



Final Report

Housing and children's development and wellbeing: a scoping study

authored by

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ACRONYMS

ABS	Australian Bureau of Statistics
ACSPRI	Australian Consortium for Social and Political Research Incorporated
AIFS	Australian Institute of Family Studies
ASQ	Ages and Stages Questionnaires
ASSDA	Australian Social Science Data Archive
CATI	Computer assisted telephone interviewing
CD	Collection District
CRA	Commonwealth Rent Assistance
DEEWR	Department of Education, Employment and Workplace Relations
DHS	Department Human Resources
DFaHCSIA	Department of Families, Housing, Community Services and Indigenous Affairs
ETS	Environmental Tobacco Smoke
HILDA	Household, Income and Labour Dynamics in Australia Survey
ICD	International Classification of Diseases
LORI	Level of Relative Isolation
LSAC	Longitudinal Study of Australian Children
LSAY	Longitudinal Surveys of Australian Youth
LSIC	Longitudinal Study of Indigenous Children
MCHRDB	Maternal and Child Health Research Database
MOU	Memorandum of Understanding
NATSIHS	National Aboriginal and Torres Strait Islander Health Survey
NCVER	National Centre for Vocational Education Research
NHMRC	National Health and Medical Research Council
NSW	New South Wales
OECD	Organisation for Economic Cooperation and Development
PEDS	Parental Evaluation of Developmental Status
PHDCN	Project on Human Development in Chicago Neighbourhoods
PISA	Programme for International Student Assessment
SAAP	Support Accommodation Assistance Program
SEIFA	Socio-Economic Index for Areas
TasCHWS	Tasmanian Child Health and Wellbeing Survey
TICHR	Telethon Institute for Child Health Research
VCHWS	Victorian Child Health and Wellbeing Survey

WAACHS	Western Australian Aboriginal Child Health Survey
WACHS	Western Australian Child Health Survey
WAGER	Western Australian Genetic Epidemiology Resource
WIRF	Women and Infants Research Foundation

EXECUTIVE SUMMARY

The aim of this scoping study is to review the existing literature on the connections between housing and childhood development and wellbeing and to investigate the value and feasibility of conducting empirical research in the Australian context. Specifically, the research questions addressed are:

- What aspects of housing and housing assistance have been demonstrated to influence children's development and wellbeing?
- What are the implications of this influence for housing policy and programs?
- What data sources are currently available that could be used to investigate the link between housing and housing assistance characteristics and child development and wellbeing outcomes in Australia?
- Based on these data sources, what methodologies and analytic approaches could be employed to examine direct and indirect associations between housing and children's development and wellbeing?

Links between housing and children's development and wellbeing. Child and adolescent wellbeing is crucial to Australia's social and economic future. Early child development is vital in setting the foundation for health as well as social and economic activity across the life-course. Developmental outcomes in terms of learning and school achievement play a considerable additional role in the school-to-work transition and subsequent labour market outcomes. Existing evidence has established that interventions are more effective if implemented earlier rather than later in life. The connections between housing and childhood development are well-recognised in the international literature. However, there is currently a dearth of empirical evidence about the nature of these connections in Australia.

Bronfenbrenner's bio-ecological theory (Bronfenbrenner 1979b; Bronfenbrenner & Ceci 1994) provides the overarching conceptual framework for understanding the factors that influence child development as revealed uncovered in the literature review. It is premised on the belief that features outside the child's ecology or immediate environment can, and frequently do, impact on the child's development. Bronfenbrenner's bio-ecological theory challenges the predominant view that individuals have the capacity to act independently and to make their own free choices by drawing attention to the proximal contexts of:

- Family, school and community.
- Distal structural components of society, culture, economic influence and politics that are largely outside the sphere of the child's and family's influence.

Drawing on Bronfenbrenner's model (Bronfenbrenner 1979b; Bronfenbrenner & Ceci 1994), recent studies such as Bartlett (1997) have pointed out that the material, spatial and symbolic aspects of a child's physical home environment significantly influences a child's development. This is founded on the view espoused by Bronfenbrenner (1979) that a child's development is embedded within a set of social settings. Aspects of the home that have been empirically identified by the existing literature to influence children's development include:

- environmental allergens
- toxicants
- cleanliness, housing disrepair and safety
- building height and opportunities for outdoor play

- crowding
- housing affordability
- homeownership
- frequent residential moves
- homelessness
- neighbourhoods.

The literature review conducted in this study draws from a range of disciplines including sociology, epidemiology, economics, housing policy, social welfare, health, medicine, child development and psychology. The links between each housing or neighbourhood variable listed above and child developmental outcomes at various stages of child development are summarised in Table 1. Key findings include:

1. There are strong links between various housing variables and child development outcomes. Some of these links are irreversible and continue on into adulthood, such as the negative effects of toxicants on various dimensions of child development.
2. There are variations in the effects of a housing characteristic at different stages of a child's life course, For example, unaffordable housing affects children most during early childhood via its adverse impact on the family's ability to access basic necessities. Neighbourhood effects are strongest on adolescents—in particular their educational outcomes due to the influence of peers.
3. Factors shaping child development and wellbeing are complex, often interrelated and frequently multiplied by coincident factors. As a result, housing can impact on children's development and wellbeing through both direct and indirect mechanisms. For example, the inability to afford housing is linked to frequent moves, shared housing with other families, crowding, or even homelessness. However, there are trade-offs with potentially positive neighbourhood effects.
4. Housing aspects can exert strong indirect influences on children's development via influences on parental practices, especially for infants and young children who spend most of their time indoors under parental supervision.

Policy implications, and limitations of the evidence to date. The majority of the studies reviewed have focused on children's neurological and cognitive development, mental health, school achievement and specific physical health outcomes. Most are from the United States. To date studies have uncovered both positive and negative effects of housing assistance on children's outcomes with no consensus on which effects dominate.

There is noticeably a lack of empirical research conducted in Australia on the links between housing and child development, with the rare exception of an Australian study by Edwards and Bromfield (2008). The Australian statistical data on housing and child developmental outcomes and our review of Australian housing policies as pertains to children indicate that:

- Associations between various housing aspects and child developmental outcomes uncovered in the overseas literature also exist within the Australian context.
- There are housing policies in Australia that aim to promote positive developmental outcomes among Australian children.

However, without empirical analysis using Australian data, it is not possible to assess the causal effects of housing and housing policies on child development in Australia.

Three issues arise as being of particular policy concern and in urgent need of research attention in Australia:

- Statistical data shows that children make up a significant proportion of the homeless in Australia.
- The housing experiences of Indigenous children are significantly worse than those experienced by non-Indigenous children.
- Housing stress is particularly prevalent among households with children in Australia.

However, much of the evidence on factors determining child developmental outcomes arising from the international literature may not be wholly applicable in the Australian context. Policy analysis and development in Australia will be clouded by differences between features of the Australian socio-demographic, economic and institutional environment and those of other countries.

