height (growth spurt) [b]					
Age 10–11 years	19.2	33.1	46.8	1.0	100.0
Age 12–13 years	12.8	30.3	55.7	1.3	100.0
Deepening voice [b]					
Age 10–11 years	90.0	8.5	1.5	–	100.0
Age 12–13 years	53.3	22.2	22.9	1.6	100.0
Begin to grow hair on the face [b]					
Age 10–11 years	94.3	4.7	0.9	–	100.0
Age 12–13 years	68.7	18.9	12.2	0.2	100.0

Notes: Percentages based on weighted data. [a]This question was only asked at age 8–9. [b] This question was not asked at age 8–9.
Source: LSAC K cohort, Waves 3, 4 & 5

These physical signs can then be used to determine the proportion of children who are showing any signs of puberty. Table 6.5 shows the percentage of boys and girls at ages 8–9, 10–11 and 12–13 years that had started showing any signs of the onset of puberty (i.e., parents rated at least one of the physical signs of puberty as "barely started", "definitely started" or "seems complete"); and the proportion of children who were showing definite signs of the onset of puberty (i.e., parents rated at least one of the physical signs of puberty as either "definitely started" or "seems complete").

Table 6.5: Proportion of boys and girls showing signs of puberty, by gender and age group

	Any signs (%)		Any definite signs (%)	
	Boys	Girls	Boys	Girls
Age 8–9 years	20.8	40.4	6.5	16.1
Age 10–11 years	86.6	96.0	52.8	73.9
Age 12–13 years	94.6	99.5	65.8	92.9

Notes: Percentages based on weighted data. Children are considered to be showing "definite signs" if parents rated any of the specific signs of puberty as "definitely started" or "seems complete". Children are considered to be showing any signs if parents rated any of the specific signs of puberty as "barely started", "definitely started" or "seems complete".
Source: LSAC K cohort, Waves 3, 4 & 5

For some children, pubertal onset was quite early. At the age of 8–9, 21% of boys and 40% of girls were showing some signs of the onset of puberty and 16% of girls and 7% of boys were showing definite signs that puberty had begun. By 10–11 years, these proportions had increased substantially, with around 90% of children showing some signs of the onset of puberty and 74% of girls and 53% of boys showing definite signs. At age 12–13, almost all girls (93%) and two-thirds of boys (66%) were showing definite signs of the onset of puberty.

Looking at the percentage of boys and girls at each stage of development, according to puberty category scores shows a similar picture (Table 6.6). At age 8–9, the majority of boys (96%) were in the pre-pubertal stage, 3% were early pubertal and only 1% were mid-pubertal. By age 10–11, 61% of boys were pre-pubertal, 27% were early pubertal, 12% were mid pubertal and 1% were in the late pubertal stage. By the age of 12–13, only 24% of boys were pre-pubertal, 29% were early pubertal, 37% were mid-pubertal and 10% were late pubertal. The proportion of girls showing signs of puberty at age 8–9 was considerably higher than that of boys. At age 8–9, 63% of girls were pre-pubertal, 13% were in the early pubertal stage and 24% were in the mid-pubertal stage. At age 10–11, 17% of girls were pre-pubertal, 19% were in the early pubertal category, 58% were mid-pubertal and 5% were in the late pubertal stage. However, at the age of 12–13, only 1% of girls were pre-pubertal; 4% were in the early puberty stage; 38% were mid-pubertal; 53% were in the late puberty stage and 4% of girls were in the post-pubertal stage.

Table 6.6: Pubertal stage, by gender and age group

Gender/Age	Pre-pubertal (%)	Early pubertal (%)	Mid-pubertal (%)	Late pubertal (%)	Post-pubertal (%)	Total (%)
Boys						
Age 8–9 years	96.2	2.9	#1.0	–	–	100.0
Age 10–11 years	60.7	26.6	11.8	#0.9	–	100.0
Age 12–13 years	24.1	29.2	36.5	10.0	#0.2	100.0
Girls						
Age 8–9 years	63.0	13.1	24.0	–	–	100.0
Age 10–11 years	17.1	19.2	58.1	5.3	#0.4	100.0
Age 12–13 years	1.4	4.0	37.7	53.4	3.5	100.0

Notes: Percentages based on weighted data. # Estimate not reliable (cell count less than 20).
Source: LSAC K cohort, Waves 3, 4 & 5

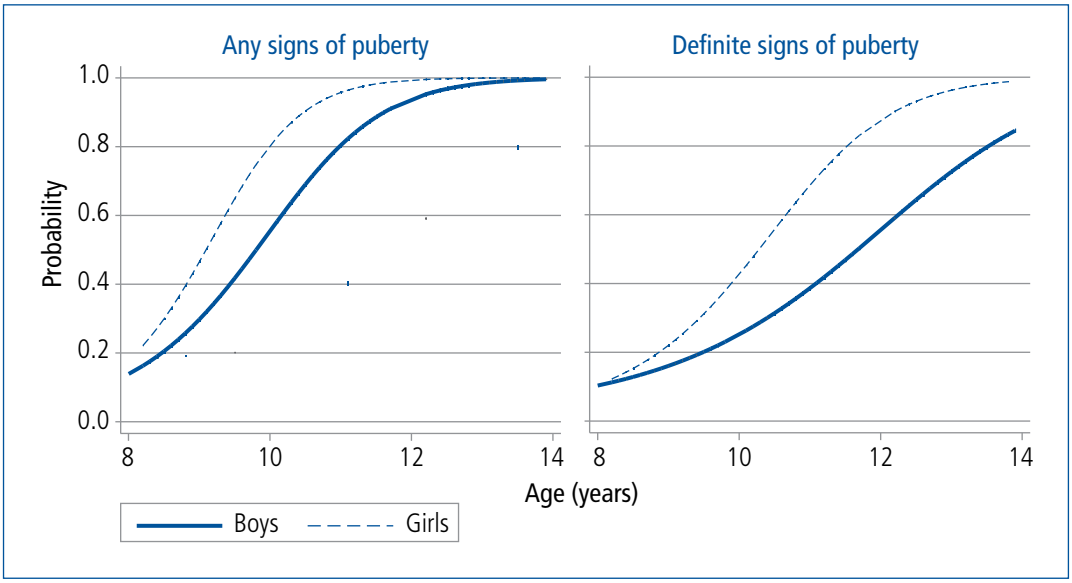
In the previous tables, broad age categories, based on the wave of LSAC are used. This means that the age of children (e.g., within the "8–9 years" age group) may differ by up to two years. There is likely to be a considerable amount of variation in the pubertal status of children within these broad age groups. Looking at pubertal status according to the age of the child at the time of interview (in weeks) gives a more precise picture of the proportion of children showing signs of puberty at specific ages. In Figure 6.1 (page 136), observations over Waves 3, 4 and 5 of LSAC are pooled and used to estimate the probability of showing signs of puberty at specific ages between 8 and 14.[2]

As expected, the predicted probability of showing any signs of puberty was higher for girls than for boys, particularly before the age of 12. After the age of 13, the proportion of boys and girls showing any signs of puberty started to converge, with almost all children showing at least some sign of the onset of puberty by the age of 14. However, gender differences in the proportion of children showing definite signs of puberty remained until the early teenage years. While almost all girls were showing definite signs of the onset of puberty at this age, for boys, the predicted probability of showing definite physical signs of puberty at the age of 14 was just over 80%.

6.4 Pubertal timing and family factors

Studies have shown that the timing of puberty is associated with family characteristics, such as household structure (i.e., whether the child is living with both biological parents, in a single-parent household, in a blended family with a step-parent or with neither of their biological parents), and inherited factors, particularly maternal pubertal timing. In this section, we examine the association between environmental factors (household structure, absence of the biological father) and the pubertal timing of parents and children's pubertal timing.

[2] In the logistic regressions presented in this chapter, age (in weeks) squared, rather than linear age, is included in the models to account for the fact that the probability of showing signs of puberty increases at a decreasing rate. That is, as more children show signs of puberty, the growth in the probability of showing signs of puberty slows down, and the curves eventually level off.



Notes: Logistic regression with observations pooled over three waves by age. Probabilities for boys and girls are estimated separately. For boys, n = 5,983. For girls, n = 5,748. For probability of any signs of puberty: Pseudo R-squared is 0.36 for boys and 0.43 for girls. For probability of definite signs of puberty: Pseudo R-squared is 0.18 for boys and 0.35 for girls.
Source: LSAC K cohort, Waves 3, 4, & 5

Figure 6.1: Predicted probability of showing signs of puberty, by age and gender

Pubertal timing and household structure

Table 6.7 shows the proportion of children showing any definite signs of puberty by whether their biological mother or biological father was living in their household at the time of interview.[3] For boys and girls, the proportion showing definite signs of puberty was higher among those who were not primarily living with their biological father at ages 8–9, 10–11 and 12–13 years. However, the difference was only statistically significant for boys aged 12–13.

Table 6.7: Proportion of children showing definite signs of puberty, by age group, gender and presence of biological parents

	Boys			Girls		
	Age 8–9 (%)	Age 10–11 (%)	Age 12–13 (%)	Age 8–9 (%)	Age 10–11 (%)	Age 12–13 (%)
Biological father present in P1 household						
Yes	6.4	51.2	65.1	14.9	72.8	92.3
No	7.1	57.5	68.0 *	20.1	77.0	94.5
Total	6.5	52.8	65.8	16.1	73.9	92.8
N	1,925	2,087	1,970	1,864	2,002	1,881
Biological mother present in P1 household						
Yes	6.6	52.6	65.9	16.2	73.9	92.9
No	#5.0	56.7	63.8	#9.1	75.7	90.9
Total	6.6	52.8	65.8	16.1	73.9	92.8
N	1,925	2,087	1,970	1,864	2,002	1,881

Notes: Percentages based on weighted data. Statistical significance is tested against the base category ("Yes") *** $p < .001$; ** $p < .01$ and * $p < .05$. #Estimate not reliable (cell count less than 20).
Source: LSAC K cohort, Waves 3, 4 & 5

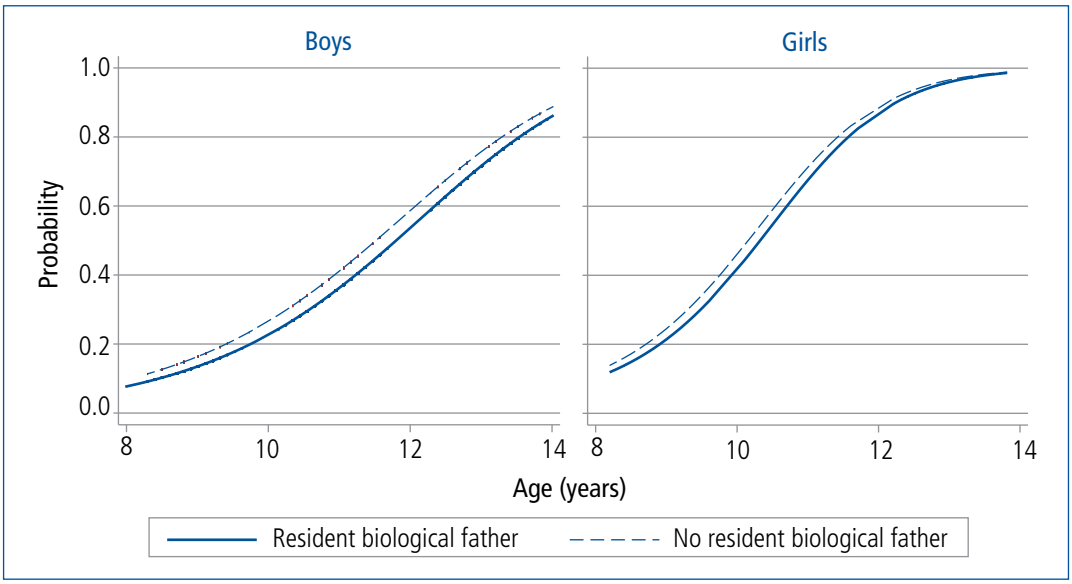
[3] The increase in the number of observations between Wave 3 and Wave 4 is due to changes in the data collection. In Wave 3, these questions were asked in the self-completion questionnaire, while in Wave 4 they were asked in the main interview. These changes in data collection methods are described in more detail in the introduction of this Report.

Although not statistically significant, there appears to be a trend towards the proportion of boys and girls showing definite signs of puberty being lower among those who were not living primarily with their biological mother at age 8–9 and at age 12–13, and higher among children who were not living with their biological mother at age 10–11. The absence of any statistically significant differences is likely to be because the vast majority of children (at least 96% in each wave) were living with their biological mother at the time of interview.

Using broad age categories, the differences in the proportion of children showing definite signs of puberty depending on whether they were primarily living with their biological parents were generally not statistically significant. However, logistic regressions using a more precise measure of age and pooling data over three waves of LSAC indicate that there is a significant association between the presence in the child's primary residence of the biological father and pubertal status for boys and girls.[4] The differences in the predicted probability of showing signs of puberty, according to the presence of the biological father, are shown in Figure 6.2.

For girls, the predicted probability of showing signs of puberty was higher if there was no resident father at ages 8–11. However, by the age of 12, the difference was very small; and by the age of 13, when most girls were showing some signs of puberty, there was no observable difference in the predicted probability of puberty according to the presence of the biological father. For boys, the difference in predicted probability of showing signs of puberty was quite uniform across ages 8–14. This is likely to be because the onset and completion of puberty is later for boys than for girls, and therefore the factors influencing pubertal timing are likely to continue until a later age for boys compared to girls.

Figure 6.2 shows that there is a significant association between pubertal timing and the presence in the P1 household of the biological father for boys and girls. However, the size of this difference is quite small, with differences in the predicted probabilities of puberty for children with a father residing in the P1 household, compared to those who were not primarily living with their biological father, ranging from 1 to 5 percentage points, depending on the age and gender of the child. When additional factors that are known to influence pubertal timing are included in the models, the influence of the presence of the biological father was no longer statistically significant for boys or



Notes: Logistic regression with observations pooled over three waves by age and presence of biological father. Probabilities for boys and girls estimated separately. For boys, n = 5,982, Pseudo R-squared = 0.18. For girls, n = 5,747, Pseudo R-squared = 0.35. Presence of biological father is significant at the 1% level for boys and the 5% level for girls.
Source: LSAC K cohort, Waves 3, 4 & 5

Figure 6.2: Predicted probability of showing definite signs of puberty, by age, gender and presence of biological father

[4] Estimates of the association between pubertal status and the presence of the biological mother were not statistically significant, even before accounting for other factors associated with pubertal timing. This lack of statistical significance is likely to be because 98% of children in the pooled sample were living with their biological mother.

girls.[5] This implies that while there is an association between the presence of the biological father and pubertal timing, there are other factors, such as the child's weight and whether they were breastfed until 6 months of age, that have a stronger influence on pubertal development.

Studies have shown that the presence of a step-parent has a significant influence on pubertal timing, particularly for girls (Arim et al., 2007; Ellis & Garber, 2000). In Table 6.8, we examine the differences in proportions of children showing definite signs of puberty according to household structure—that is, whether a child lives with both their biological parents, in a single-parent household, with a biological parent and a step-parent or in a more complex household structure.[6] Compared to children who were living with both their biological parents, a larger proportion of boys who were living in single-mother households at age 10–11 and girls in single-mother households at age 12–13 were showing definite signs of puberty. For all other household structures, there was no significant difference in the proportion showing definite signs of puberty. This lack of statistical significance is largely due to the small number of observations of children in these household types.

Table 6.8: Proportion of children showing definite signs of puberty, by age, gender and household structure

	Boys			Girls		
Household structure	**Age 8–9 (%)**	**Age 10–11 (%)**	**Age 12–13 (%)**	**Age 8–9 (%)**	**Age 10–11 (%)**	**Age 12–13 (%)**
Two biological parents	6.4	51.0	65.3	15.0	72.9	92.4
Single mother	6.5	58.9 *	67.8	19.5	77.0	95.4 *
Single father	–	60.0	65.0	#7.9	#65.2	85.4
Biological mother and step-father [a]	#11.1	50.0	66.5	#23.9	75.0	91.2
Biological father and step-mother [a]	#21.1	#38.3	#45.0	#37.9	#100.0	#100.0
Same-sex parents	–	#48.9	#100.0	–	#100.0	#100.0
Neither biological parent	–	#62.6	#75.8	#4.1	#80.6	#93.8
Total	**6.5**	**52.8**	**65.8**	**16.1**	**73.9**	**92.9**
N	**1,925**	**2,088**	**1,970**	**1,864**	**1,997**	**1,881**

Notes: Percentages based on weighted data. Statistical significance is tested against the base category ("Yes") *** $p < .001$; ** $p < .01$ and * $p < .05$. # Estimate not reliable (cell count less than 20). [a] Includes step, foster or adoptive parents. Single-parent families include those with a "Parent 2" who is not a biological, step, foster or adoptive parent (i.e., a grandparent, other relative or unrelated adult).