It is by establishing (or rejecting) causal links between housing-related factors and children's developmental outcomes that empirical research can best inform policy. However, establishing causality is notoriously difficult in social research and there are added methodological challenges in the current context. The first is the need to simultaneously control for an array of housing and non-housing related factors that impact upon developmental outcomes, and in particular disentangling these from the well-established gradient between socio-economic status and children's outcomes.

Second, there is no clear-cut temporal relationship between housing circumstances and outcomes. The effects may materialise with a lag or cumulate gradually making the link between contemporaneously measured housing and outcome variables somewhat tenuous. For this reason the usual econometric advantages of longitudinal data (associated with repeated observations) does not apply, but rather longitudinal surveys provide superior measurement of housing histories and developmental outcomes. Due to the fact that housing and outcome variables may have very different connotations for Indigenous and non-Indigenous families, it is argued that outcomes for Indigenous children need to be investigated separately.

Addressing the evidence gap: an Australian data audit. In light of these methodological challenges, an extensive audit of national, state-based and Indigenous-specific child health surveys was undertaken to identify datasets that may be suitable for analysing the effect of housing on child developmental outcomes. The audit has revealed numerous datasets with an excellent range of child development outcome variables along with key housing variables and good controls for family socio-economic status and other potentially confounding variables.

Based on the audit, a two-stage program for future research into the relationship between housing and developmental outcomes for Australian children is recommended. The initial stage would involve analysis of the interrelationships between the housing, child development and socio-economic status variables contained in the *Longitudinal Survey of Australian Children (LSAC)* and the *Longitudinal Survey of Indigenous Children (LSIC)*. These datasets are chosen for the initial analysis primarily because they have an excellent range of potential outcome variables capturing different aspects of child development; they are large, nationally representative samples and are readily accessible. This analysis will serve to highlight the potential significance of the role that housing factors may play in shaping child outcomes and in transmitting intergenerational inequality in Australia, and to identify the key relationships between housing factors and different child developmental outcomes. The second stage would involve separate studies for each of these priority

relationships using the datasets and analytical techniques best suited to establishing causality. The availability of longitudinal data is unlikely, in itself, to allow the identification of causality between housing and child outcomes. Rather, researchers will need to scrutinise the available datasets for possible sources of endogenous variation in housing circumstances that can be used through instrumental variables or 'natural experiment' techniques.

For Indigenous Australians, the most promising opportunities for more detailed studies following the Stage 1 analysis are further analysis of the LSIC as more waves of data become available, and analysis using the richer set of variables on housing and outcomes contained in the *WA Aboriginal Child Health Survey*. Few of the data sets assessed contain data on allergens and toxins, other than exposure to smoking in the home, and the *Raine Study* and the upcoming *Peel Health Study* appear to offer the best potential to analyse the effects of these factors.

The research process should also identify key new variables that need be collected through future waves of existing longitudinal surveys or upcoming child health studies. For example, at present there is no information that can be analysed to reveal the prevalence and impacts of periods of homelessness for Australian youth.

1 INTRODUCTION

Child and adolescent health and wellbeing is crucial to Australia's social and economic future, and its promotion presents key challenges within the current Australian policy context. Early child development is vital in setting the foundation for health as well as social and economic activity across the life-course, while child developmental outcomes in terms of learning and school achievement play an important role in the school-to-work transition and subsequent labour market outcomes.

With falling birth rates and population ageing, children are increasingly recognised as a valuable resource as they will form the future working age population. Disturbingly, despite the economic progress Australia has enjoyed in recent years, many indicators of children's developmental outcomes are exhibiting adverse trends, including higher rates of diabetes and obesity, learning disabilities, adolescent suicide, aggressive behaviours, violence, child abuse and neglect (Stanley 2001; Li, McMurray & Stanley 2008). Furthermore, these adverse outcomes are disproportionately found in families with limited financial, social and other resources, and by virtually every conceivable measure of wellbeing Indigenous children face profoundly inferior outcomes. As one example, Indigenous youth are 23 times more likely to be imprisoned than non-Indigenous youth (SCRGSP 2007).

Clearly, reversing these adverse outcomes in children and youth and addressing inequalities in opportunity for young Australians should be a top priority and the research required to guide policy must be cross-disciplinary. Existing evidence has established that interventions are more effective if implemented earlier rather than later in life (Shonkoff et al. 2009). Hence, investments in services that impact on child and adolescent development are likely to result in improved life outcomes for children and reduce the need for more public expenditure on services in the later years, which may be more expensive but less effective in achieving positive outcomes.

Government has recognised that housing has an important impact on childhood development. For example, South Australia's Department of Human Services (DHS) Early Childhood Services Framework currently lists housing as one of the important determinants of childhood outcomes (DHS 2003). Moreover, the issues are important in the Australian housing policy context because assessment of housing policy effectiveness should account for both housing and non-shelter outcomes. Childhood wellbeing and developmental outcomes are non-shelter outcomes that will influence the relative value of alternative housing policies. This is crucial in order for policy-makers to be able to prioritise alternative policies given limited government funds. Lack of understanding of the impacts of housing policy on childhood outcomes may impose future costs on the budgets of departments responsible for health, education, employment and other related outcomes.

1.1 Aims of the scoping study

The connections between housing and childhood development are well-recognised in the international literature. While the links between housing circumstances and childhood outcomes have been well established from both theoretical and empirical perspectives, there is currently a dearth of empirical evidence in Australia about the nature of these connections. Hence, the aim of this scoping study is to review the existing international and Australian literature on the connections between housing and childhood development and wellbeing and to investigate the value and feasibility of conducting empirical research in the Australian context. Specifically, four key research questions (RQs) addressed in the study are:

RQ1. What aspects of housing and housing assistance have been demonstrated to influence children's development and wellbeing?

RQ2. What are the implications of this influence for housing policy and programs?

RQ3. What data sources are currently available that could be used to simultaneously measure housing and housing assistance characteristics and child development and wellbeing outcomes in Australia?

RQ4. What methodologies and analytical approaches could be employed to examine direct and indirect associations between housing and children's development and wellbeing?

1.2 Report outline

Chapter 2 of this report presents a conceptual framework for analysing child outcomes, and highlights the role of housing and neighbourhoods within this framework (RQ1).

Chapter 3 contains an extensive literature review drawn from multiple disciplines, including sociology, epidemiology, economics, housing policy, social welfare, health, medicine, child development and psychology. This review will emphasise the key findings in the literature on the impacts of housing circumstances and housing assistance on child developmental outcomes (RQ1).

In Chapter 4, we present existing statistics that describe the associations between housing and child development in Australia, identify preliminary policy implications from these statistics, and also provide a discussion of the extent to which the findings from the largely overseas literature apply in the Australian context (RQ2).

Chapter 5 summarises the findings from the previous chapters, outlines some of the key methodological challenges in establishing the links between housing and child outcomes in the Australian context and then presents an audit of national, state-based and Indigenous-specific datasets with respect to their suitability for this purpose. A strategy for future empirical research based on these datasets is proposed (RQ3 and RQ4).

A brief summary and conclusion is then provided in Chapter 6.