Source: LSAC K cohort, Waves 3, 4 & 5

Estimates of the probability of showing definite signs of puberty, controlling only for age and household structure, indicate that for boys and girls, the predicted probability of showing definite signs of puberty was significantly higher for those in single-parent households, compared to those living with both their biological parents (Figure 6.3 on page 139).[7]

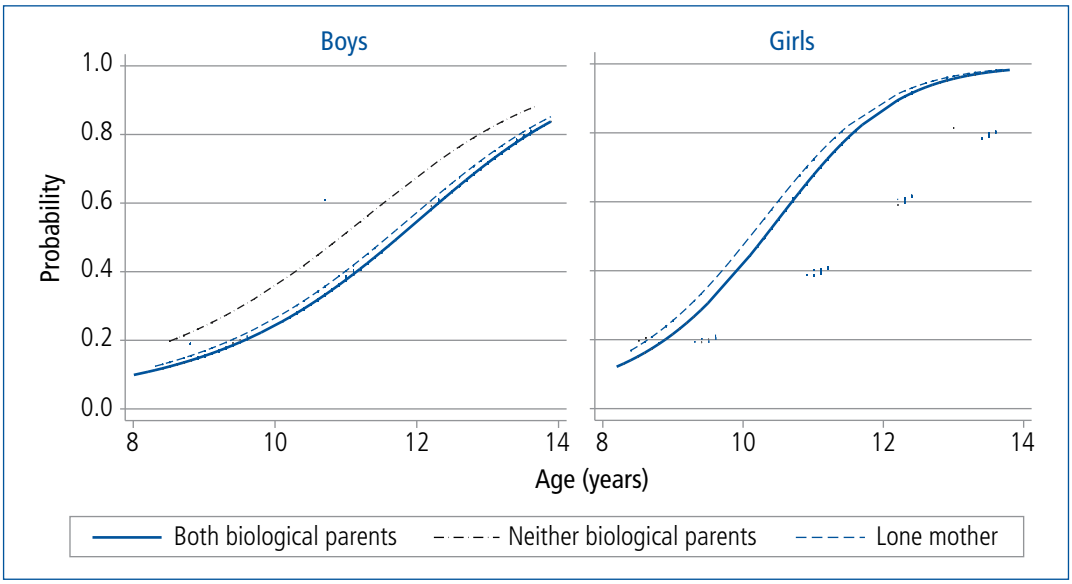
For boys and girls, the increase in the proportion of variation explained by the model that accounted for household structure, compared to the model that controlled only for age, was very small. This result suggests that there are other factors that have a stronger influence on pubertal timing than household structure. Furthermore, for boys and girls, the difference in the probability of showing signs of puberty for those in single-parent households was no longer statistically significant after controlling for other characteristics of the child.[8] However, it is important to note that even using data pooled over three waves of LSAC, the number of children who were not living with their

[5] Controlling for: birth order, low birth weight, whether the child was underweight or overweight in the previous wave, whether the child has a long-term health condition, whether the child was breastfed until at least 6 months of age. For boys and girls, the adjusted estimates indicate that the odds of showing signs of puberty increase substantially with the child's weight in the previous wave; odds are lower for children who were breastfed until at least 6 months of age and also lower for middle and youngest children compared to first-born children.

[6] For more details about diversity and change in children's household structures, refer to chapter 3 of this Report.

[7] Controlling only for age squared, the odds of showing definite signs of puberty are 1.1 times greater for boys in single-mother households, relative to boys living with both biological parents (marginally significant) For girls, the odds of showing definite signs of puberty are 1.2 times greater for those in single-mother households, relative to girls living with both biological parents (significant at the $p < .05$ level).

[8] Controlling for: birth order, low birth weight, whether the child was underweight or overweight in the previous wave, whether the child has a long-term health condition, whether the child was breastfed until at least 6 months of age.



Notes: Logistic regression with observations pooled over three waves by age and household type. Probabilities for boys and girls estimated separately. For boys, n = 5,983, Pseudo R-squared = 0.18. For girls, n = 5,747, Pseudo R-squared = 0.35.
Source: LSAC K cohort, Waves 3, 4 & 5

Figure 6.3: Predicted probability of showing definite signs of puberty, by age, gender and household type

biological mother (either in a single-father household or with a step-mother) was quite small, and it is possible that the associations between pubertal timing and household structure would be statistically significant with a larger number of observations for children in these family types.[9]

The association between children's and parents' pubertal timing

Many studies have shown a significant association between mothers' pubertal timing, and their daughters' age at the onset of puberty (Ellis & Essex, 2007; Maisonet et al., 2010). A recent study analysing the DNA of more than 180,000 women found that the experience of menarche is influenced by "imprinted" genes, a small subset of genes whose activity differs depending on which parent passes on that gene (Perry et al., 2014). Their findings imply that one parent may more profoundly affect puberty timing in their daughters than the other parent, depending on which parent passes on that gene. However, there are no studies that we are aware of that examine the relationship between the pubertal timing of mothers and their sons, or fathers and their sons or daughters. In Table 6.9 (page 140), we compare the proportions of boys and girls showing definite signs of puberty at each age based on their (biological) mother's retrospective self-report of her own pubertal timing.

At the age of 8–9 years, while the proportion of boys showing signs of puberty ranged from 3% for those whose mothers reported starting puberty way behind other children to 8% for those who reported starting way ahead, these differences were not statistically significant. However, there was a significant difference in the proportion of boys showing definite signs of puberty at ages 10–11 and 12–13 according to their mother's pubertal timing. At age 10–11 years, the proportion of boys whose mother reported starting puberty later than others was lower than that of boys whose mother had their puberty about the same age as others (41% vs 55%). At age 12–13 years, 69% of boys whose mother started puberty about the same age as others showed definite signs of puberty. This proportion was significantly lower among boys whose mother started puberty behind (53%) or way behind (41%) other children.

Maternal pubertal timing was also associated with girls' own pubertal timing. At 8–9 years, a larger proportion of girls whose mother reported starting puberty ahead of most other children showed

[9] Many of the children in single-parent families do spend a significant amount of time with their non-resident parent; and for children in single-mother households who have regular contact with both their biological parents, the effect of the "absence" of the biological father is likely to be negligible. Chapter 3 of this Report provides further details about the amount of contact that children have with parents living elsewhere.

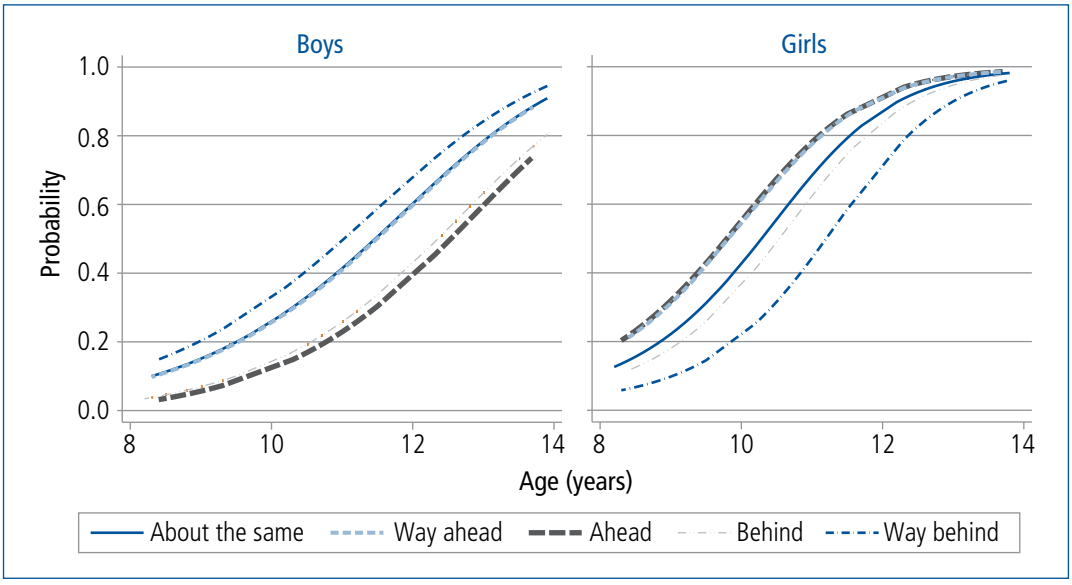
definite signs of puberty (25%), compared to girls whose mother started puberty about the same age as others (15%). At 10–11 years, the proportion of girls who were showing definite physical signs of puberty was higher among those whose mother reported starting puberty ahead or way ahead of others (84% and 87% respectively), compared to girls whose mothers said that they began puberty about the same age as their peers (73%) and girls whose mothers said they started puberty way after most other children (48%). While most girls were showing definite signs of puberty at the age of 12–13, there were still significant differences according to mothers' pubertal timing, with a larger proportion of girls whose mother started puberty ahead of her peers showing definite signs of puberty, and a smaller proportion of girls whose mothers started puberty behind or way behind their peers showing definite signs of puberty at this age.

In Figure 6.4, the predicted probabilities of showing definite signs of puberty are compared, according to the mother's reports of her own pubertal timing. For boys, estimates controlling only for age and mother's pubertal timing indicated that compared to those whose mothers reported starting puberty at around the same time as their peers, the odds of showing signs of puberty

Table 6.9: Proportion of children showing definite signs of puberty, by age group, gender and mother's pubertal timing

	Boys			Girls		
Mother's pubertal timing	**Age 8–9 (%)**	**Age 10–11 (%)**	**Age 12–13 (%)**	**Age 8–9 (%)**	**Age 10–11 (%)**	**Age 12–13 (%)**
Way ahead of most other kids	8.4	65.6	74.4	18.6	86.5 **	98.7 *
Ahead of most other kids	7.8	52.6	69.8	25.1 **	83.8 ***	95.5
About the same age as other kids	6.3	54.7	69.4	14.5	72.9	93.5
Behind most other kids	4.0	41.2 ***	52.5 ***	15.9	68.5	88.9 **
Way behind most other kids	3.2	41.0	41.1 ***	7.1	47.8 ***	83.4 ***
Total	**6.1**	**52.1**	**65.8**	**16.1**	**73.4**	**92.8**
N	1,667	1,847	1,907	1,624	1,786	1,833

Notes: Percentages based on weighted data. Sample is restricted to children whose biological mother responded to the question about pubertal timing. Statistical significance is tested against the base category ("About the same age as other kids"). *** $p < .001$; ** $p < .01$ and * $p < .05$.
Source: LSAC K cohort, Waves 3, 4 & 5



Notes: Logistic regression with observations pooled over three waves, by age and mother's pubertal timing. Sample is restricted to children whose biological mother answered the question about pubertal timing. Probabilities for boys and girls estimated separately. For boys, N = 5,421, Pseudo R-squared = 0.18. For girls, N = 5,243, Pseudo R-squared = 0.36.
Source: LSAC K cohort, Waves 3, 4 & 5

Figure 6.4: Predicted probability of showing definite signs of puberty, by age, gender and mother's pubertal timing

were 1.3 times higher for boys whose mothers reported starting puberty way ahead of their peers; and for boys whose mother reported starting puberty either behind, or way behind her peers, the odds of showing definite signs of puberty were around half that of boys whose mother reported starting puberty at around the same time as her peers. After adjusting for characteristics known to be associated with pubertal timing, these differences remained statistically significant.[10]

The odds of showing definite signs of puberty were 1.6 times greater for girls whose mother reported starting puberty either ahead or way ahead of her peers, relative to girls whose mother reported starting puberty at around the same time as her peers. The odds of showing definite signs of puberty were 1.2 times greater for girls whose mother reported starting puberty at around the same time as her peers, relative to those whose mother reported starting puberty behind her peers; and 2.8 times greater for girls whose mother reported starting puberty at around the same time as her peers, relative to those whose mother reported starting puberty way behind her peers. These differences remained statistically significant even after accounting for characteristics of the child, such as health, birth weight and body mass index in the previous wave.[11]

In addition to parents' self-reported pubertal timing, the LSAC survey also asked the mothers of the study children at what age their own periods started. Table 6.10 compares the proportion of children showing definite signs of puberty according to their mothers' age at menarche.

About 2% of boys whose mother experienced menarche at age 15 or older showed signs of puberty at age 8–9 years. This proportion was significantly lower than that for boys whose mother experienced menarche between the age of 12 and 14 (7%). At 10–11 years, the proportion of boys showing definite signs of puberty was highest among those whose mother experienced menarche before the age of 12 (63%), followed by those whose mother experienced menarche at age 12–14 (51%) and those whose mother experienced menarche at age 15 or older (47%). There was a similar pattern at age 12–13, with 77% of boys whose mother experienced menarche before the age of 12 showing definite signs of puberty, compared to 65% of those whose mother experienced menarche at age 12–14 and 58% of boys whose mother experienced menarche at age 15 or older.

For girls, there were significant differences in the proportion showing signs of puberty according to their mothers' age at menarche. Compared to girls whose mothers experienced menarche between the

Table 6.10: Proportion of children showing definite signs of puberty, by gender and mother's age at menarche, Waves 3–5

	Boys			Girls		
Mother's age at menarche	Age 8–9 (%)	Age 10–11 (%)	Age 12–13 (%)	Age 8–9 (%)	Age 10–11 (%)	Age 12–13 (%)
Early (< 12)	8.3	62.5 *	76.9 ***	25.5 ***	83.0 ***	95.5 *
Average (12–14)	6.7	51.2	65.4	14.2	72.8	92.8
Late (15+)	#1.9 **	46.9 *	58.2 **	15.9	64.4 *	89.8
Total	6.2	52.0	65.8	16.1	73.3	92.8
N	1,647	1,822	1,882	1,613	1,776	1,820

Notes: Percentages based on weighted data. Sample is restricted to children whose biological mother responded to the questions about pubertal timing. Statistical significance is tested against the base category ("Average") *** $p < .001$; ** $p < .01$ and * $p < .05$.

Source: LSAC K cohort, Waves 3, 4 & 5

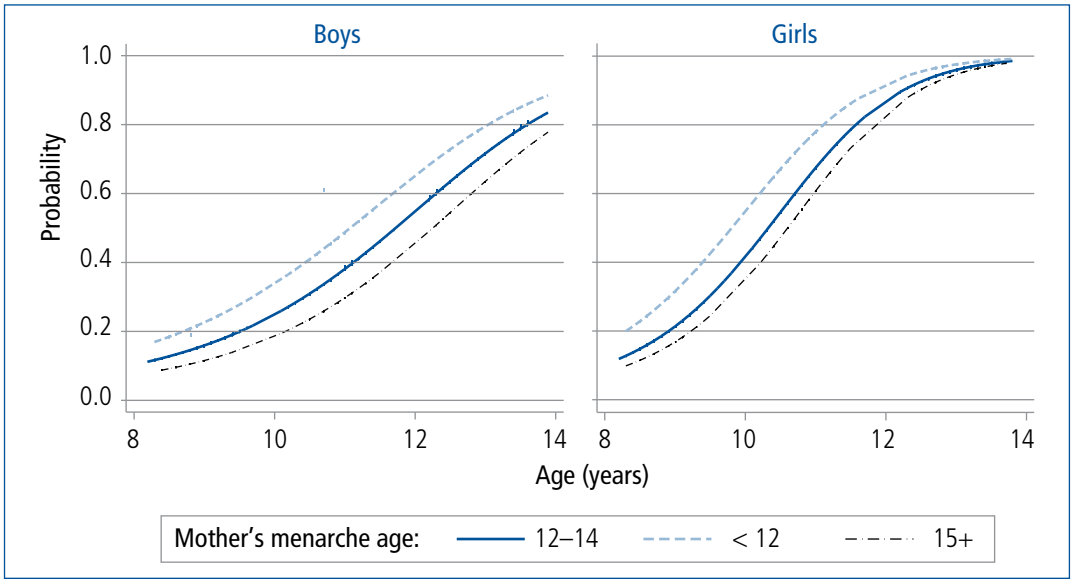
[10] After controlling for birth order, low birth weight, whether the child was underweight or overweight in the previous wave, whether the child has a long-term health condition, whether the child was breastfed until at least 6 months of age, the odds of showing definite signs of puberty were still around 50% lower for boys whose mother reported starting puberty either behind or way behind her peers ($p < .01$) relative to boys whose mother reported starting at around the same time as her peers.

[11] After controlling for household structure, birth order, low birth weight, whether the child was underweight or overweight in the previous wave, whether the child has a long-term health condition, whether the child was breastfed until at least 6 months of age, the odds of showing definite signs of puberty were still around 1.5 times greater for girls whose mother reported starting puberty either ahead or way ahead of her peers, relative to those whose mother reported starting at around the same time as her peers; and the odds of showing definite signs of puberty were 1.3 times greater for girls whose mother reported starting puberty at around the same time as her peers, relative to those whose mother reported starting behind; and 2.6 times greater relative to girls whose mother reported starting puberty way behind her peers ($p < .05$).

age of 12 and 14, the proportion of girls showing definite signs of puberty at age 8–9 was significantly higher among those whose mothers experienced menarche before the age of 12 (26% compared to 14%). At the age of 10–11, there were also significant differences in the proportion of girls showing definite signs of puberty, with 83% of girls whose mother experienced menarche before the age of 12 showing definite signs of puberty, compared to 73% of those whose mother experienced menarche at age 12–14 and 64% of girls whose mother experienced menarche at age 15 or older. By age 12–13, most girls were showing definite signs of puberty—and the differences according to mothers' age at menarche were smaller. Still, the proportion of girls showing definite signs of puberty was highest among those whose mother experienced menarche before the age of 12.

Estimates of the probability of showing definite signs of puberty according to mother's age at menarche are presented in Figure 6.5. For boys, the predicted probability of showing definite signs of puberty was 1.6 times greater among those whose mother experienced menarche before the age of 12, relative to those whose mother experienced menarche between the ages of 12 and 14; and the odds of showing definite signs of puberty were 1.5 times greater for those whose mother experienced menarche between the ages of 12 and 14, relative to boys whose mother experienced menarche at the age of 15 or older.

For girls, the predicted probability of showing definite signs of puberty was 1.7 times greater for those whose mother experienced menarche before the age of 12, relative to those whose mother experienced menarche between the ages of 12 and 14; and 4 times greater for girls whose mother experienced menarche between the ages of 12 and 14 relative to girls whose mother experienced menarche at the age of 15 or older. These differences remained statistically significant and similar in size even after accounting for other characteristics of the child.[12]



Notes: Logistic regression with observations pooled over three waves, by age and father's pubertal timing. Sample is restricted to children whose biological father answered the question about pubertal timing. Probabilities for boys and girls estimated separately. For boys, N = 3,714, Pseudo R-squared = 0.18. For girls, N = 3,760, Pseudo R-squared = 0.36.
Source: LSAC K cohort, Waves 3, 4 & 5

Figure 6.5: Predicted probability of showing definite signs of puberty, by age, gender and mother's age at menarche

[12] After controlling for household structure, birth order, low birth weight, whether the child was underweight or overweight in the previous wave, whether the child has a long-term health condition, whether the child was breastfed until at least 6 months of age, the odds of showing definite signs of puberty were 1.5 times greater for boys whose mother experienced menarche before the age of 12, relative to those whose mother whose mother experienced menarche between the age of 12 and 14 ($p < .01$); and the odds of showing definite signs of puberty were 1.4 times greater for boys whose mother experienced menarche between the age of 12 and 14, relative to boys whose mother experienced menarche at age 15 or older ($p < .01$). For girls, the odds of showing definite signs of puberty were 1.5 times greater for those whose mother experienced menarche before the age of 12 ($p < .01$), relative to those whose mother experienced menarche between the age of 12 and 14; and the odds of showing definite signs of puberty were 1.5 times greater for girls whose mother experienced menarche between the age of 12 and 14, relative to those whose mother experienced menarche at age 15 or older (marginal significance).

While many studies that have shown that a mother's pubertal timing is associated with the pubertal timing of their daughters, there are no studies that we are aware of that have examined the association between a father's pubertal timing on the pubertal timing of his sons and daughters. Table 6.11 shows that there is a significant association between a father's pubertal timing and the age at which their child begins to show definite signs of the onset of puberty.

Table 6.11: Proportion of children showing definite signs of puberty, by age group, gender and father's pubertal timing

	Boys			Girls		
Father's pubertal timing	**Age 8–9 (%)**	**Age 10–11 (%)**	**Age 12–13 (%)**	**Age 8–9 (%)**	**Age 10–11 (%)**	**Age 12–13 (%)**
Way ahead of most other kids	#3.6	#58.6	#72.2	#22.9	95.2*	#88.5
Ahead of most other kids	#6.8	47.7	70.3	#16.7	75.9	97.1
About the same age as other kids	5.7	51.5	67.2	14.2	73.0	93.7
Behind most other kids	7.0	46.4	54.5 ***	15.8	60.5 ***	87.5 **
Way behind most other kids	–	#42.9	#55.9	#17.4	#41.5 **	#75.0 ***
Total	**5.9**	**50.4**	**65.4**	**14.8**	**71.7**	**92.8**
N	1,214	1,298	1,329	1,191	1,277	1,292

Notes: Percentages based on weighted data. Sample is restricted to children whose biological father answered the question about pubertal timing. Statistical significance is tested against the base category ("About the same age as other kids") *** $p < .001$; ** $p < .01$ and * $p < .05$.

Source: LSAC K cohort, Waves 3, 4 & 5

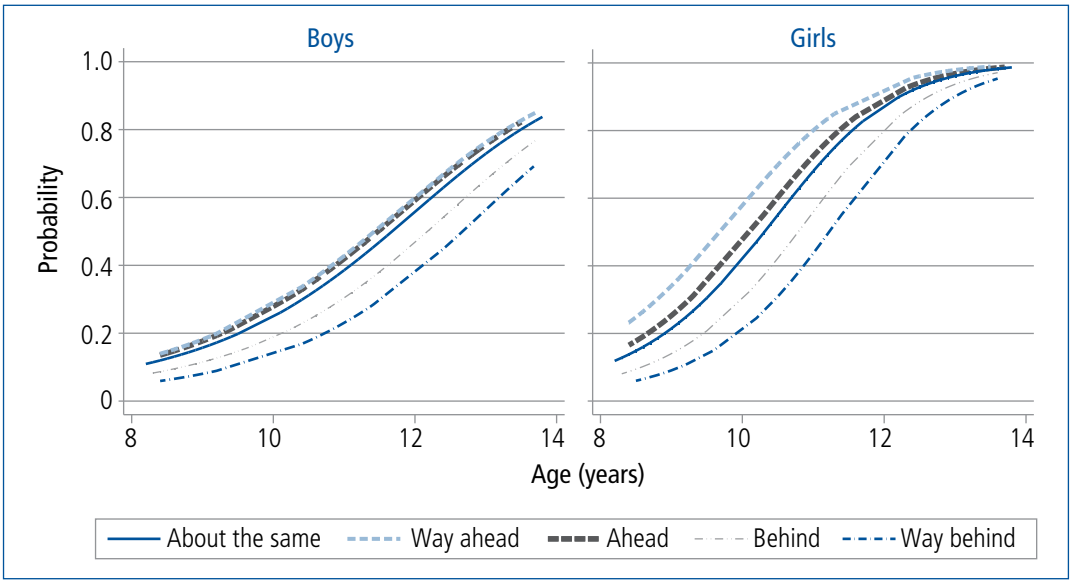
For boys, differences in the proportion showing definite signs of puberty according to their father's reports of their own pubertal timing were only significant at age 12–13, with fewer boys whose father started puberty later than his peers showing definite signs of puberty (55%) compared to boys whose father started puberty around the same age as his peers (67%). For girls, there were no significant differences in the proportion showing signs of puberty at the age of 8–9 according to their father's reports of his pubertal timing. However, at age 10–11 years, the proportion of girls showing definite signs of puberty was higher among those whose father reported starting puberty way ahead of most other kids, compared to girls whose father started puberty at around the same age as other kids.

At 10–11 years, girls whose father began puberty way ahead of other children were more likely to be showing definite signs of puberty (95%) than girls whose father began puberty around the same age as their peers (73%) and girls whose father reported starting puberty behind or way behind other children (61% and 42% respectively). At age 12–13, the proportion of girls showing definite signs of puberty was also significantly lower among those whose father reported starting puberty behind or way behind most other kids, compared to those whose father reported starting puberty at around the same time as his peers.

Estimates of the predicted probability of showing definite signs of puberty, according to fathers' reports of their own pubertal timing are presented in Figure 6.6 (page 144). For boys, those whose father reported starting puberty at around the same time as his peers, the odds of showing definite signs of puberty were 1.4 times greater, relative to those whose father reported starting puberty behind his peers; and 2.1 times greater, relative to boys whose father reported starting puberty way behind his peers. However, the difference between the predicted probability of showing definite signs of puberty for boys whose father reported starting ahead or way ahead of his peers, compared to those whose father reported starting puberty at around the same time as most other kids was not statistically significant.

For girls, the odds of showing definite signs of puberty were 1.7 times greater among those whose father reported starting puberty way ahead of his peers, compared to those whose father reported starting at around the same time as most other kids (although this difference was only marginally significant, $p < .1$). For girls whose father reported starting puberty at around the same time as most other kids, the odds of showing definite signs of puberty were 1.7 times greater, relative to those whose father reported starting behind his peers, and 2.7 times greater relative to girls whose father reported starting way behind his peers. For boys and girls, these differences in the estimated probability of showing definite signs of puberty remained statistically significant even

after accounting for other characteristics of the child that are known to be associated with pubertal timing.[13]



Notes: Logistic regression with observations pooled over three waves, by age and father's pubertal timing. Sample is restricted to children whose biological father answered the question about pubertal timing. Probabilities for boys and girls estimated separately. For boys, N = 3,714, Pseudo R-squared = 0.18. For girls, N = 3,760, Pseudo R-squared = 0.36.
Source: LSAC K cohort, Waves 3, 4 & 5

Figure 6.6: Predicted probability of showing any signs of puberty, by age, gender and father's pubertal timing

Previous studies of the association between maternal age at menarche and children's pubertal development have focused on the pubertal timing of daughters. The results in this chapter show that mother's pubertal timing is significantly associated with not only the pubertal timing of their daughters, but also with the pubertal timing of sons. Furthermore, there is a significant association between fathers' reports of their own pubertal timing and the pubertal timing of their sons and daughters. These associations remain statistically significant even after controlling for other characteristics that are known to influence pubertal timing.

6.5 Pubertal status and socio-emotional outcomes

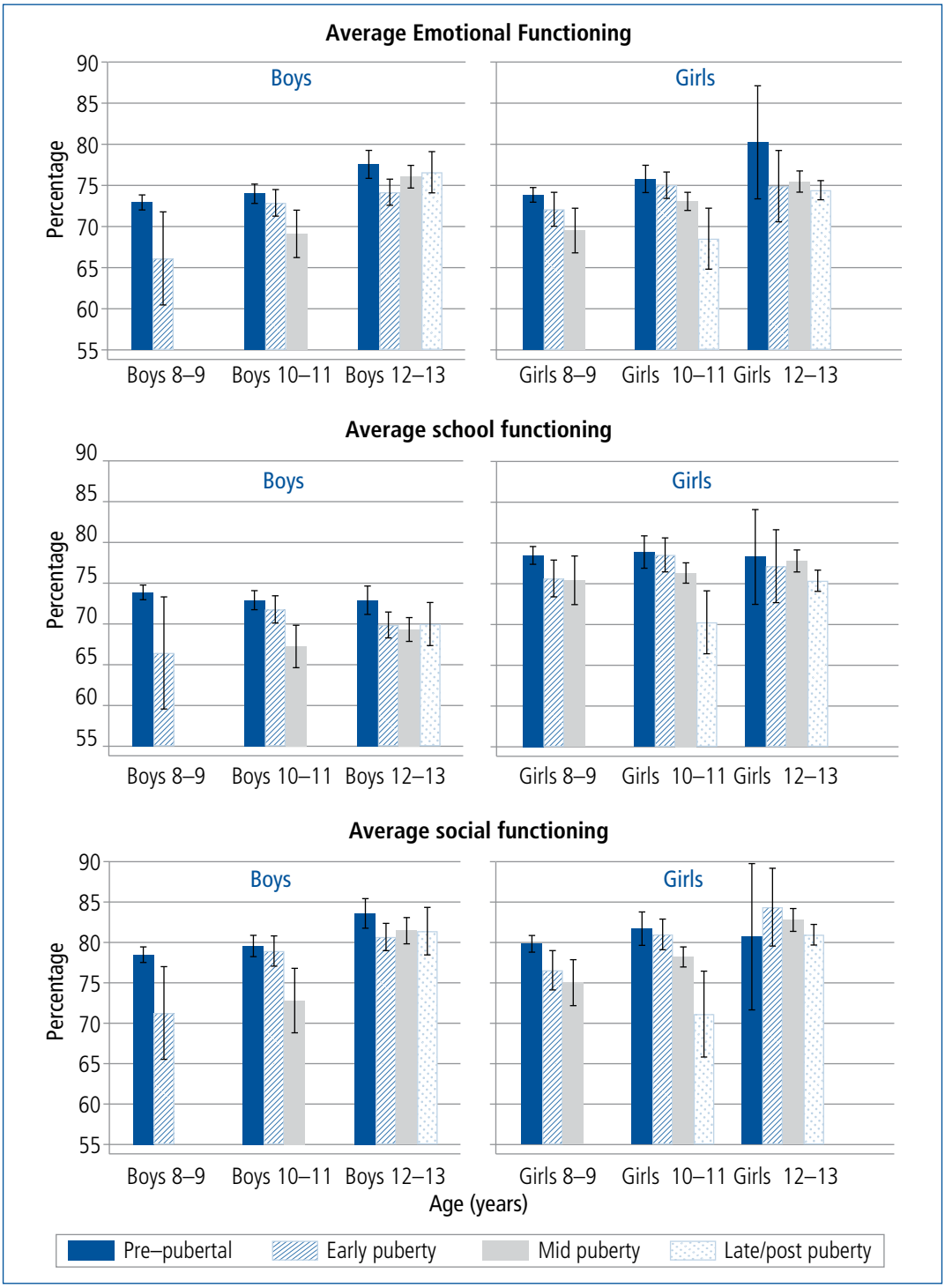
In this section, we examine the association between pubertal development and children's emotional functioning, school functioning and relationships with their peers (social functioning). Figures 6.7 and 6.8 (page 145 &page 146) compare the average scores for emotional, school and social functioning for boys and girls, according to their age and puberty category score at the time of interview and the age at onset of puberty, respectively.