2 CONCEPTUAL FRAMEWORK

The bodies of literature most relevant to this scoping study relate to the factors that affect children's development and wellbeing and to the relationship between housing and health and wellbeing. Within each of these two areas exists a large and diverse range of more specific sub-areas of research; covering multiple outcomes, many potential causal factors and transmission mechanisms; and a variety of theoretical and empirical approaches. The cross-product of these two broad areas creates a bewildering array of possible linkages from the various characteristics of housing to the various aspects of childhood development. To help organise the existing evidence in a way that is amenable to identifying research and policy priorities, it is useful to consider the material within an overarching conceptual framework, for which Bronfenbrenner's bio-ecological theory seems best suited. This chapter provides a brief overview of that model and highlights the role of a child's home and neighbourhood within this framework.

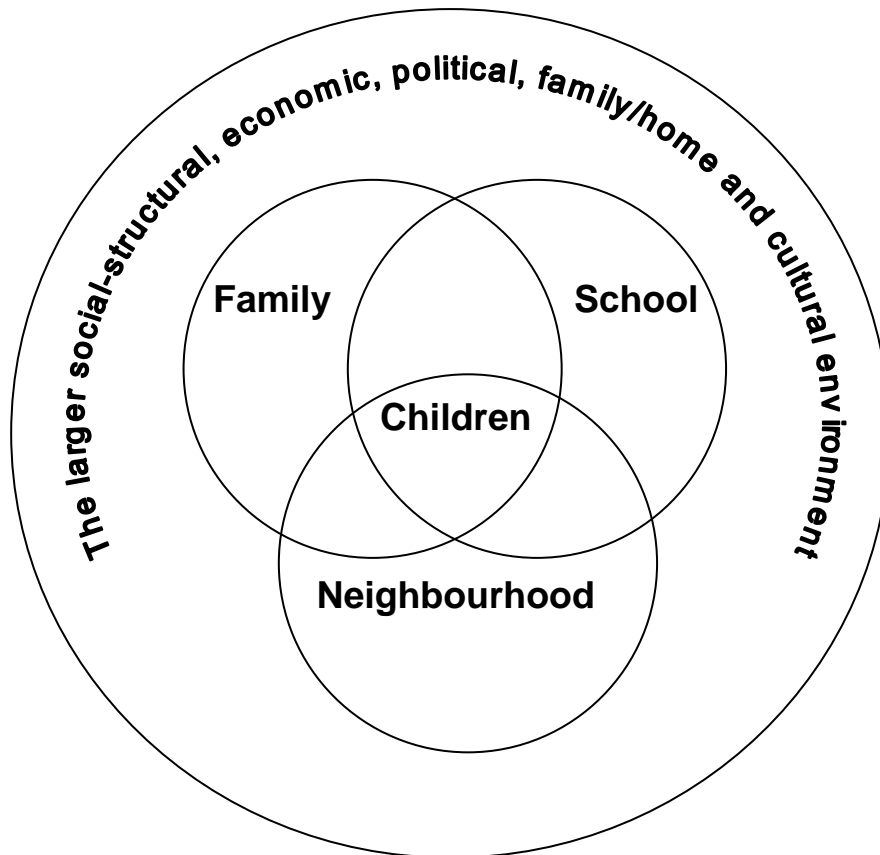
2.1 Bio-ecological theory

The discovery that social gradients are pervasive in both health and child development has fuelled speculation among population health researchers that poor outcomes result from common biological, psychological, and social processes (Commission on Social Determinants of Health 2008; Hertzman 1999). Accumulating evidence from developmental neuroscience and developmental psychopathology of the complex functioning of the human central nervous system offers considerable support for this proposition (Cicchetti & Walker 2003; Shonkoff, Boyce & McEwen 2009). Consequently, many researchers in the study of human development now share the belief that they should investigate this functioning through the assessment of genetic, physiological and neurocognitive aspects of ontogenesis and socio-emotional, environmental and cultural influences on behaviour (Cicchetti & Cohen 1995).

The belief that features outside the child's immediate environment can, and frequently do, impact on the child's development was popularised by developmental psychologist Urie Bronfenbrenner. Bronfenbrenner (1979) conceived of development as occurring within:

- Nested settings beginning with the developing person, the *microsystem*.
- Immediate social settings of home, school and neighbourhood, the *mesosystem*.
- Settings that do not involve the developing person as an active participant, such as the parent's workplace, the *exosystem* and the wider society and culture, the *macrosystem* (see Figure 1).

Figure 1: Ecological contexts shaping child development



Source: Modified from Jessor (1993)

Bronfenbrenner and his colleagues (Bronfenbrenner 1995; Bronfenbrenner & Ceci 1994) have subsequently extended the ecological model to include the biological processes of development. This approach has become known as the 'bio-ecological perspective'. By drawing attention to the proximal contexts of family, school and community and the distal 'structural' components of society, culture, economic influence and politics that are largely outside the sphere of the child's and family's influence, Bronfenbrenner's bio-ecological theory challenges the predominant view that individuals have the capacity to act independently and to make their own free choices. 'Structure' refers to those factors such as socio-economic status, social class, religion, gender, ethnicity, customs and institutions (such as education, law enforcement, health, welfare, and housing) that seem to limit or influence the opportunities that individuals have.

2.2 The role of the home and neighbourhood

Bronfenbrenner's bio-ecological model of child development is concerned with the immediate social settings of the child's home (Bronfenbrenner 1979b; Bronfenbrenner & Ceci 1994). In more recent years other academics such as Wohlwill (1980), Super and Harkness (1986) and Wachs (1990) have argued that the physical environment is essential to understanding the context of child development, and that the physical and social environment work jointly and independently to influence a child's development and interactions with his/her parents. Drawing on Bronfenbrenner's ecological model (Bronfenbrenner 1979b; Bronfenbrenner & Ceci 1994), Bartlett (1997) noted that the material, spatial and symbolic aspects of a child's physical home environment is founded on the view espoused by Bronfenbrenner (Bronfenbrenner 1979b;

Bronfenbrenner & Ceci 1994) that a child's development is embedded within a set of social settings. Aspects of the home that have been empirically identified by the existing literature to influence children's development include:

- environmental allergens
- toxicants
- cleanliness, housing disrepair and safety
- building height and opportunities for outdoor play
- crowding
- housing affordability
- homeownership
- frequent residential moves
- homelessness
- neighbourhood characteristics.

As with the findings of Bronfenbrenner (Bronfenbrenner 1979b; Bronfenbrenner & Ceci 1994), numerous recent studies have noted that neighbourhood conditions have the potential to improve or hinder the development of children (Brooks-Gunn et al. 1997a; 1997b; Leventhal & Brooks-Gunn 2000; 2003). Studies have identified five models that explain the pathways through which the neighbourhood impacts on child development (Jencks & Mayer 1990; Brooks-Gunn et al. 1993; Leventhal & Brooks-Gunn 2000):

- *Contagion (or epidemic) model*: primarily based on the premise that the negative behaviour of peers and neighbours strongly influences and/or spreads to problem behaviour being demonstrated by others.
- *Collective socialisation model*: proposes that neighbourhood factors influence children by means of community social organisation, such as the presence of adult role models, adult monitoring and supervision, along with the existence of routines and structures.
- *Competition model*: states that peers and neighbours compete for scarce community resources.
- *Relative deprivation model*: proposes that individuals evaluate their relative standing and situation through comparisons with their neighbours and peers.
- *Neighbourhood institutional resource model*: asserts that neighbourhood resources influence children through such things as police presence and access to resources that provide stimulating social and learning environments such as libraries, community centres and parks, along with the provision of community services that promote healthy development.