At age 8–9:

- The majority of boys (96%) and girls (74%) were in the pre-pubertal stage.
- Compared to boys in the pre-pubertal stage, average scores for emotional, school and social functioning were approximately 7 points (0.4 standard deviations) lower for those in the early

[13] After controlling for household structure, birth order, low birth weight, whether the child was underweight or overweight in the previous wave, whether the child has a long-term health condition, whether the child was breastfed until at least 6 months of age, the estimated odds of showing definite signs of puberty were 1.4 times greater for boys whose father reported starting puberty at around the same time as his peers, relative to those whose father reported starting puberty behind his peers ($p < .05$); and 2.2 times higher relative to boys whose father reported starting puberty way behind other kids ($p < .05$). For girls, the estimated odds of showing definite signs of puberty were 1.8 times greater for girls whose father reported starting puberty at around the same time as his peers, relative to those whose father reported starting puberty behind other children ($p < .01$).

puberty stage. However, it is important to note that at this age, most boys (96%) were still in the pre-pubertal stage.[14]



Notes: Logistic regression with observations pooled over three waves, by age and father's pubertal timing. Sample is restricted to children whose biological father answered the question about pubertal timing. Probabilities for boys and girls estimated separately. For boys, N = 3,714, Pseudo R-squared = 0.18. For girls, N = 3,760, Pseudo R-squared = 0.36.
Source: LSAC K cohort, Waves 3, 4 & 5

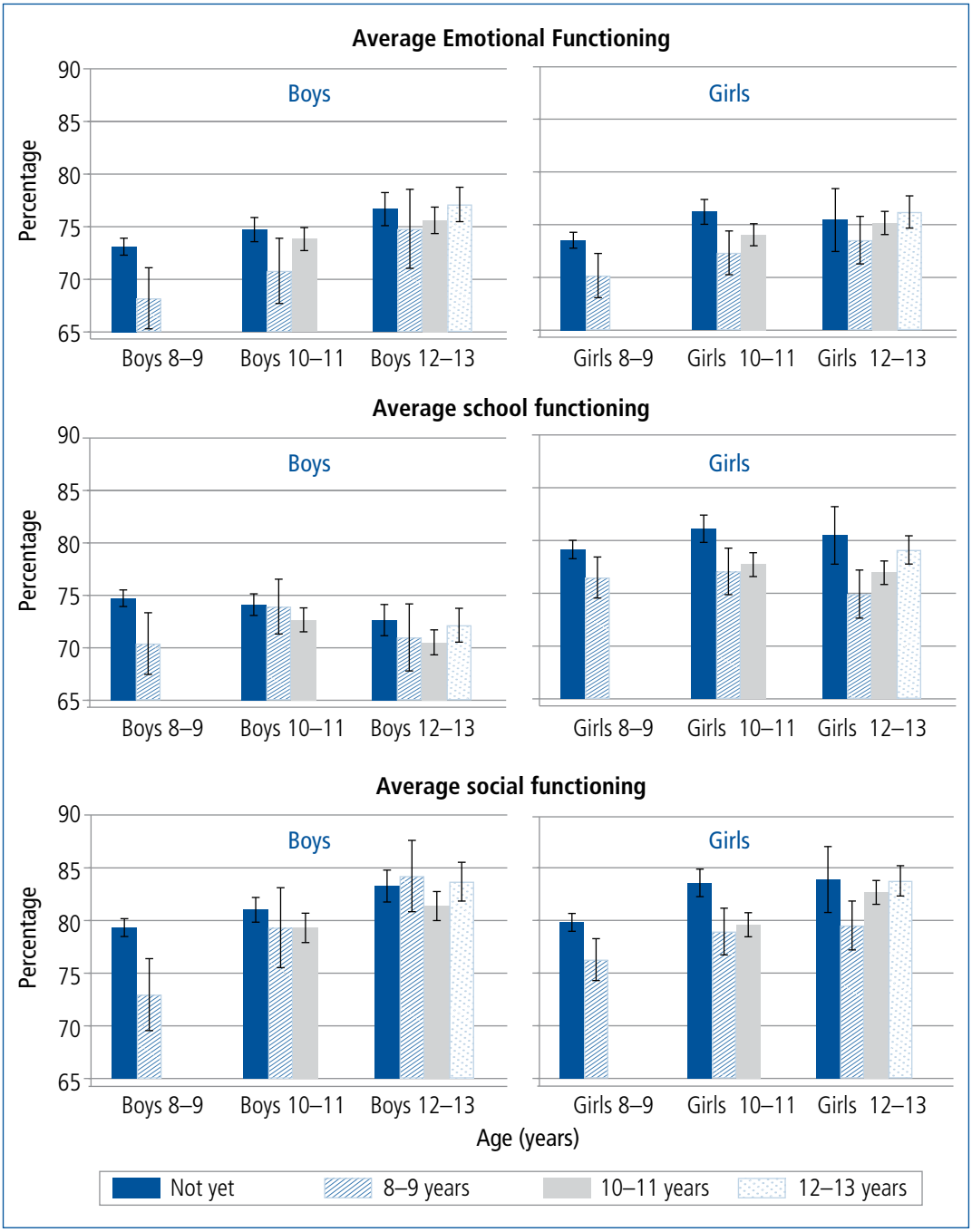
Figure 6.7: Average emotional, school and social functioning scores, by gender, age and pubertal development stage

[14] While the difference in emotional functioning scores is statistically significant, the percentage of boys in the pre-pubertal stage at age 8–9 is quite small; and the confidence interval for this estimate is quite large. Therefore, this result should be interpreted with caution.

- For girls, average scores for emotional, school and social functioning were 3–5 points (0.2 to 0.3 standard deviations) lower for girls in the mid-pubertal stage compared to girls in the pre-pubertal stage.

At age 10–11:

- Compared to boys in the pre-pubertal stage, average scores for emotional, school and social functioning were 5–7 (0.3 standard deviations) points lower for boys in the mid-pubertal stage.
- For boys, differences in average scores for emotional, school and social functioning were not statistically significant according to age at onset of puberty.



Notes: Logistic regression with observations pooled over three waves, by age and father's pubertal timing. Sample is restricted to children whose biological father answered the question about pubertal timing. Probabilities for boys and girls estimated separately. For boys, *N* = 3,714, Pseudo *R*-squared = 0.18. For girls, *N* = 3,760, Pseudo *R*-squared = 0.36.

Source: LSAC K cohort, Waves 3, 4 & 5

Figure 6.8: Average emotional, school and social functioning scores, by gender, age and age at onset of puberty

- For girls, average functioning scores were lower for those in the later stages of pubertal development. Compared to girls in the pre-pubertal stage, average functioning scores were 7–9 points (0.4 to 0.5 standard deviations) lower for girls in the late or post-pubertal stage.
- Average scores for emotional, school and social functioning were lowest among those who started puberty at age 8–9 and highest among those who had not yet experienced the onset of puberty.

At age 12–13:

- Average emotional, school and social functioning scores for boys in the early pubertal stage were approximately 3 points (0.2 standard deviations) lower than those of boys in the pre-pubertal stage. However, there were no significant differences between average functioning scores for boys in the early, mid or late/post stages of puberty.
- Differences in the average emotional, school and social functioning scores for boys, according to the age at onset of puberty were not statistically significant.
- More than half (54%) of girls were in the late/post pubertal stage and there were no significant differences in average emotional, school and social functioning scores according to pubertal status.
- For girls, average scores for emotional, school and social functioning increased with age at the onset of puberty. However, for emotional functioning, these differences were not statistically significant.

For boys, differences in emotional, school and social functioning scores were smaller but still statistically significant even after accounting for characteristics that are known to be associated with social outcomes.[15] Average adjusted functioning scores were generally around 2–4 points (0.2 to 0.3 standard deviations) lower for boys in early or mid puberty compared to those in the pre-pubertal stage.

For girls, there was no significant difference in emotional functioning scores at age 8–9 after adjusting for socio-demographic characteristics. However, adjusted school and social functioning scores were 2–3 points (0.1 to 0.2 standard deviations) lower for girls in the early and mid-pubertal stages compared to those in the pre-pubertal stage. At age 10–11, compared to girls in the pre-pubertal stage, adjusted scores for school functioning were 5 points (0.3 standard deviations) lower for those in the late or post-pubertal stages. For social functioning, the differences were smaller, with adjusted scores around 2 points (0.1 standard deviation) lower for girls in the mid-pubertal stage compared to those in the late-pubertal stage.[16]

As expected, given the unadjusted functioning scores for girls at age 12–13 were not significantly different according to pubertal status, there were no significant differences in adjusted functioning scores for girls at age 12–13.

These results are consistent with previous studies that have shown that early maturing adolescents are more likely to have psychological and behavioural problems (Ge, Brody, Conger, Simons, & Murry, 2002; Ge et al., 2003). For boys, differences in average functioning scores were largest among those who had started showing signs of puberty at an early age, compared to those who had not. While these differences became smaller as boys got older, there were still significant differences in functioning scores at the age of 12–13, even after accounting for socio-demographic characteristics. For girls, there were also significant differences in average functioning scores, with girls who were showing definite signs of puberty at age 8–9 having significantly lower functioning scores, on average, compared to girls who were not yet showing signs of puberty. These differences were largest at age 10–11, with average functioning scores decreasing substantially with the level of pubertal development at this age. However, at age 12–13, the majority of girls were in the mid or late stages of puberty, and differences in functioning scores according to pubertal status were not

[15] Linear (OLS) regressions were run separately by gender and age group, controlling for puberty category and age (in weeks), family type, birth order, household size, number of siblings, low birth weight, whether the child was breastfed until 6 months old, whether the child has a long-term health condition or disability, whether the child was under or overweight, parental education and equivalised parental income. Differences in school functioning scores at age 8–9 were no longer statistically significant after adjusting for these covariates.

[16] At age 10–11, compared to girls in the pre-pubertal stage, adjusted scores for emotional functioning were 8 points (0.5 standard deviations) lower. However, this result should be interpreted with caution due to the limited number of observations for girls in the post-pubertal stage.

statistically significant. While there were clear differences in average functioning scores at the age of 8–9 for those girls and boys who had experienced the onset of puberty, compared to those who had not, differences in functioning scores at age 12–13 according to the age at onset of puberty were not statistically significant. These results suggest that while some children who experience the onset of puberty at a younger age may experience difficulties; as they progress through adolescence and the variation in the physical signs of pubertal development among their peers becomes less evident, differences in emotional, school and social functioning become less significant.[17]

6.6 Summary and discussion

The onset of pubertal development has been widely viewed as an important marker of the transition into adolescence. This chapter has provided a nationally representative picture of the variations in the physical signs of the onset of puberty of Australian children aged 8–9 to 12–13 years. On average, girls started puberty earlier than boys, but at age 8–9 most children had not started showing any signs of puberty. The proportion of children showing definite signs of puberty increased substantially between the ages of 8–9 and 10–11 years, and by age 12–13, almost all girls and two-thirds of boys were showing definite signs of the onset of puberty.

This chapter examined two specific factors that have been shown to be important influences on pubertal timing—household structure and parents' pubertal timing. Our analysis indicates that there is a significant association between the pubertal timing of boys and girls and the presence of their biological father, but the presence or absence of their biological mother was not statistically significant. However, when covariates were included in the models, the influence of the presence of the biological father was no longer statistically significant for boys or girls. Similarly, estimates of the association between pubertal status and household structure showed that compared to children living with both parents, boys and girls living in single-mother households, boys living with neither parent and girls living in father–stepmother households were more likely to show physical signs of puberty at a younger age. However, after controlling for other characteristics that are known to influence pubertal timing, these differences were no longer statistically significant. The lack of statistical significance for these variables is inconsistent with some previous studies that have found significant associations between family structure and the early pubertal timing of daughters (Boagaert, 2008; James et al., 2012; Quinlan, 2003) and/or sons (Arim et al., 2007; Kim & Smith, 1998). In our analyses we were able to control for a wider range of factors (e.g., birth order, low birth weight, child health and weight) compared to other studies, which is likely to account for the different findings reported here.

Previous research has suggested that early maternal pubertal timing predicts the early onset of puberty among daughters. For example, Ellis and Essex (2007) found that a mother's age at menarche was significantly associated with her daughter's pubertal timing. Consistent with previous studies, we found that girls whose mother reported starting puberty earlier than others were more likely to show definite signs of puberty at an early age. We also found a significant association between the pubertal timing of mothers and sons, with boys whose mother reported starting puberty behind her peers less likely to be showing definite signs of the onset of puberty at a younger age; and boys whose mother experienced menarche before the age of 12 more likely to be showing definite physical signs of the onset of puberty. While several studies have documented the association between the pubertal timing of mothers and daughters, to the best of our knowledge, there are no previous studies of the association between the pubertal timing of fathers and their children. This lack of evidence is presumably due to a lack of available data related to the pubertal timing of fathers and their children. In this chapter, we find a significant association between fathers' reports of their own pubertal timing and the pubertal timing of their sons and daughters, with the likelihood of a child showing definite signs of puberty significantly lower among those whose father reported starting puberty later than his peers. These associations remained statistically significant even after controlling for other characteristics that are known to influence pubertal timing.

[17] Estimates of emotional, school and social functioning at the age of 12–13 not presented here show that there were no significant differences in the average scores for emotional, school or social functioning according to the age at onset of puberty (i.e., whether they began showing physical signs of puberty at age 8–9, 10–11 or 12–13) for boys or girls.

We also investigated the association between pubertal status and children's emotional, social and school functioning levels. Poorer emotional, school and social functioning was observed among children showing advanced stages of puberty earlier than their peers; and differences in functioning scores become smaller and less significant with age, as the levels of pubertal maturation became more similar within peer groups.

These results suggest that it is the early onset of puberty compared to peers, rather than the stage of pubertal development, that is most problematic for children's emotional, social and school functioning; and these differences become less problematic as adolescents begin to reach a similar level of physical development.[18] These findings are consistent with previous research that have shown that the rapid physical changes during puberty are accompanied by substantial changes in social roles and relationships, which in turn may influence adolescents' interactions with their peers (Paikoff & Brooks-Gunn, 1991). Early maturing adolescents have been shown to be more likely to have psychological and behavioural problems and are susceptible to the adverse effects of interpersonal stressors (Natsuaki et al., 2009), partly because they may not be emotionally or cognitively ready for the physical and social changes accompanying puberty (Ge et al., 2002).

Our findings suggest that the early onset of puberty may put young adolescents at risk of emotional distress, peer relationship problems and poorer school functioning in the short term. However, these issues are generally short-lived; and are not generally sustained into later adolescence. These results have implications for how schools and parents might best help children prepare for this important life transition. Considering the possible socio-emotional distress that is triggered by physical changes during puberty, programs focused on fostering social acceptance of varying physical appearance and on promoting positive self-esteem may prove effective. Adolescence is an important time in the development of emotional awareness, when relationships with peers become increasingly important and valued. Therefore, educational programs that focus on peer support and anti-bullying are likely to be of particular value during early adolescence.

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[18] It should be noted that while multiple waves of data are used, we do not examine how the functioning levels of individuals change over time, and with pubertal development.

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7 Parents' choices of primary school

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7.1 Introduction

For most of the twentieth century, it was quite uncommon for Australian parents to actively choose a school for their children. In the past, parents might have been concerned about whether a child might leave high school before completing year 12. Today, the question of "Which school is best for my child?" has become increasingly significant; and choosing a school is now a common and expected activity (Campbell, Proctor, & Sherington, 2009).

While government schools remain the major provider of primary school education in Australia, Catholic and independent primary schools have a significant market share. In 2014, 19% of primary school children attended a Catholic school and 12% went to an independent school (Australian Bureau of Statistics [ABS], 2015). For most parents, choosing a school for their child is a major decision which may require a good deal of research to learn about potential schools and their offerings. This decision is usually based on a variety of school attributes. Academic results, school location, the reputation of the school, the philosophical or religious focus of the school and the affordability of school fees have been shown to be the main factors affecting school choice in Australia (Goh & Dolincar, 2006). Other factors, including opportunities for the child to establish social networks; school and class size; whether the school is co-educational or single-sex; specific programs, subjects and extracurricular activities that are offered by the school; and whether the primary school is a "feeder school" for a high school with a good reputation are also important considerations for some parents (Campbell et al., 2009).

For many parents, the decision about which school their children will attend is made well before the time a child is enrolled in primary school. Families actively plan for the schooling of their children, and this planning and evaluation occurs both before and after enrolling their child in school for the first time. As some well-regarded independent schools have long waiting lists for enrolment, for some parents, anxiety about school choice can begin as early as the conception of a child (Campbell et al., 2009).

The decision about which school a child will attend may be further complicated by other factors; for example, waiting lists for popular schools and school zoning, whereby school enrolment is dictated by strict residential boundaries (Johnston, Lee, Shah, Shields, & Spinks, 2014). Many families think about the schooling of their children before buying or renting a house, with the suburbs with acceptable schools or easy transport accessibility often determining where the search for a home will occur. There is some anecdotal evidence that "buying an enrolment" in a government school with a good reputation is becoming an increasingly common strategy for parents of primary and secondary school-age children, with many highly regarded government schools enforcing residential zones to restrict enrolments to children who live within a limited distance of the school. However, given the high prices of homes in these areas, this option may be out of reach for many families, and therefore this strategy is likely to be most common among high-income families.

In an article in the *Sydney Morning Herald*, Bonnor (2014) suggested that parents really only have a choice about which school their child will attend if they can find money for fees or a house in the right suburb, and have access to information and networks. A study of the impact of school zones on housing values in the United States found that a one student-level standard deviation difference in a school's mean test score was associated with a 10 percentage point difference in

house value (Kane, Staiger, & Riegg, 2005). In Australia, Davidoff and Leigh (2007) investigated the relationship between housing prices and the quality of public schools in the Australian Capital Territory by comparing sale prices of homes on either side of high school attendance boundaries and found that a 5% increase in test scores (approximately one standard deviation) was associated with a 4% increase in house prices.

A survey conducted for the Independent Schools Council of Australia (ISCA) in 2008 found that, in choosing an independent school for their children, parents are influenced by a variety of factors, including religious affiliation, broad academic outcomes, quality teaching, a supportive, caring environment, the physical environment and facilities, the content of the curriculum, quality leadership and the range of extracurricular opportunities; but what parents wanted above all is for their children to have a well-rounded education with a strong emphasis on learning life skills. According to Ball (2003), the choice of a school is the choice of a "moral community" that reflects parents' values, whereby parents can differentiate themselves from other parents who do not share their values and draw boundaries between different groups of parents. Using the 2001 Australian Census data to examine primary and secondary school choices, Mavisakalyan (2012) found that private school attendance among native-born Australians is higher in areas with a higher share of immigrant populations; while immigrants' private school attendance is lower in localities where the share of their like-type immigrants is higher; and suggests the possibility that some (native-born and immigrant) parents are using private schools to segregate their children from unfamiliar cultures.

While most of the research about school choice, particularly for Australia, focuses on the determinants of high-school choice (e.g., Dearden, Ryan, & Sibieta, 2011; Kelley & Evans, 2004; Le & Miller, 2003; Potts, 2005) much less is known about the different factors that Australian parents consider when choosing their child's first school. There is some limited evidence to show that the decision-making process when choosing a primary school differs according to socio-economic status, the child's gender and academic ability, and other characteristics including whether the child already has a sibling attending school. For example, Bussell (2000) found that during the early stages of the decision-making process there are variations between different groups of parents; in particular, between first-time choosers and those with a child already at school and between parents from different socio-economic groups. A study based on a school choice program in the United States found that parents value proximity highly, and the preference attached to a school's academic results increase with parental income and the student's own academic ability (Hastings, Kane, & Staiger, 2005).

This chapter uses the LSAC data to examine the main factors associated with parents' decisions about the type of primary school their child will attend. Both cohorts of LSAC data are used to explore the association between the sector (government, Catholic or independent) of school that a child attends at the age of 6–7 and a range of characteristics including household income, parents' education, parents' religion, region of residence and parents' expectations about their child's education. Using the MySchool data, which became publically available in 2008 and was matched to LSAC data for the first time in Wave 5, for children in the B cohort who changed schools between the age of 6–7 and 8–9, we are also able to examine parents' reasons for changing schools and differences in the attributes (e.g., NAPLAN performance and disadvantage level) of the new school compared to the old school.

The key research questions explored in this chapter are:

1 Does parents' choice of primary school sector differ according to characteristics such as parents' education, household income and parents' aspirations for their child?

2 Do parents' reasons for changing schools differ according to characteristics of the child and the household?

3 How do other aspects of school quality influence parents' choice of school?

The chapter is structured as follows. A description of the data and methods used is given first. The first analytical section of the chapter focuses on the sector of the school attended (government, Catholic or independent). The second section examines parents' reasons for choosing the school that their child attends, and differences in these reasons according to characteristics of the child and the household. The final analytical section looks at reasons for changing schools, and differences in these reasons according to the type of school change, that is change in sector and change in school

quality, measured by school *Index of Community Socio-Educational Advantage* (ICSEA) score and school academic performance. This is followed by a discussion and conclusion.

7.2 Data and methodology

Data from both cohorts of LSAC are used in this chapter, to provide insights on how parents make the decision about the primary school that their child will attend. For children in the B cohort, data from Waves 3, 4 and 5 are used; and for the K cohort, data from Waves 2, 3 and 4 are used.

For the majority of children in the LSAC study, age 6–7 was the first time we could examine school choice, and so it is school choice at this age that is the main focus of this chapter, with some additional analyses of later school moves. The majority of children were in year 1 at this age, and we focus only on these children, to concentrate on school choice at a particular stage in children's school life. The percentage of children attending government, Catholic and independent schools in year 1 was quite similar for children in the B and K cohorts of LSAC. Around two-thirds of children were attending a government school, just over 20% were attending a Catholic school and the remaining 10–11% went to an independent school.

Two key sets of information are used in this chapter: ACARA (MySchool data) and parent reported information about their reasons for choosing the primary school their child attends, and the reasons their child changed schools (if their child had changed schools since starting primary school).

School ICSEA and NAPLAN information come from MySchool data, which are matched to LSAC for 2008 onwards.[1] These data provide detailed information about all Australian schools, including their academic performance and the level of socio-economic advantage or disadvantage of the school population. The data became publically available for the first time in 2010, when the majority of the B cohort children were in Year 1. It was not appropriate to examine whether MySchool data influenced parents' choice of primary school, as it was not available to parents when they were making these decisions. However, for children in the B cohort who changed schools between 2010 and 2012, we can examine school transitions in terms of changes in school sector, school performance and school advantage level, as well as the reasons for changing school. MySchool data are described further below.

School advantage is measured using the *Index of Community Socio-Educational Advantage* (ICSEA). This measure, which is designed to represent the level of educational advantage for each school, is constructed from two alternative data sources: information relating to parent occupation, school education, non-school education and language background obtained from student enrolment records (direct data); and Australian Bureau of Statistics (ABS) census data (indirect data) (ACARA, 2012). Every school has an ICSEA value on a scale that has a median of 1000 and a standard deviation of 100. ICSEA values range from around 500 (representing extremely educationally disadvantaged backgrounds) to about 1300 (representing schools with students from very educationally advantaged backgrounds) (ACARA, 2012).

A measure of school NAPLAN performance is created based on the year 3 and year 5 NAPLAN scores of the school in the year that the child started that school. The performance of the school is measured by summing the school average scores in all five NAPLAN domains (Reading, Numeracy, Spelling, Grammar and Writing) for year 3 and year 5.[2]

Methodology

This chapter provides descriptive evidence about the school sector that children attend at age 6–7, parents' reasons for their choice of school, reasons for changing schools and the types of transitions between schools (i.e., changes between school sector and differences in the academic performance and advantage level of the new school compared to the previous school). Where data for both

[1] School sector is reported by the child's primary caregiver.

[2] It should be noted if parents had made their decision about the school based on school performance, that decision would have been based on the performance of the school prior to changing schools. However, information about school performance in the years prior to the move is not available. Still, if a school has a reputation for high levels of performance in NAPLAN tests, this is not likely to change substantially from one year to the next. Among children who had not changed schools between year 1 and year 3, the change in school NAPLAN score between 2010 and 2012 was less than 5% for 49% of children and less than 10% for 97% of children.

LSAC cohorts are available and there are no substantive differences in the results for the B and K cohorts, results for the pooled sample are presented.

To examine factors that might explain variation in school sector, characteristics of the child and their household in the previous wave were used, when the child was aged 4–5. Differences in school sector at age 6–7, according to socio-economic characteristics (equivalised parental income, parents' education and occupation) and parents' religion are examined.[3] Further, school choice was examined by parents' expectations about their child's post-school education. This was asked for the first time in LSAC when the children were aged 6–7. However, it is assumed that for most parents, their expectations would not have changed dramatically in the two years prior to their child starting primary school.

Parents of children in the K cohort (but not the B cohort) were also asked about their main reason for their choice of primary school when their child was aged 6–7. Differences in these responses, according to the characteristics of the parents and the child are examined.

Parents of children who had changed schools since the last interview were asked about their main reason for changing schools.[4] For children in both cohorts, differences in the reason for changing schools are examined according to the change in school sector, as well as some characteristics of the parents and the child. For children in the B cohort, we are able to use MySchool data to examine differences in reasons for changing schools, depending on the academic performance and level of disadvantage of the previous school and the current school.

7.3 Factors associated with school sector choice

The decision about which school to send a child to is a complex one, and it is likely that many factors work together in influencing that decision. For example, socio-economic factors are likely to be related to parents' expectations about their child's education; and both these factors are likely to influence the decision about the type of school that a child attends. In this section we use data from both LSAC cohorts to examine differences in school sector choice (government, Catholic or independent) according to a subset of factors that have been shown to influence school choice, namely parents' religion, socio-economic factors (parental income, parents' education and occupation) and parental expectations about their child's post-school education).[5]

Parents' religion and choice of school sector

In the past, Catholic schools were primarily for practicing Catholics and few non-Catholics considered enrolling their children, but now, most Catholic schools are open to non-Catholic as well as Catholic enrolments (Preston, 2003). Most non-government (i.e., Catholic or independent) schools

[3] Parental income is the sum of the gross weekly income of the resident mother and father, or the gross weekly income of the sole parent in households where there is only one parent. To account for variation in family composition, parental income is equivalised using the modified OECD equivalence scale, with children aged 15 years and over considered to be dependant on parental income and represented as additional adults in the equivalence scale. Following Baxter, Gray, Hand, & Hayes (2012), it is assumed that other adults in the household had separate financial arrangements and were not dependent on, or did not contribute significantly to, the finances of the study child's parents. Imputed values are used for missing income data. For more details about income imputation in LSAC, refer to Mullan, Daraganova, and Baker (under review).

[4] Parents of children in the B cohort were given 10 options for this question: Residential move (e.g., child and some or all family members moved to a different residential location, including as a result of marital separation); Convenience for family (e.g., school is closer to family home or parental work place, including if a parent changed jobs); Child's learning needs better met by new school; Child's social problems; Broader educational opportunities at new school; Other opportunities and resources provided by the school; Access to before/after school care; Financial reasons; Change from infant to primary, or primary to middle (or secondary) school; School closure. For parents of children in the K cohort, there were five options: Residential move (e.g., child and some or all family members moved to a different residential location); Convenience for family (e.g., school is closer to family home or parental work place); Academic reasons (e.g., better opportunities for the child because of the quality or nature of the education programs, including reputation of the school); Child related concerns (e.g., child having academic difficulties or social problems with peers or teachers); and Other. Categories for children in the B cohort were combined to form five categories that matched those of the K cohort. Because of the small number of observations in the 'child related concerns' category, this category was included in the 'other' category.

[5] In the analysis presented in this section, B cohort and K cohort data have been combined, as there were no substantive differences between the cohorts when analysis was run separately on each.

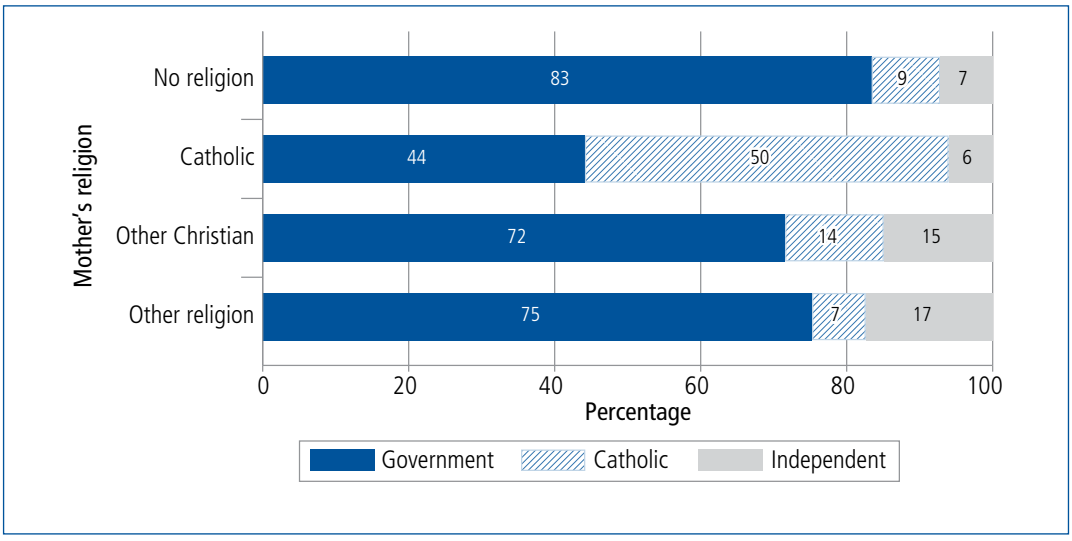
in Australia have a formal Christian religious affiliation; and this restricts the choices available for parents who prefer a secular or non-Christian education for their children. Campbell, Proctor, and Sherington (2009) found that some parents expected religiously affiliated schools to demonstrate active religiosity, while others saw them as a haven for their children from unsatisfactory government schools.

Figure 7.1 shows that many Catholic families remain loyal to Catholic schools, with half of the children whose mother reported being Catholic attending a Catholic school. There is also a considerable amount of variation in the percentage of children attending independent schools, with the percentage of children attending independent schools significantly higher among those whose mother had either a Christian denomination other than Catholic or a non-Christian religion.

While the percentage of children attending a Catholic school was highest when the mother was Catholic, a significant proportion of children whose mother was Catholic attended government schools, but only 6% attended an independent school. This may be related to factors such as socio-economic status, and also the religion of the father. Further analysis of these associations revealed considerable differences in the percentage of children attending Catholic schools, depending on whether they were living in single-parent or two-parent households (Figure 7.2 on page 158). For example, among children whose mother is Catholic, 52% of children in two-parent households and 32% of children in single-mother households attended a Catholic school. A report by the National Catholic Education Commission (2004) suggests that the difference in enrolment patterns between single- and two-parent families may be due to a number of reasons, including the capacity to pay for a Catholic education for single-parent families.

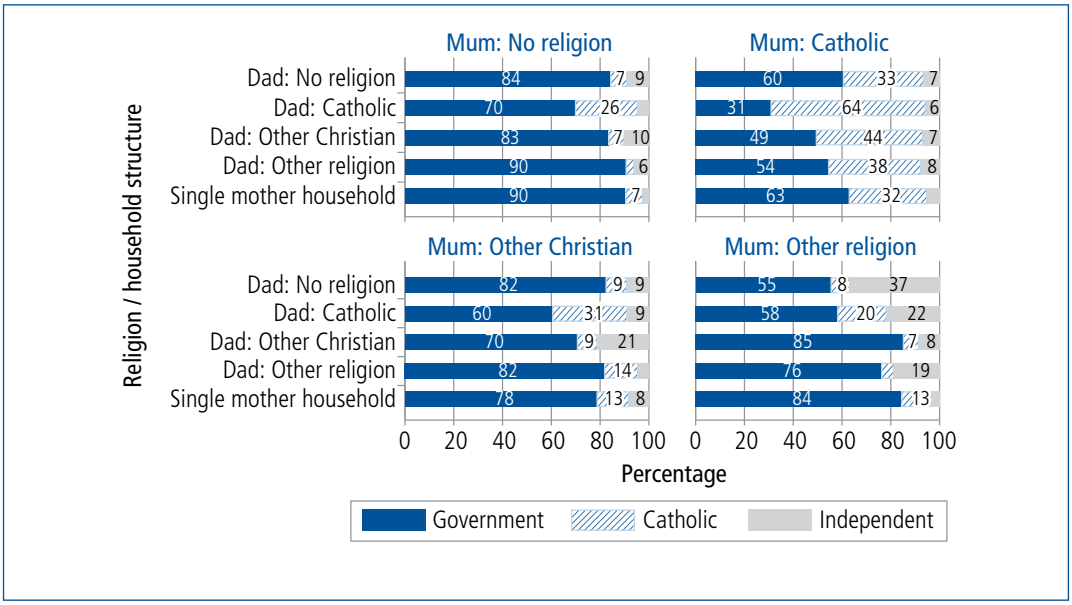
Among children who were living in a two-parent household, 64% of children with two Catholic parents attend a Catholic school. It appears that when making the decision about school sector, the mother's religion has a stronger influence than the father's. For example, 38% of children whose mother was Catholic and whose father had a non-Christian religion attended a Catholic school, compared to 20% of children whose father was Catholic and whose mother had a non-Christian religion.

Still, a relatively large proportion of children whose mother is not Catholic also attend Catholic schools. Around 8% of children with no resident parent reporting being Catholic attended a Catholic school. This is likely to be because of a perceived higher quality of Catholic schools compared to government schools, and at a lower cost than other independent schools (Sander, 2001). For some non-Catholic families, this is likely to make a Catholic school an appealing alternative to the local government school and higher-cost independent schools.



Note: Chi-square tests used to compare proportions in each school sector indicate significant differences according to mother's religion ($p < .001$).
Source: LSAC B cohort, Waves 3 and 4; and K cohort, Waves 1 and 2 ($n = 6,261$)

Figure 7.1: Year 1 school sector at age 6–7, by mother's religion



Note: Chi-square tests used to compare proportions in each school sector indicate significant differences according to father's religion ($p < .001$).