Against the backdrop of the conceptual framework discussed in this chapter, the next chapter presents results from an extensive review of the empirical literature that has investigated the links between housing and child development.

3 LITERATURE REVIEW: WHAT IS KNOWN ABOUT THE LINKS BETWEEN HOUSING AND CHILD DEVELOPMENT?

This chapter explores the key connections between housing and child development by providing a detailed review of existing studies. There currently exists a vast body of overseas literature examining these links that draw from a range of disciplines including sociology, epidemiology, economics, housing policy, social welfare, health, medicine, child development and psychology. There is, however, noticeably a lack of empirical research conducted in Australia in this area. Given that the report ultimately aims to recommend analytical approaches to examining the connections between housing and children's development and wellbeing using Australian data sources, the literature review in this chapter is heavily based on studies that conduct either statistical analysis to uncover associations between housing and children's development or use regression analysis to uncover causal links between housing and children's development. Of particular relevance are studies that are able to highlight the magnitude of influence of various housing variables on children's outcomes, and those that isolate the role of housing from other confounding factors (such as parenting roles) on children's development and wellbeing.

Section 3.1 provides a detailed review of the literature covering a range of housing variables listed in the previous chapter. Where documented, variations in the effects of a housing characteristic at different stages of a child's life course are reported. Key stages of childhood development during which the impacts of various housing characteristics can be expected to vary include infancy, preschool years, elementary and high school years, and adolescence.

The factors shaping childhood development and wellbeing are complex, often interrelated and frequently multiplied by coincident factors (Saegert & Evans 2003). The inter-relationship among various housing and other non-housing variables results in direct and indirect pathways through which housing can impact on children's development and wellbeing. Section 3.2 highlights these inter-relationships that have been uncovered in the existing literature. This is followed by section 3.3, which draws out the pathways through which housing assistance can affect child development and wellbeing. Section 3.4 summarises the key findings from the literature.

3.1 Existing studies

3.1.1 Environmental allergens, tobacco smoke and household chemicals

Asthma has been identified as a prominent health problem among children in Australia and also worldwide (Moon et al. 1998; Breyse et al. 2004). Chronic exposure to allergens such as mould, pets, cockroaches, rats, mice and dust mites has been linked to the initiation and exacerbation of asthmatic symptoms in sufferers (Breyse et al. 2004). Cullinan and Taylor (1994) summarise findings from various studies that have found that while genetic factors play a role in the increase in prevalence of asthma in children, environmental factors have been mainly responsible.

Belanger et al. (2003), a United States study, examined factors that can impact on indoor air quality in the home and found that the presence of mould increases the rates of wheezing and persistent coughing in infants. A Netherlands study by Wever-Hess et al. (2000) found damp housing and inhalant allergens to be a risk factor for recurrent asthma exacerbations among 0–1 year olds. Lanphear et al. (2001), who examined children under six years old, reported that about 39 per cent of doctor-

diagnosed cases of asthma in children under six years old in the United States could be prevented by removing their exposures to indoor pollutants and allergens in their homes. Brunekreef et al. (1989) found the relationship between indoor dampness and both respiratory symptoms and other non-chest illness to be strong and consistent among children aged 8–12 years in the United States. In an Australian study which focused on children aged 7–14 years in the Latrobe Valley (Victoria), the presence of higher concentrations of fungal spores was found to be related to the presence of only a few extractor fans, high interior humidity levels, musty odours, the inadequate removal of mould indoors, water intrusion and insufficient ventilation. The higher fungal spore concentrations within the houses of residents were thus associated with increasing the risk of respiratory illnesses for the inhabitants (Garret et al. 1998).

Studies generally agree that exposure to environmental allergens has especially strong and critical effects during infancy and early childhood. Salam et al. (2004), a United States study, highlighted allergens as having especially strong effects on infants and concluded that respiratory health may be determined by such exposure during the child's first year. Bradman et al. (2005) concluded that indoor rodent infestations and other allergens are particularly likely to have adverse effects on young children, who spend most of their time indoors at home. Sporik et al. (1990) has found that exposure to house-dust mite allergens in early childhood can trigger future development of asthma.

Exposure to environmental tobacco smoke (ETS) exposure is another major risk factor for poor respiratory health in children. At least 150 epidemiological studies on ETS and non-cancer respiratory health effects in children have been published in the last 25 years. The greatest contributor to ETS, especially for young children, is from mothers who smoke in the home. Children living in a smoke-filled environment are more susceptible to upper and lower respiratory tract infections such as the common cold, middle ear disease, infections with respiratory syncytial virus, bronchitis, pneumonia, and other serious bacterial infections (Cheraghi & Salvi 2009). Sudden infant death syndrome has also been directly linked to ETS exposure by numerous studies.

Although contentious, there is some evidence of a relationship between everyday household chemicals and wheeze and allergy in young children (Franklin 2008). Indoor air toxicants are emitted from a broad range of sources, including cleaning agents, furnishings, paints, cosmetics, aerosol sprays and pesticides. These products also contain chlorine, ammonia, surfactants, acids, bases and oxidants, and reactions between compounds can create highly irritative secondary pollutants. The health effects of this chemical mix, at concentrations normally encountered in homes, is not yet known in detail (Franklin 2008).

3.1.2 Toxicants (heavy metals and pesticides)

Heavy metals and pesticides are commonly found in the home environments that some children function in. Children living in housing areas closest to the source of these toxicants, such as industrial zones and suburban areas previously used for industrial activity, are most likely to be affected (McMichael et al. 1988). Young children are especially at risk of being exposed to hazardous substances because they typically play in mud, crawl on floors, and put their hands in their mouths. Furthermore, because they are smaller, they receive higher doses of toxicants per kilogram of body weight. Many organ systems, such as the nervous system and the lungs, are undergoing rapid growth and development in the first years of life and are especially vulnerable to damage (US Agency for Toxic Substances Disease Registry 2003).

Lead poisoning is a heavy metal that has been established as one of the most common causes of environmentally induced disease in children (Kim et al. 2002). Lead poisoning in children commonly results from exposure to soil, paint and lead paint dust often in older and poorly maintained homes.