Source: LSAC B cohort, Waves 3 and 4; and K cohort, Waves 1 and 2. Sample restricted to children in Year 1 at age 6–7 ($n = 6,183$).

Figure 7.2: Year 1 school sector at age 6–7, by parents' religion and household structure

Socio-economic factors and choice of school sector

While the conventional view of the basis for school sector choice may be that it is a matter of income and social class, there is some evidence to suggest that factors such as parental education and occupation, and values and attitudes are also important; and that for families choosing non-government schools, school community and culture are more important than social class and wealth (ISCA, 2008).

This section explores socio-economic factors, first looking at income, then parents' education and occupation. Figure 7.3 (page 159) compares the school sector that children were attending at age 6–7 according to the quartile of equivalised parental income when the child was aged 4–5. The percentage of children attending a government school is highest among those with parental income in the lowest quartile (76%) and lowest among children whose combined parental income is in the highest quartile (56%). Given the higher cost of school fees in many independent schools, it is not surprising that the percentage of children attending these schools was highest among children whose parents' combined income was in the highest quartile. Estimates by the Australian Scholarships Group (ASG, 2015), providing a breakdown of the average annual costs for a child attending 6 years of primary schooling, suggest that the total cost for a child to attend an independent primary school, starting in 2015, would be around $97,000, compared to $44,000 for a Catholic school and $19,000 for a government school.[6]

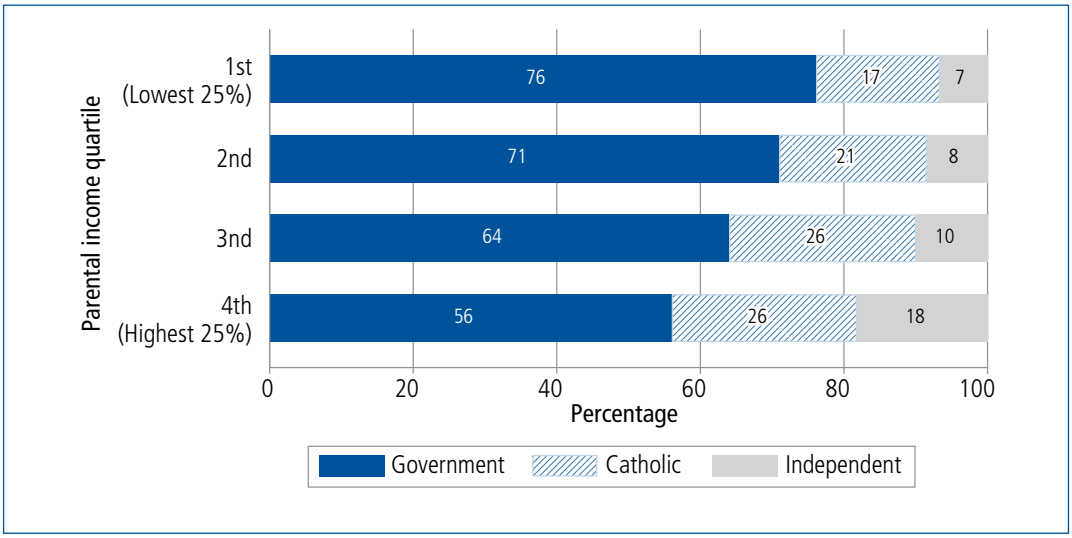
While differences in the percentage of children attending independent schools were quite small in the first, second and third income quartiles, for children whose parental income was in the highest quartile, the percentage who attended an independent school was almost double that of children with parental income in the third quartile. However, there was no difference in the percentage of children attending Catholic schools in the top two quartiles of equivalised parental income; and even in the lowest two income quartiles, the percentage of children attending Catholic schools is more than double that of children attending independent schools.

Parents' education level is also associated with differences in the type of school that a child attends (Figure 7.4, page 159). Among children whose mother had a degree qualification, 42% attended a non-government school, compared to 25% of children whose mother did not complete year 12. This

[6] Estimated costs include fees, clothing, extracurricular activities, travel and computers for 6 years of primary school education (national average for children living in a metropolitan area).

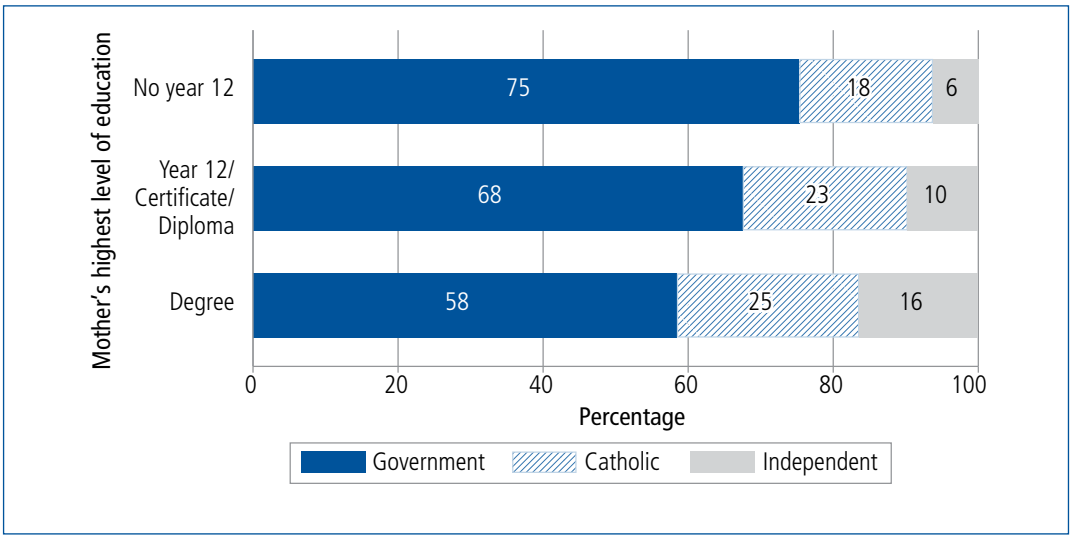
difference was mainly due to the difference in the percentage of children attending independent schools, with only 6% of children whose mother did not complete year 12 attending an independent school, compared to 16% of children whose mother had a degree qualification.

The education level of the child's father is also an important factor. Figure 7.5 (page 160) shows that among children in two-parent households, the percentage of children attending a government school was lowest among those whose father had a degree qualification. The influence of the father's education on school sector choice appears to be weaker among children whose mother had a post-school qualification. For example, among children whose mother had a degree, the percentage of children attending a government school was around 60%, regardless of the father's education level. However, among children whose mother did not have a post-school qualification, the percentage of children attending a government school ranged from 62% for those whose father had a degree to 74% among those whose father did not complete year 12.



Note: Chi-square tests used to compare proportions in each school sector indicate significant differences according to quartile of parental income ($p < .001$).
Source: LSAC B cohort, Waves 3 and 4; and K cohort, Waves 1 and 2 ($n = 6,295$)`

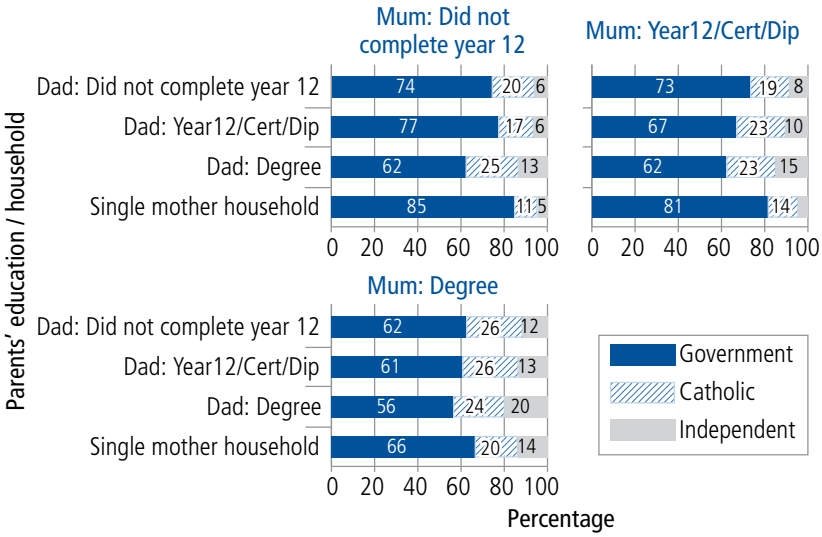
Figure 7.3: Year 1 school sector at age 6–7, by quartile of combined parental income at age 4–5



Notes: Chi-square tests used to compare proportions in each school sector indicate significant differences according to mother's education ($p < .001$). Degree category includes postgraduate qualifications.
Source: LSAC B cohort, Waves 3 and 4; and K cohort, Waves 1 and 2 ($n = 6,268$)

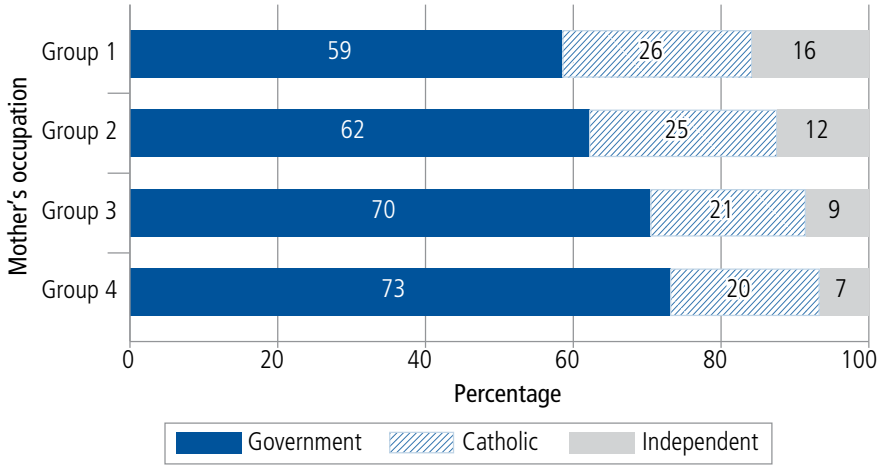
Figure 7.4: Year 1 school sector at age 6–7, by mother's highest level of education

There is some evidence showing that parents' decisions about school choice differ according to their occupation. In a survey of parents of secondary school students in Australia, Campbell, Proctor, and Sherington (2009) found that academic quality was more important for parents with professional and associate professional occupations; and concluded that these differences were largely due to family financial resources. However, it is important to keep in mind that there is a strong association between parental occupation and education, with parents in professional and associate professional occupations more likely to also have higher levels of education. Figure 7.6 compares the percentage of children in each school sector, according to their mother's occupation.



Notes: Chi-square tests used to compare proportions in each school sector indicate significant differences according to father's education ($p < .001$). Degree category includes undergraduate and postgraduate qualifications.
Source: LSAC B cohort, Waves 3 and 4; and K cohort, Waves 1 and 2 ($n = 6,175$)

Figure 7.5: Year 1 school sector at age 6–7, by parents' education



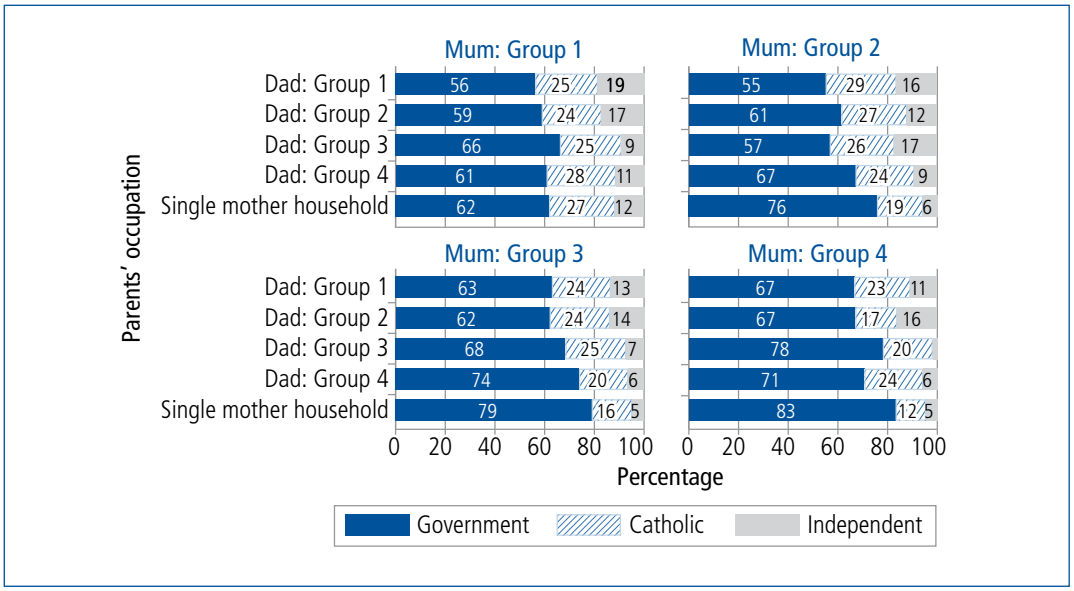
Notes: Chi-square tests used to compare proportions in each school sector indicate significant differences according to mother's occupation ($p < .001$). For mothers who were not employed at the time of interview, most recent occupation is used. Group 1 = Managers, administrators and professionals; Group 2 = Associate professionals, advanced clerical and service workers; Group 3 = Intermediate and elementary clerical sales and service workers; Group 4 = Tradespersons, production and transport workers and labourers.
Source: LSAC B cohort, Waves 3 and 4; and K cohort, Waves 1 and 2 ($n = 6,100$)

Figure 7.6: Year 1 school sector at age 6–7, by mother's occupation

Where there was no father living in the child's primary residence, we have labelled the category "single mother household" for comparison with the different levels of paternal education.

The percentage of children attending Catholic schools was quite similar across mother's occupation categories. However, the percentage of children in independent schools ranged from 7% of those whose mothers worked as tradespersons, production and transport workers or labourers to 16% of children whose mothers were managers or professionals.

Figure 7.7 shows that for children who were living in two-parent households, differences in the percentage of children attending Catholic school depending on their parents' occupation were relatively small. However, the percentage of children attending independent schools was considerably higher among children whose father's occupation was in either group 1 or group 2 (managers, administrators, professionals, associate professionals, advanced clerical and service workers). Among children in single-parent households, there was a considerable amount of variation in school sector by mother's occupation group, with a much larger proportion of children whose mothers worked in managerial or professional roles attending non-government schools. Presumably this difference is, to some extent, due to differences in mother's income, and hence capacity to pay for a non-government school, depending on their occupation.



Notes: Chi-square tests used to compare proportions in each school sector indicate significant differences according to father's occupation ($p < .001$). For parents who were not employed at the time of interview, most recent occupation is used. Group 1 = Managers, administrators and professionals; Group 2 = Associate professionals, advanced clerical and service workers; Group 3 = Intermediate and elementary clerical sales and service workers; Group 4 = Tradespersons, production and transport workers and labourers.

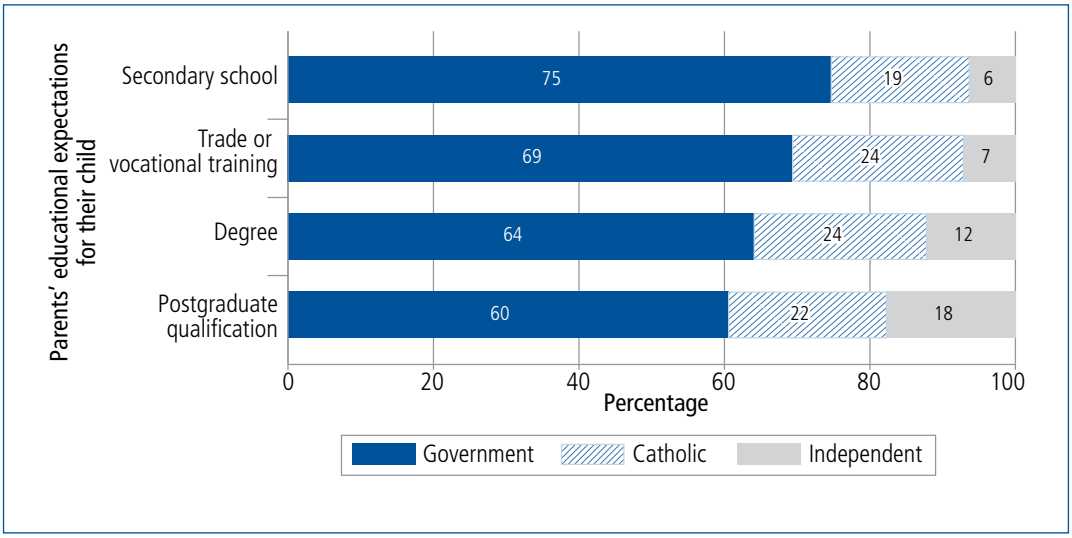
Source: LSAC B cohort, Waves 3 and 4; and K cohort, Waves 1 and 2 (n = 6,077)

Figure 7.7: Year 1 school sector at age 6–7, by parents' occupation

Parents' educational expectations and choice of school sector

Parents' decisions about which primary school their child will attend are also likely to be associated with their aspirations for their child's education. Previous studies have shown a strong link between parental expectations and later educational attainment; and given that the question about educational expectations was asked after the child had already started primary school, these expectations are likely to be related to the child's ability before starting school, as well as the child's progress in their schooling so far (e.g., Gregory & Huang, 2013). When children were aged 6–7, the child's main carer (in most cases the mother) was asked how far they think their child would go with their schooling. Figure 7.8 (page 162) shows the relationship between parental expectations and school sector choice.

While the differences in the percentage of children attending Catholic school according to parents' expectations were not large, there were substantial differences in the percentage of children attending independent schools depending on parents' expectations about their post-school



Notes: Chi-square tests used to compare proportions in each school sector indicate significant differences according to parental expectations ($p < .001$). 109 observations for children whose parents did not expect them to complete secondary school were included in the secondary school category.

Source: LSAC B cohort, Waves 3 and 4; and K cohort, Waves 1 and 2 ($n = 6,130$)

Figure 7.8: Year 1 school sector at age 6–7, by parents' educational expectations for their child

education, with only 6% of children whose parents expected them to go no further than secondary school attending an independent school, compared to 18% of children whose parents expected them to obtain a postgraduate qualification.

In summary, the analysis in this section has shown that there are a variety of factors associated with the decision about which primary school a child will attend, including parents' religious affiliation, socio-economic factors, and parents' expectations about their child's post-school education. However, it is important to note that while the bivariate analysis section has shown a statistical association between many of these factors, we are unable to draw any conclusions about the causal influences of these factors on school choice, as other characteristics have not been controlled for.

7.4 Parents' reasons for school choice

Several studies have shown that academic outcomes are not the only criteria for school choice, and that parents rank aspects such as values and discipline more highly. Buckingham (2015) suggested that few parents choose a school for their child based on the sector alone—the decision is based on the individual merits of the schools available to them, and parents make judgements about what they believe is best for their child, based on their own priorities. Proctor (2011) found that parents, particularly mothers, did a considerable amount of research before making the decision about their child's school, gathering information about schools and also seeking out the advice of friends and family. She found that when choosing a school for their child, parents tended to trust their "gut feeling" or their friends' anecdotes as much as anything else. Parents of children in the K cohort (age 6–7 in 2006) were asked what was the most important reason influencing their choice of the child's school.[7] Table 7.1 (page 163) compares parents' reasons for choosing a primary school, according to the school sector chosen.

Overall the most commonly cited reasons were:

- convenience for the family;
- other family members attending, or having previously attended, the school;
- academic reasons; and
- religious reasons.

[7] This information was not collected for the B-cohort children.

Table 7.1: Most important reason for school choice, by school sector

	School sector (%)			
	Government	Catholic	Independent	Total
Convenience for family	40.8	4.9	5.3	29.7
Other family members attend or have attended this school	23.7	19.1	14.3	21.7
Academic reasons	11.6	21.4	35.2	16.1
Religious values of the school	0.2	38.5	27.1	10.9
School offered a specific program	5.0	4.6	7.8	5.2
Child knows other children that attend this school	6.7	2.3	# 0.9	5.2
Financial reasons	1.6	# 0.5	# 0.4	1.3
Single-sex school	# 0.0	# 0.0	# 1.1	# 0.1
Other reason	6.7	8.4	7.7	7.2
Did not have a choice	3.8	# 0.5	# 0.2	2.7
Total	**100.0**	**100.0**	**100.0**	**100.0**

Notes: # Estimate not reliable (cell count less than 20). Chi-square tests used to compare reasons for school choice indicate significant differences according to school sector ($p < .001$). Percentages may not total exactly 100.0% due to rounding.

Source: LSAC K cohort, Wave 2. Sample is restricted to children who were in year 1 in Wave 2 ($n = 4,444$).

However, these reasons varied significantly according to school sector.

- Among children attending a government school, the most common reasons for the parents' choice of school was convenience for the family, followed by family reasons (i.e., other family members either currently attending or having previously attended that school).[8]
- As one would expect, for children who attended a Catholic school, the religious values of the school were the most common reason for choosing the school. However, less than 40% of parents of children in Catholic schools said that religious values were the most important reason for choosing the school, with just over 20% of parents saying that the most important reason for their choice of school was academic reasons, and 19% saying that they chose the school because a family member either was attending or had attended that school.[9]
- For children attending an independent school, academic reasons were the most common reason for the parents' choice, followed by the religious values of the school.

The previous section of this chapter has shown that the school sector chosen by the parents varies considerably depending on parents' religions, and to a lesser extent with the socio-economic characteristics of the child's parents. Figures 7.9 to 7.12 show that parents' reasons for school choice also vary according to these characteristics.

In Figure 7.9 (page 164), parents' reasons for choosing a school are compared, according to the mother's religion:

- Compared to mothers who reported having no religion or a Christian denomination, mothers with non-Christian religions more commonly said that they chose a government school for convenience and less commonly reported choosing a government school for family reasons.
- Almost half of Catholic mothers reported choosing a Catholic school for religious reasons, while a similar proportion of those with no religion who made the same choice said they did so on academic grounds.
- Among parents whose children attended an independent school, 55% of mothers who reported having no religion said that they chose the school for academic reasons, while 31% of mothers

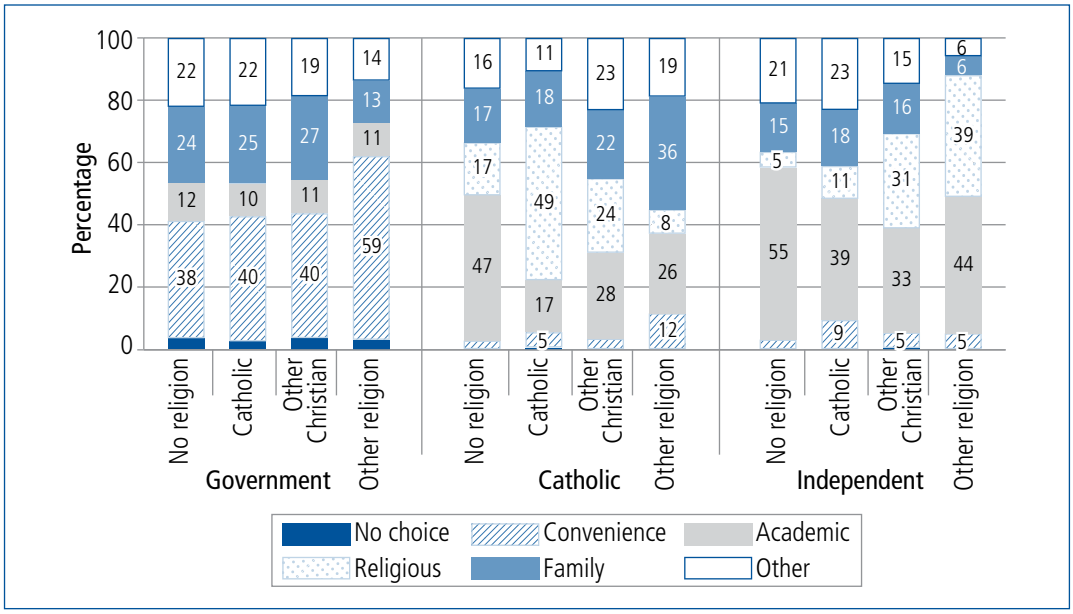
[8] It is important to consider that for some parents in rural or remote areas, location is likely to restrict the number of choices they have available. For example, there may be no Catholic or independent schools within a reasonable distance of the family home. However, addressing the issue of location by considering the set of choices available to each family is beyond the scope of this chapter.

[9] In some non-government schools, having other family members attending the school may result in a fee reduction. In this sense, for some parents, this reason may be at least partly a financial consideration.

with a Christian denomination other than Catholic and 39% of mothers with a non-Christian religion reported choosing an independent school for religious reasons.

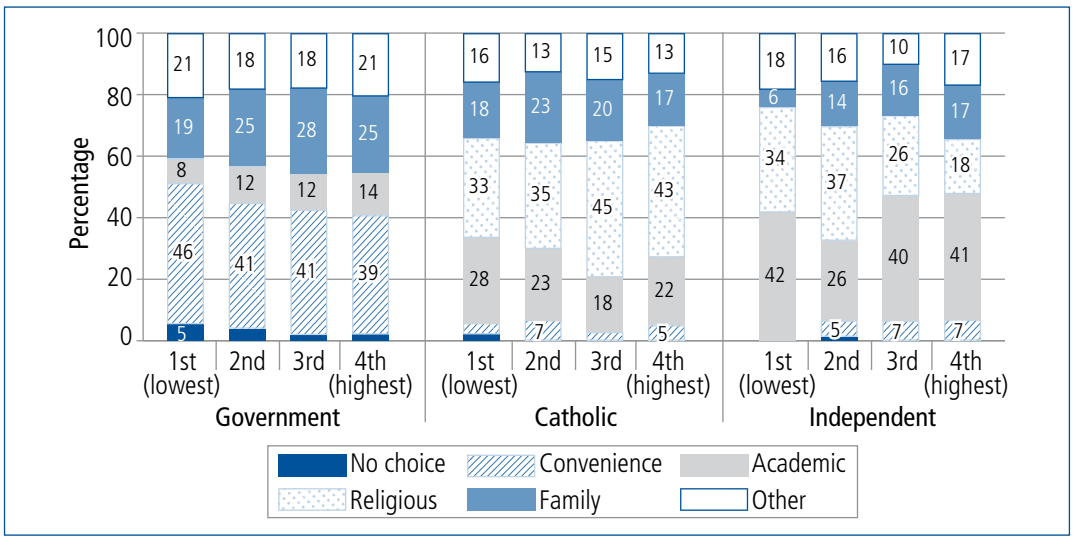
In Figure 7.10, parents' reasons for choosing a school are compared, by quartile of parental income:

- Of those parents who chose a government school, there was little variation in reasons for school choice across the top three income quartiles. The percentage who said they chose the school because of convenience was highest among those in the lowest quartile of household income. A slightly lower percentage of parents in the lowest quartile cited academic reasons.
- Among parents of children who attended a Catholic school, choosing a school for its religious values was more common among parents in the upper half of the income distribution.
- Parents commonly chose independent schools for academic reasons. With more parents in the lowest income quartile saying academic reasons were their highest priority (42%), rather than religious values (34%). However, among those in the second income quartile, choosing a school



Note: Percentages may not total exactly 100.0% due to rounding.
Source: LSAC K cohort, Wave 2. Sample is restricted to children who were in year 1 in Wave 2 (n = 3,070).

Figure 7.9: Reasons for school choice, by school sector and mother's religion



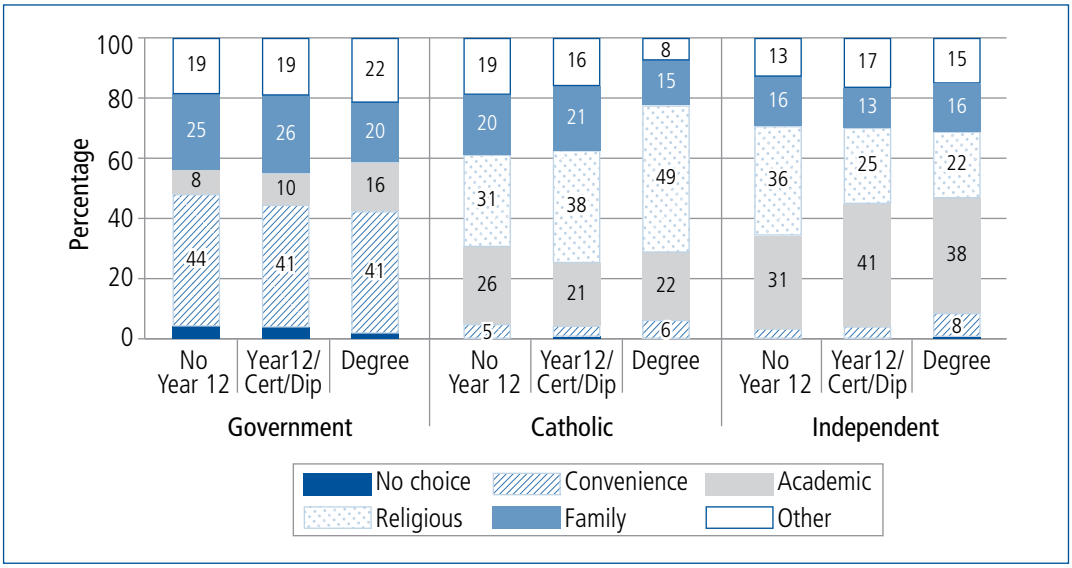
Notes: Percentages may not total exactly 100.0% due to rounding.
Source: LSAC K cohort, Wave 2. Sample is restricted to children who were in year 1 in Wave 2 (n = 3,091).

Figure 7.10: Reasons for school choice, by school sector and quartile of combined parental income

for religious reasons (37%) was more common than choosing a school for academic reasons (26%); and in the highest quartile, only 18% of parents reported choosing an independent school for religious reasons.

Figure 7.11 shows that:

- Among children who attended a government school, the percentage of parents who chose the school because of convenience was around 40%, regardless of the mother's education. However, the percentage of parents who chose a government school for academic reasons was significantly higher among children whose mother had a degree qualification.
- The percentage of parents who chose a Catholic school for its religious values increased substantially with the mother's education level.
- Among children who were attending an independent school, the percentage of parents who chose the school for religious reasons was significantly higher in households where the mother had not completed high school; with parents in this group less likely to report having chosen a school for academic reasons.



Notes: Estimates not reliable for mothers who had not completed year 12 whose children were attending an independent school. Percentages may not total exactly 100.0% due to rounding.

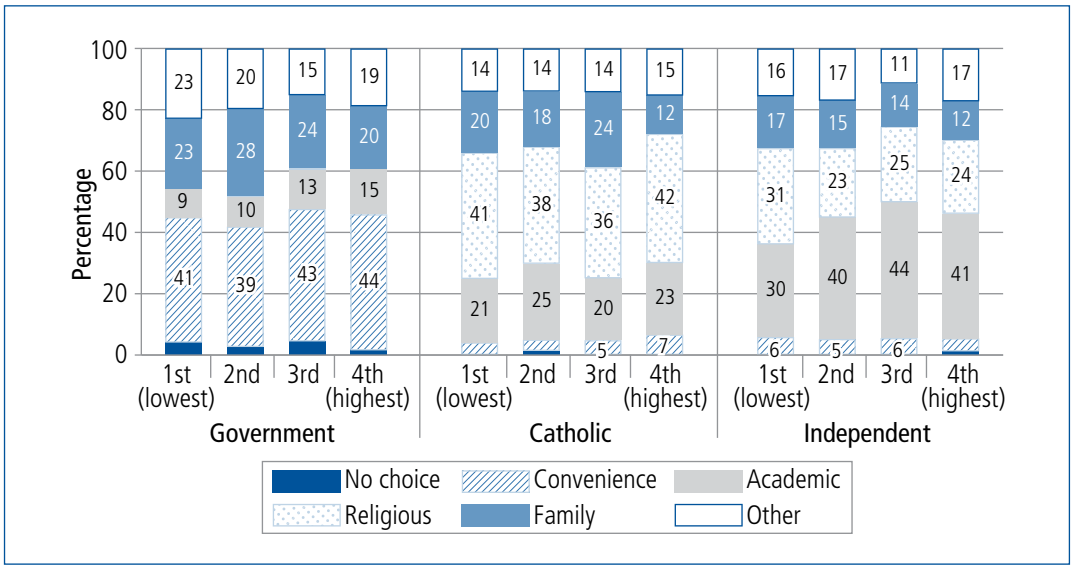
Source: LSAC K cohort, Wave 2. Sample is restricted to children who were in year 1 in Wave 2 (n = 3,072).