The effects of lead poisoning are generally irreversible and include behavioural problems and impaired neurological development and growth (Bellinger et al. 1987, Needleman et al. 1990, White et al. 1993). Lead exposure during early childhood is associated with subsequent reductions in IQ (Needleman 1979; Dietrich et al. 2001; Bellinger & Needleman 2003; Hubbs-Tait et al. 2005; Koger et al. 2005), along with lower mathematical and reading scores (Lanphear et al. 2000), lower class ranking and increased likelihood of high school drop-out (Needleman et al. 1990). It has also been found to be associated with causing emotional, behavioural and social problems including attention deficit disorder (Chiodo et al. 2004). Children aged 1–3 years old with higher lead body burdens tend to exhibit greater hyperactivity, distractibility and lower frustration tolerance (Mendelsohn et al. 1998). Furthermore, juvenile delinquency has been found to be associated with lead levels assessed in elementary school (Needleman et al. 1990) and prenatal blood lead levels (Dietrich et al. 2001). Children who are lead poisoning survivors exhibit increased hyperactivity, impulsivity, and aggression after recovery, with the adverse behavioural outcomes often continuing in adulthood (Dietrich et al. 2001; Hubbs-Tait et al. 2005).

The home environments of children may also be contaminated with pesticides. Landrigan et al. (1999) reported that inner-city children in the United States with excessive exposure to pesticides manifested significantly increased risks of neurological, endocrine, and other developmental disabilities. Babies who had been exposed pre-birth to pesticides containing chlorpyrifos were found to have lower birth weights and lengths in comparison to unexposed babies (Whyatt et al. 2002).

3.1.3 Cleanliness, housing disrepair and safety

Gottfried and Gottfried (1984) reported a positive correlation between some physical characteristics of the home environment and cognitive development in young children. What was found to be of particular relevance were the safety and cleanliness of the home environment. The cleanliness of a child's residence has also been related to their later educational attainment, even after controlling for relevant demographic and socio-economic differences across households. This may be because of the correlation between the maintenance of a clean and organised house with other positive parental characteristics, including efficiency and motivation (Dunifon et al. 2001).

Housing disrepair, such as leaks under the sinks and peeling paint, are particularly likely to have adverse effects on young children, who spend most of their time indoors at home (Bradman et al. 2005). Breyse et al. (2004) found that falls were the main type of injury occurring at home among children. Falls are primarily associated with lack of safety devices, structural faults in the homes and insufficient lighting. The installation of window guards in apartments with young children has been shown to significantly reduce the incidence of childhood injuries from falls (Spiegel & Lindaman 1977).

Research completed by both Parke (1978) and Bartlett (1998) reinforce the concept that a housing environment that is physically safe promotes the natural curiosity of most children and their tendency to explore, thereby facilitating more opportunity for growth. Eamon (2000) reported that home environments that are unclean, cluttered or unsafe exacerbates the internalising behaviour within children through parental influences. Children living in less than ideal housing environments that contain

potential hazards (e.g. exposed hot water pipes) are more likely to experience a restraining of their natural inclinations to explore and learn as a result of the fact that they were more likely to hear 'no' as a default response from their parents to many of their questions due to the increased dangers associated with their surroundings (Bartlett 1998, p.413). Related studies that support this hypothesis include Wachs (1990) and Eamon (2000).

It has been found that housing designs which maximise the direct line of sight that parents have when supervising their toddlers promotes less punitive parenting practices and fewer rules, due to the improved visibility and the increased sense of security parents are likely to feel with regard to their young children playing safely in adjoining rooms (Bartlett 1997).

3.1.4 Building height and opportunities for outdoor play

Various studies posit that residence in high-rise buildings have potentially numerous negative effects on young children. Evans et al. (2003) found that residence in high-rise buildings is linked to less socially supportive relationships with neighbours. Studies such as Ineichen and Hooper (1974) and Richman (1977) have found a link between high-rise living and elevated behavioural problems in children. Michelson (1968) found links between high-rise living and poor academic outcomes.¹

Studies from various countries have found that residence in high-rise buildings restricts opportunities for outdoor play (see Oda et al. 1989 for a Japanese study and Churchman & Ginsberg 1984 for an Israeli study). Studies find the negative impact of residence on higher floors to be stronger for preschoolers than older children (Oda et al. 1989). This may be because parents place greater restrictions on outdoor play on younger children resulting in increased tension and isolation for younger mothers who stay home with their children (Churchman & Ginsberg 1984).

The importance of housing to the development of early socialisation skills in children was underlined in a review of the impact of housing on children by Bartlett (1997). One factor that was identified as being of particular significance to healthy childhood development was the need for outdoor play. Outdoor play increases the potential for active play, provides a range of stimulation to children, supports their autonomy and reduces parental stress (Parke 1978; Moore 1986). It has been found that children with restricted opportunities for outdoor play are less independent and sociable, and exhibit reduced motor skill competencies and ability to perform routine tasks (Oda et al. 1989; Huttenmoser 1995).

The evidence for a negative relationship between low cost housing, disadvantaged neighbourhoods and children's development and wellbeing is outlined in greater detail in section 3.1.7.

3.1.5 Crowding

The lack of space that children experience when living in crowded areas has been found to have a direct negative impact on their wellbeing and development, including sense of autonomy, social behaviour, health and developmental outcomes and school performance. Indirect negative impacts of crowding on children were mediated through poor parenting practices.

Research published by Bartlett in 1998 documents a study she completed on three families over an 18-month period, in which the relationship between housing and the development of children in those households was analysed. The provision of

¹ However, there have been some studies such as Richman (1974) and Homel and Burns (1989) that did not find adverse effects.

adequate play space for children was found to heighten and develop their sense of autonomy (Bartlett 1998).

On the other hand, children interacting in crowded conditions display increased levels of social withdrawal (Loo 1972). This may be a child's way of coping with too much unwanted social interaction (Evans 2006). Liddell and Kruger (1989) found that crowding at home is positively associated with social withdrawal among children during their first few weeks at nursery school. Studies on elementary school children include Murray (1974), which found residential crowding to be associated with higher levels of neuroticism among children, and Evans et al. (2002) that found crowding to cause psychological distress and poorer behavioural adjustment at school.

Numerous studies have provided evidence of the links between crowding and poor health. Crowding has been linked to the spread of communicable childhood diseases such as meningococcal meningitis (Baker et al. 1999), a higher incidence of respiratory illness (Mann et al. 1992), stomach infections (Galpin et al. 1992) and higher mortality rates (Coggon et al. 1993; Howden-Chapman & Pene 2000).

Crowding also adversely affect various other aspects of a child development. Psychomotor development (Widmayer et al. 1990) is found to be related to residential density among one-year-old infants. Gottfried and Gottfried (1984) found that as infants mature, crowding starts to have a negative effect on mental development at 18–24 months of age. The study found links between crowding and reduced verbal and perceptual development at 30, 36 and 42 months, and poorer language development at 39 months. Wachs (1978) demonstrated a negative association between crowding and the IQ scores of children aged 30 months. Bradley et al. (1994) showed that low-density housing had a positive impact on the socio-emotional and cognitive development of low-birth-weight infants aged three. Toddlers from more crowded homes are more likely to suffer from impaired semantic memory (Gottfried & Gottfried 1984).