Figure 7.11: Reasons for school choice, by school sector and mother's highest level of education

In terms of parental aspirations for their child's education, Figure 7.12 (page 166) shows that:

- Among children who attended a government school, the percentage of parents who said that they made their school choice for academic reasons was highest among those who expected their child to complete a university degree.
- While the percentage of parents who reported choosing a Catholic school for religious reasons increased with parental expectations about their child's education, the percentage of parents who reported choosing a Catholic school for academic reasons was still highest among those who expected their child would complete a degree qualification.
- Among children who were attending an independent school, parents who expected their child to complete a postgraduate qualification were much more likely to say that they chose the school for academic reasons, and less likely to say they chose the school for religious reasons.

In summary, for many parents, the decision about which primary school their child will attend is made with academic reasons as one of the main considerations. However, there are many other attributes that are also important in this decision. For parents who choose a Catholic or an independent school, the religious values of the school are an important consideration. Others make the choice about primary school simply for convenience, or for family reasons.



Notes: Estimates not reliable for mothers with expectations of secondary school or trade qualifications whose children were attending an independent school. Percentages may not total exactly 100.0% due to rounding.
Source: LSAC K cohort, Wave 2. Sample is restricted to children who were in year 1 in Wave 2 (n = 3,011).

Figure 7.12: Reasons for school choice, by school sector and quartile of parents' expected level of education for their child

7.5 Reasons for changing schools

In 2010, MySchool data became publically available, providing parents with information about every school in Australia, including the school NAPLAN performance since 2008 and the school ICSEA score, which is a measure of the level of advantage or disadvantage of the school population. In this section, we look at parents' reasons for changing schools, for children who changed schools between the ages of 6–7 and 8–9; and for children in the B cohort, we use the matched MySchool data to examine the differences in the performance and advantage levels of their current school and their previous school.

Around 16% of children who were in year 1 at age 6–7 had changed schools by age 8–9 (17% in the B cohort and 15% in the K cohort). Parents of children who had changed schools since the previous wave of LSAC were asked for the main reason their child had changed schools. For over 50% of children, the main reason that parents gave for changing schools was because of a residential move, as shown in Table 7.2. However, it is likely that some families made a residential move in order to live in what they perceived to be a better area, with better schools (and better learning opportunities) a flow-on effect from this decision. Therefore, there may be some overlap between these two reasons for changing schools.

The most common type of transition, in terms of school sector, was a change from one government school to another. Of those children who changed schools between ages 6–7 and 8–9, almost 60% had moved from one government school to another; around 10% had moved from a government school to an independent school, 7% moved from a Catholic school to an independent school, 7% had moved from one Catholic school to another and 5% had moved from one independent school to another.[10]

Table 7.3 shows the changes in school sector for those children who changed schools. Among children who had left a government school, the majority had moved to another government school, rather than a Catholic or independent school. However, among children who left a Catholic or independent school, changing school sector was more common, with over 40% of children who left a Catholic school moving to a government school. Among children who were attending an

[10] Percentages based on pooled data for the B and K cohorts.

independent school at age 6–7 and had subsequently changed schools, only 38% of children in the B cohort and 56% of children in the K cohort had moved to another independent school.

Table 7.2: Main reason for changing schools, children who changed schools between ages 6–7 and 8–9

	B cohort (Age 6–7 in 2010) %	K cohort (Age 6–7 in 2006) %
Residential move	53.9	58.1
Convenience	7.7	9.6
Academic/Learning opportunities	24.6	15.8
Other	13.9	16.6
Total	**100.0**	**100.0**

Notes: Academic/Learning opportunities include: Child's learning needs better met by new school; Broader educational opportunities at new school; Other opportunities and resources provided by the school (B cohort) and better opportunities for the child because of the quality or nature of the education programs, including reputation of the school (K cohort). Other includes: Child's social problems; Access to before/after school care; Financial reasons; Change from infant to primary, or primary to middle (or secondary) school; School closure. Percentages may not total exactly 100.0% due to rounding.

Source: LSAC B cohort, Waves 4 and 5 (n = 472) and K cohort, Waves 2 and 3 (n = 563). Sample restricted to children in year 1 at age 6–7.

Table 7.3: Changes in school sector, children who changed schools between ages 6–7 and 8–9

	Government	Catholic	Independent	Total
B Cohort				
Government	77.2	9.0	13.8	100.0
Catholic	48.8	43.1	# 8.1	100.0
Independent	47.9	# 13.8	38.3	100.0
Total	**69.3**	**15.0**	**15.7**	**100.0**
K Cohort				
Government	79.7	8.4	11.8	100.0
Catholic	41.4	46.0	# 12.5	100.0
Independent	# 33.4	# 10.2	56.4	100.0
Total	**68.5**	**15.0**	**16.6**	**100.0**

Notes: # Estimate not reliable (cell count less than 20). Sample is restricted to children who were in year 1 at age 6–7. Percentages may not total exactly 100.0% due to rounding. Differences across groups are significant at the 5% level in a chi-square test.

Source: LSAC B cohort, Waves 4 and 5 (n = 472) and K cohort, Waves 2 and 3 (n = 427)

There were some differences in the reasons that parents gave for changing their child's school, depending on the type of transition made. For example, among children who had moved from one government school to another, or from one Catholic school to another, the most common reason for the change was because of a residential move. However, children who had moved from one independent school to another, or from a government to a non-government school, the most common reason given for the change in school was learning opportunities.[11]

Given that the majority of parents reported that their child changed schools because of a residential move, it is not surprising that there are no significant differences in reasons for changing schools, depending on parental education, parents' religion or expectations about the child's education. There were small but statistically significant differences in reasons for changing schools, depending on the quartile of parental income. Compared to children in the lowest quartile of parental income, children in the highest quartile of parental income were less likely to have changed schools because of a residential move, and more likely to have changed schools for better academic or learning opportunities.

[11] For other types of school sector transitions, estimates were not reliable due to a limited number of observations.

For children in the B cohort who changed schools between 2010 and 2012, we are able to compare the level of school performance and school advantage of their current school with that of the school they were attending at age 6–7. Of those children who changed schools, a larger proportion moved out of low ICSEA (more disadvantaged) schools than high ICSEA schools. More specifically, 30% of children who changed schools left a school in the lowest ICSEA quartile; while only 18% of those who changed schools left a school in the highest ICSEA quartile.

Of those children in the B cohort who changed schools between 2010 and 2012, just over half (51%) had moved to a school with a similar ICSEA score to that of their previous school, 26% had moved to a more advantaged school and the remaining 23% had moved to a more disadvantaged school. Differences in the ICSEA score of the current and the previous school are likely to depend, at least to some extent, on the reason that the child changed schools. In Table 7.4, changes in school ICSEA according to the main reason for changing schools are presented.

Table 7.4: Change in school ICSEA, by reason for school change, children who changed schools between age 6–7 and 8–9 (B cohort 2010–12)

	Change in school ICSEA			
Reason for changing schools	**Lower**	**Similar**	**Higher**	**Total**
Residential move	26.0	45.5	28.5	100.0
Learning opportunities	11.2#	64.7	24.1	100.0
Other	26.7	50.3	23.0	100.0
Total	**22.7**	**51.0**	**26.3**	**100.0**

Notes: #Estimate not reliable (cell count less than 20). Because of small cell counts, "convenience" is included in the "other" category. Children are considered to have changed to a lower/higher ICSEA school if the difference in school ICSEA scores is at least 40 points (approximately 0.5 standard deviations) lower/higher. Differences across groups are significant at the 5% level in a chi-square test.

Source: LSAC B cohort, Waves 4 and 5 (n = 409)

Of those children who changed schools because of a residential move, just over a quarter had changed to a lower ICSEA school and almost 30% had moved to a higher ICSEA school. However, among those who changed schools for better learning opportunities, the majority had moved to a school with a similar level of advantage to that of their previous school.[12] This result suggests that parents' opinions about the learning opportunities provided by primary schools are not necessarily associated with the level of advantage or disadvantage of the school population.

Turning now to changes in school performance, the percentage of students moving out of low performing schools was higher than that of those leaving higher performing schools, with around 20% of children who were attending schools in the lower half of the NAPLAN distribution changing schools, compared to approximately 13% of those who were attending a school in the top half of the school NAPLAN distribution. In Table 7.5, changes in school performance, according to the main reason for changing schools are presented.

Of those children who changed schools for better learning opportunities, almost 60% had moved to a school with an average NAPLAN score at least half a standard deviation higher than that of their previous school. However, among those who changed schools because of a residential move, only 44% had moved to a higher performing school, while almost 30% had moved to a school with a lower level of academic performance.[13] While these figures suggest that a large percentage of children who changed schools had moved to a higher performing school, it is important to remember that the number of children who actually changed schools is relatively small. In terms of the national population, this equates to an estimated 3,500 children who were aged 6–7 in 2010 changing schools by 2012 because of better learning opportunities and moving to a higher

[12] Among those who changed schools for better learning opportunities, the average change in ICSEA score was 16.5 points, compared to 2.8 points for those who changed schools because of a residential move and -5.9 points for those who changed for other reasons. T-tests indicate that the difference in the average change in ICSEA scores for those who changed for better learning opportunities and those who changed schools because of a residential move are statistically significant at the 5% level.

[13] Differences in average change in school performance for those who changed because of learning opportunities and those who changed because of a residential move are statistically significant at the 5% level.

performing school. In other words, it does not appear that the availability of MySchool data has resulted in a large number of parents moving their children to a higher-performing school.

While the first NAPLAN tests were taken in May 2008, school performance data were not made publically available until the launch of the MySchool website in January 2010. Therefore, parents who made the decision to change their child's school between 2008 and 2010 would have made this decision based on considerations other than school NAPLAN performance. Although the figures in Tables 7.5 and 7.6 are not directly comparable due to differences in the age of the children at the time they changed schools, they do provide some insight into transitions between lower and higher performing schools before and after the availability of MySchool data.

Table 7.5: Change in school performance, by reason for school change, children who changed schools between age 6–7 and 8–9 (B cohort 2010–12)

	Change in school NAPLAN performance (2010–12)			
Reason for changing schools	Lower performing	Similar	Higher performing	Total
Residential move	28.8	27.1	44.1	100.0
Learning opportunities	16.0#	25.3	58.7	100.0
Other	34.5	37.9	27.6	100.0
Total	**28.3**	**24.9**	**46.8**	**100.0**

Notes: #Estimate not reliable (cell count less than 20). Because of small cell counts, "convenience" is included in the "other" category. Children are considered to have changed to a lower/higher performing school if the difference in average school NAPLAN scores is at least 0.5 standard deviations lower/higher. Group differences significant at the 5% level in a chi-square test.

Source: LSAC B cohort, Waves 4 and 5 (n = 402)

Among children in the K cohort who had changed schools between age 8–9 (in 2008) and age 10–11 (in 2010), 47% had changed schools primarily because of a residential move, 28% of parents reported that their child had changed schools for better learning opportunities, and the remaining 25% said they had changed schools for other reasons, including convenience. Among those who reported changing schools for better learning opportunities, more than half (54%) had moved to a higher performing school. However, among those who changed schools because of a residential move, only 40% had moved to a higher performing school; and 21% had moved to a school with a lower level of academic performance. These figures suggest that parents who moved their child to a different school for better educational opportunities were able to make a reasonable assessment of the quality of the learning opportunities of a particular school based on evidence other than school NAPLAN scores.

Table 7.6: Change in school performance, by reason for school change, children who changed schools between ages 8–9 and 10–11 (K cohort, 2008 cf. 2010)

	Change in school NAPLAN performance (2008 cf. 2010)			
Reason for changing schools	Lower performing	Similar	Higher performing	Total
Residential move	21.2	39.1	39.8	100.0
Learning opportunities	8.7#	37.7	53.6	100.0
Other	21.1	47.7	31.2	100.0
Total	**17.7**	**40.8**	**41.5**	**100.0**

Notes: #Estimate not reliable (cell count less than 20). Because of small cell counts, "convenience" is included in the "other" category. Children are considered to have changed to a lower/higher performing school if the difference in average school NAPLAN scores is at least 0.5 standard deviations lower/higher. Group differences significant at the 5% level in a chi-square test. Percentages may not total exactly 100.0% due to rounding.

Source: LSAC K cohort, Waves 3 and 4 (n = 515)

Table 7.6 shows that among children who changed schools, most moved to a school with an ICSEA score similar to that of their previous school. Differences in NAPLAN performance of current and previous schools were more substantial, with a large proportion (42%) of children who changed schools moving to a higher performing school, even if their parents reported changing schools for

reasons other than academic ones. For some, moving to a better school may be simply a flow-on effect from upgrading houses and moving to a better area; but it is reasonable to presume that when making a residential move, parents will consider the quality of nearby schools, including their academic performance, even if it is not their main reason for moving house. Still, it cannot be concluded that the availability of MySchool data has resulted in a dramatic shift of students into higher performing schools. National population estimates indicate that of the 188,000 students who were in year 1 in 2010, around 12,000 (6.5%) had moved to a higher performing school by 2012. The majority of the parents of children who had moved to a higher performing school said that the main reason for changing schools was because of a residential move.

7.6 Summary and discussion

The analysis in this chapter shows that parents' choice of primary school is associated with a variety of parental characteristics. Parents' religion and socio-economic status and parental expectations about their child's education are all significantly associated with the school sector that parents choose.

Parents' reported reasons for changing schools also varied with religion, socio-economic characteristics and parents' expectations about post-school education. For many parents, the decision about which primary school their child will attend is made with academic reasons as the main consideration. However, there are many other attributes that are also important in this decision. For a substantial proportion of parents who choose a Catholic or an independent school, the religious values of the school are an important consideration. Others make the choice about primary school simply for convenience, or for family reasons. More specifically:

- A large proportion of mothers who were Catholic reported choosing a school for religious reasons, while mothers who reported having no religion more commonly reported choosing a school for academic reasons.
- The percentage of parents who said that they made their school choice for academic reasons was highest among those in the highest income quartile; while the percentage of parents who said that the school was chosen because of convenience was highest among those in the lowest quartile of household income.
- The percentage of parents who said that their main reason for choosing a Catholic school was because of the religious values of the school increased substantially with the mother's education level.
- Parents who expected their child would complete a degree or postgraduate qualification were more likely to have reported choosing a school for academic reasons.

For children who changed schools between the ages of 6–7 and 8–9, the majority of parents said that the main reason for changing schools was because of a residential move. Comparing the attributes of the current and the previous school for those children who changed schools suggests that most parents will look for a school with similar attributes to that of the child's previous school. That is, the school attributes that they valued when making their original choice of primary school are also attributes that they will look for when choosing a new school because of a residential move.

Compared to those who changed schools because of a residential move, a higher percentage of those children whose parents reported changing schools for better academic opportunities had moved to a school with a higher average NAPLAN score or a higher ICSEA value. This result implies that for parents who place a high value on a school's academic achievement, information available on the MySchool website may influence their choice of schools. While most parents who are weighing up the costs and benefits of various schools will take more than NAPLAN scores into account when making their decision, the academic performance of the school is still an important consideration. There is some evidence that even before MySchool data became available in 2010, parents who placed a high priority on specific school attributes engaged in extensive research about the options available to them. Ball (2003) suggested that it is middle-class parents that are privileged with the most effective cultural capital in understanding schools and how they can best serve their children. Proctor (2011) found that parents did a considerable amount of research before making the decision about their child's school, with mothers, in particular, seeking information about the choices available, not only from schools but also getting the advice of friends and family. She found

that when choosing a school for their child, parents tended to trust their gut feeling or their friends' anecdotes as much as anything else.

There are some limitations to this analysis. Without complete information about the range of choices available to each family in terms of how many government, Catholic and independent schools are within a reasonable distance of a child's residence, it is not possible to determine whether the parents made the choice about their child's primary school by weighing up the attributes of a range of available schools and choosing the one that they believed was best for their child or they simply chose the school because of the limited options available. With complete ACARA data, a more complex model of school choice, incorporating the attributes of all schools within each child's feasible choice set, could be estimated. However, this is beyond the scope of this chapter.

7.7 References

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