Elementary school children who reside in more crowded homes have been found to have poorer cognitive development. The findings of Parke (1978) outlined the importance to children of 'stimulus shelter' such as a private bedroom, which provides them with a secure space that they can retreat in the event that they want some reprieve from being constantly exposed to noise and stimulation. The absence of such a refuge for children was thus suggested to potentially contribute to the delayed development of certain cognitive abilities (p.61). Shaw and Emery (1988) demonstrated the negative influence of crowding on cognitive competency. It has been demonstrated that school-aged children living in small and overcrowded housing may not have sufficient quiet space to enable them to complete homework (Gove & Hughes 1983; Evans et al. 2001). Children without a place to study can suffer adverse cognitive consequences (Wachs 1979). Other research has shown that young children living in crowded conditions are likely to exhibit less persistence and vigour in solving complex and challenging puzzles (Evans et al. 1998; Evans et al. 2001).

Crowding also has a negative effect on learning. Elementary school children living in more crowded homes had poorer performance in standardised reading tests (Evans et al. 1998; Saegert 1982) and perceive themselves to be less competent scholastically (Evans & Saegert 2000). Chronic crowding, not taking into account socio-economic status, has been found to be associated with lower task-performing motivation in children aged 6–12 years old (Evans et al. 1998). Furthermore, Goux and Maurin (2005) found negative associations between overcrowded housing and learning in elementary and middle school. High school performance has also been identified to be negatively linked to residential crowding (Ray et al. 1982).

Overcrowding and residential density has been found to contribute to psychological distress in adults (Ross et al. 2000). One potential implication of this may be that it leads to increased conflict between children and parents due to the effect that the interior design of housing environments has on parenting practices and consequently its indirect influence on child development. This has been documented in the literature worldwide (see Fuller et al. 1993 (Thai study), Loo & Ong 1984 (Chinese study), Bartlett 1998 (American study), Evans et al. 1998 (Indian study), Youssef et al. 1998 (Egyptian study). Evans et al. (1998) demonstrates that perceived parent-child conflict is an important underlying process that largely accounts for many of the negative influences crowding has on children aged 10–12 years. In more crowded homes, parents are less responsive to young children and this unresponsiveness can begin before 12 months of age (Evans et al. 1999; Wachs & Camli 1991). They also use less sophisticated speech to children from infancy to two-and-a-half years of age (Evans et al. 1999). Insufficient play space within the home environment increases parental stress and increases the need to use television to pacify restless and unsettled children (Bartlett 1998). Parke (1978) proposed that confined housing conditions are more likely to induce more punitive parenting practices that may consequently be copied by children and filter through to their behaviour and interactions with others. In addition, children living in crowded home environments were more likely to experience abuse due to the greater difficulty they face in removing themselves from potentially volatile situations (Bartlett 1997).

3.1.6 Housing affordability

There are many existing studies that have shown that poverty adversely affects child development. Duncan and Brooks-Gunn (1999) provides evidence that poverty restricts cognitive development in children. Costello et al. (2003) has drawn links between a rise in family income and reduced psychiatric problems in children from low-income families.

The effect of housing affordability on child development and wellbeing is closely tied to the adverse effects of poverty. The material hardship model postulates that income enables families to purchase material goods and services that benefit children's development and wellbeing (Becker 1981; Mayer 1997). Housing costs often represent a significant cost to a family's income and determine to a large extent how much is left over to finance other living costs such as clothing, food and social expenses. High housing expenses relative to income can impede the capacity of families to account for other living costs associated with such things as food, clothing and health care (Bratt 2002). Housing affordability can exert its effect on child development and wellbeing indirectly because families with high housing costs might be forced to trade down into lower quality housing or reduce consumption of other basic necessities such as food or health care, which could in turn lead to poorer health outcomes for children (Meyers et al. 1995; Harkness & Newman 2005).

An alternative model that focuses on family stress posits that financial hardship increases stress and depression within parents, which in turn increases the likelihood of inconsistent or punitive parenting behaviour towards children (Conger et al. 1994). Unaffordable housing indirectly affects children's wellbeing by inducing parental stress as a result of bearing the burden of financial hardship (Harkness & Newman 2005).

Furthermore, considerable evidence suggests that the experience of family stress modifies the child's biology through the central mediator of stress responsiveness, the hypothalamic-pituitary-adrenal (HPA) axis (Kendall et al. 2009). Recent research using data for 2000 children and families participating in the Western Australian Pregnancy Cohort (Raine) Study has revealed that exposure to stressful life-events in the family, such as economic hardship, employment difficulties and dysfunctional

relationships, even before birth, can impact on problematic behaviour at two and five years of age (Robinson et al. 2008) and the mental health of children at eight to nine years of age (Kendall, Zubrick & Blair 2004).

Sandel et al. (1999) provides evidence of links between affordable housing and children's health. The study reported how the growing shortage of affordable housing in the United States has contributed to an increase in health problems among children, including asthma and respiratory diseases, chronic illness, injuries, lead poisoning and homelessness. The study also highlighted links between lack of affordable housing and malnutrition and poor educational outcomes among children. Harkness and Newman (2005) found positive links between affordable housing and good health among 6 to 11 year-olds, as well as positive links with good health and behaviour among 12 to 17 year-olds. Harkness and Newman (2005) propose that the detrimental effects of unaffordable housing on low-income children are strongest in early childhood via its negative impact on the family to access basic necessities and find that the effects of access to affordable housing are cumulative over time, resulting in a stronger link between housing affordability and wellbeing in children aged 12–17 years than those aged 6–11 years.

Interestingly, contrasting findings were presented by Harkness et al. (2009) who found that the wellbeing of children living in low-to-moderate income families in higher-priced housing markets was no worse than those living in lower-priced markets and that those parents in higher-priced markets did not experience greater stress than those in lower-price markets. There are other studies focusing on public housing, such as Currie and Yelowitz (2000) and Newman and Harkness (2002) that provide indirect evidence of the benefit of affordable housing on children's outcomes. These will be reviewed in a section devoted to housing assistance below.

3.1.7 Homeownership

The results of several studies have demonstrated that homeownership has both short-term and long-term favourable effects on the emotional and social wellbeing of children. Children with parents who owned their homes were found to be less likely to display behavioural problems (see Haurin et al. 2002 for a United States study and Boyle 2002 for a Canadian study) and better health (see Fogelman et al. 1989 for a British study).

Existing evidence also indicates that children with home owning parents also perform better academically and have better lifetime prospects than children whose parents do not own their home. Studies have shown that children with homeowners as parents have greater math and reading achievements (Haurin et al. 2002), lower propensity to drop out of high school, fewer teen births (Green & White 1997), better chance of graduating from high school (Aaronson 2000), more years of completed schooling by the time they are adults (Boehm & Schlottman 1999; Conley 2001) and higher levels of earnings as adults (Boehm & Schlottman 1999).

Many studies postulate that it is not homeownership per se that is producing benefits to children, but homeownership has an indirect influence on child development via other channels. Firstly, a possible explanation as to why homeownership may be beneficial to children is that it provides families with greater opportunity to maintain more consistency in their daily routines, social interactions and life experiences (Haurin et al. 2002). This is of course due to the fact that children belonging to families that have ownership over the homes they reside in are less likely to move compared with children of renters. A second explanation is that homeownership promotes longer tenures in a constant place of residence and therefore generally minimises the number of school transitions that children have to undergo (Aaronson 2000;

Rumberger 2002; Scanlon & Devine 2001). Thirdly, owner-occupied homes tend to be clustered in common neighbourhoods, translating into lower student turnover in neighbourhood schools, which in turn improves the quality of the schools' environment. Fourthly, some studies have found that owner-occupiers have greater incentive to invest in their homes resulting in higher quality of housing (see for example Newman 2008). However, it should be noted that studies have also pointed out that the willingness of families to invest in their homes can vary dramatically across different socio-economic groups. Several existing studies have indicated that residential occupants belonging to certain minority ethnic and lower socio-economic groups receive lower returns on their investments in housing (Flippen 2004). This assertion thereby flags a potential reason for the variations in the housing investment levels found among residents from different income groups and may assist to explain why residents from lower socio-economic groups traditionally have been comparatively less likely to invest resources in their residence (Thomson et al. 2006).²

3.1.8 *Frequent residential moves*

Several studies have found that frequent moves in relation to housing have a negative impact on educational outcomes for children. Wood et al. (1993) found that children of schooling age who frequently move were significantly more likely to fail a grade and have behavioural problems. Another study completed by Kerbow in 1996 reported that students who had to move more frequently than their contemporaries, who were more stably housed, were behind by three months of instruction at the end of grade four. It was also shown that children who repeatedly changed schools over a six-year period fell behind by a full year of learning in comparison to students who had stable housing. When children move residence and have to change schools, they have to contend with many issues including adapting to new peers, teachers and curricula that may disrupt their educational progress and achievement.

Repeated residential mobility has been associated with reduced social connectedness for children and their families (South & Haynie 2004). This has been consistent when measured across the size of children's social networks, the extent of their popularity, and also the familiarity of parents to their children's friendship networks (South & Haynie 2004). This has also been found to be the case with regard to children's connections with their parents, school and their community as well as in relation to parents' connections to their child's school (Pribesh & Downey 1999). It has therefore been proposed that a stable residence contributes positively to the development and wellbeing of children by promoting improved knowledge of and access to available community resources and social support networks over a longer period of time (Galster 2003).

Research indicates, however, that the effects of residential moves on children are influenced by the pre-existing characteristics of families and the reason behind the move (Pribesh & Downey 1999; Tucker et al. 1998; Wood et al. 1993). This is exemplified by the likelihood that children from single parent or low-income families, or with parents who have relatively low levels of educational attainment, will find moving residence more challenging than children from more affluent and advantaged families. This would be particularly pertinent in cases where the move is because of

² It has also been reported that deterioration in the physical condition of a residence often motivates occupants who have the means to leave, to upgrade to more desirable housing that they deem will better meet their needs (Rosenbaum 1991a). After they depart, they are usually replaced by less affluent occupants who often have fewer housing options and alternatives, most commonly due to their lower income and socio-economic status (Apgar 1989). The newer residents may lack the resources to adequately repair and maintain their homes so the potential for further decline in the physical state of the housing is heightened (Harris 1999).

circumstances such as a loss of employment or marital separation, in which case many families who are likely to already be under stress would experience even more difficulty given the limited resources they have available to them. The evidence provided by Tucker et al. in their 1998 study showed that frequent house moves may pose a challenge for children, irrespective of their family structure.

3.1.9 Homelessness

Homelessness can be a severe source of stress for children who experience it. The inability of parents to provide suitable housing for their children can lead to intervention by child protection agencies and the placement of children in foster care, which can cause more stress for these children. In a 2004 study, Harburger and White found that homelessness was the reason behind foster placement of children in as many as three in ten cases. In addition, they found that only about one in 50 parents of foster children (irrespective of the reason for foster placement) was given any form of housing assistance (Harburger & White 2004). Another review by Choca et al. in 2004 also found that 10–36 per cent of youth who grew up in foster care subsequently experienced homelessness.

Furthermore, homeless children are more likely to exhibit significant psychological distress (Molnar et al. 1990). It has been reported that nearly 50 per cent of children who have been homeless exhibit symptoms of depression and anxiety (Hicks-Coolick et al. 2003). Many children who have experienced homeless episodes also have personal or social developmental difficulties (Hicks-Coolick et al. 2003). An Australian study of homeless preschoolers reported that approximately half of their study sample suffered significant emotional developmental delays (Neil & Fopp 1992, pp.17–18). These findings are supported by the results of another study completed by Zima et al. in 1996, which evaluated 157 children living in homeless shelters in the United States; 38 per cent of the children assessed needed psychiatric evaluation for clinical depression.

Homeless children have also been found to be at greater risk of experiencing health problems and hunger (Better Homes Fund 1999). For example, Molnar et al. (1990) reported that homeless children often have higher lead levels, have lower rates of immunisation, poorer nutrition, and are more likely to experience illness. In 1998, Weinreb et al. completed a study that compared differences in health between 223 children from low-income households, who had never been homeless and 293 homeless children. It established that homeless children were likely to experience double the number of hospitalisations and make significantly more visits to hospital emergency departments. In addition, children who lacked stable housing were found to have an overall worse health status and also exhibited more adverse health problems, such as (a higher incidence of) ear infections, asthma and fever (Weinreb et al. 1998). As many as 50 per cent of homeless children were found to exhibit development delays and some had difficulty with language development as reported by Hicks-Coolick et al. (2003).

In comparison to children from families who were in receipt of housing assistance, homeless children were more likely to score poorly on achievement tests, repeat the same grades at school, and also have lower future expectations in relation to educational attainment with regard to secondary schooling (Rafferty et al. 2004). Homeless children are likely to experience reduced reading achievement (Zima et al. 1996). In another 1996 study completed by Rubin et al., the academic performance with regard to spelling, maths and reading of homeless children was found to be considerably poorer, despite the fact that they were no less intelligent than their contemporaries who were more stably housed. Molnar et al. (1990) found that children who lacked stable housing recorded lower rates of attendance at school,

which contributed to poorer academic performance. Comparatively higher absentee rates were recorded for homeless children in the study and they were also found to change schools more frequently. Although this study was less conclusive in attributing causality than others, the author did believe that frequent school changes among homeless children was more of a contributing factor to their poor academic performance than increased absenteeism (Rubin et al. 1996).

3.1.10 Neighbourhoods

In recent years a great deal of attention has been focused on the neighbourhood as a context for children's development. The general finding that geographically identifiable pockets of socio-economic disadvantage exist in the metropolitan and rural regions of most Western countries has fuelled this interest. An example is the extensive US Project on Human Development in Chicago Neighbourhoods (PHDCN) which is an interdisciplinary study of how families, schools, and neighbourhoods affect child and adolescent development (Inter-university Consortium for Political and Social Research 2010). The Project's design consisted of two major components. The first was an intensive study of Chicago's neighbourhoods, particularly the social, economic, organisational, political, and cultural structures and the dynamic changes that take place in the structures over time. The second component was a series of coordinated longitudinal studies that followed over 6000 randomly selected children, adolescents, and young adults to examine the changing circumstances of their lives and the personal characteristics that might lead them toward poor developmental outcomes, such as delinquency and crime. To date, the study has generated 179 publications in peer-reviewed journals.

The neighbourhoods that children are exposed to may impact their development in a number of different ways. The issue of the differential likelihood of toxic environmental exposure was raised briefly in a preceding section. Low quality housing is often located in deprived neighbourhoods and sometimes in polluted sites, on busy and heavy traffic routes. This association has been labelled 'environmental injustice' (Matsuoka 2003). In addition, six broad characteristics of neighbourhoods have been identified that are most relevant for child and adolescent development and wellbeing outcomes: income, human capital, ethnic integration, social capital, social disorganisation, and safety (Brooks-Gunn, Duncan & Aber (eds.) 1997a; 1997b).

Low-income families tend to become concentrated in neighbourhoods with high levels of rental housing, high-rise housing, housing disrepair, and crowding, and high frequencies of residential moves. Typically, children experience not just one, but many of these disadvantages, which can have a multiplicative, or even exponential negative effect on their development and wellbeing. In addition, it has been suggested that impoverished neighbourhoods have fewer and less well maintained community-owned assets, such as child-care facilities, schools, shopping centres, and public transport facilities (Brooks-Gunn et al. (eds.) 1997a; 1997b). Macintyre et al. (2008) present a comprehensive review of this research literature in which they use the term 'deprivation amplification' to describe a pattern by which a range of resources and facilities that might promote health are less common in poorer areas in Glasgow, the United Kingdom. Their own research shows, however, that a number of neighbourhood resources, such as public primary schools, police stations, and public swimming pools, are more common in more deprived neighbourhoods in this city (Macintyre et al. 2008). On the other hand, using data from the PHDCN study previously mentioned, Burchinal et al. (2008) found that child-care centre quality was lower in disadvantaged neighbourhoods and that neighbourhood structural disadvantage was more negatively related to quality when mothers had less education.

Human capital is also important for neighbourhoods because, as well as creating an economic base, adult residents who are educated and/or employed provide an important resource for the community as well as being role models for children and youth (see Benabou 1996; Brooks-Gunn, Duncan & Aber (eds.) 1997a; 1997b; Woldoff 2008 for reviews of theory and literature). The Australian Bureau of Statistics (ABS) has for some time produced a Socio-Economic Index for Areas (SEIFA) based on census data that identifies neighbourhoods throughout the country as relatively advantaged or disadvantaged on the basis of the level of resident income, education, occupation and employment of the adult residents. Australian researchers have for some time used the SEIFA Index to study relationships between neighbourhood disadvantage and children's development and wellbeing (Malacova et al. 2008; Malacova et al. 2009; Silburn et al. 1996; Silburn et al. 2006; Zubrick et al. 2000). For example, using data recently collected in Victoria, Queensland and Western Australia, Hemphill et al. (2010) showed that relative to students in the lowest SES quartile neighbourhoods, students in mid level and high SES neighbourhoods had lower school suspension rates.

As to ethnic integration: 'Various researchers have suggested that a high degree of ethnic heterogeneity has led in part to an erosion of neighbourhood social networks ... Others have argued that social isolation in inner cities has contributed to urban poverty' (Brooks-Gunn et al. in Brooks-Gunn et al. (eds.) 1997a, p.290; 1997b). Massey et al. (2009) present a thorough review of racial urban segregation in the US over the course of the twentieth century, but they do not relate racial segregation to children's development and wellbeing (Massey et al. 2009). A recent paper by a highly esteemed group of US researchers (Sampson et al. 2008) underscores the fact that there is a dearth of literature regarding racial/ethnic segregation and children's developmental outcomes. Sampson et al. (2008) make a valuable contribution with an analysis of PHDCN data in which they show that living in a severely disadvantaged neighbourhood reduces the later verbal ability of black children on average by four points, a magnitude that rivals missing a year or more of schooling.

The amount of social capital available in the neighbourhood also plays an important role in determining development and wellbeing outcomes for children. Social capital is formed in social relations, in generating trust; in establishing expectations and obligations, and in creating and enforcing norms. Social capital is seen as an important resource for the cognitive and social development of children and adolescents that can constitute an important advantage in the development of their human capital (Coleman 1990). The occasional care of a child by a neighbour, for example, is beneficial to both parent and child. While this is a common practice in many neighbourhoods, it is uncommon in others because of a lack of trust and reciprocity. The relationship between neighbourhood social capital and children's health and development has been the subject of numerous empirical inquiries over a number of years (Brooks-Gunn, Duncan & Aber (eds.) 1997a; 1997b). However, we have been unable to find seminal published Australian studies. Nobles and Frankenberg (2009) present an informative account of the concept of social capital and child health for the interested reader.

Social disorganisation 'entails the disruption of local community social organisation, usually characterised by rates of crime, delinquency, and deviant behaviours ... According to this view, the degree of social organisation in a community reflects the establishment of social relationships in the community and the content and consensus of values' (Brooks-Gunn et al. in Brooks-Gunn et al. (eds.) 1997a, pp.292–293; 1997b). The PHDCN study in the US (Inter-university Consortium for Political and Social Research 2010) was initiated specifically to examine pathways to juvenile delinquency, adult crime, substance abuse, and violence by focusing in detail on the

environments in which these social behaviours take place. We recommend the reader visit the study website and access the published literature. Buka et al. (2001) provide a useful review of literature regarding the effects of witnessing community violence on children's health and wellbeing. Outcomes range from Post Traumatic Stress Disorder to an assortment of emotional and behavioural problems. There is some evidence that childhood exposure to neighbourhood violence is not confined to the US. Mazerolle et al. (2010), for example, collected data in Queensland using measures developed for the PHDCN study and found that, despite structural and cultural differences between the US and Australia in particular, collective efficacy is a significant mechanism in explaining the spatial distribution of self-reported violent victimisation in the Australian context. According to these authors, 'Brisbane is more economically homogenous when compared to large cities in the United States, such as Chicago, with less residential segregation' ... 'Australia certainly has its share of disadvantaged communities characterised by higher crime' (Mazerolle et al. 2010, p.19).

Lastly, safety entails the degree to which individuals feel physically threatened in their community (Brooks-Gunn et al. in Brooks-Gunn, et al. (eds.) 1997a, p.293; 1997b). A rare published Australian empirical study analysed the mechanisms through which neighbourhood socio-economic status influences four-to-five year olds' conduct and pro-social behaviour using the nationally representative Longitudinal Study of Australian Children (LSAC). The study found that the higher the neighbourhood socio-economic status, the less the conduct problems among children. Higher perceived levels of neighbourhood safety and belonging were also linked to lower levels of conduct problems. Neighbourhood cleanliness and belonging were found to have a significant positive impact on pro-social behaviour (Edwards & Bromfield 2008).

Heightened fear among parents living in dangerous neighbourhoods for the safety of their children means that they are less likely to permit their children to participate in outdoor play and other activities that would increasingly expose them to the surrounding environment (Molnar et al. 2004). The resulting lack of outdoor exercise that children living in these neighbourhoods consequently engage in is therefore unfavourable for their health. The risks facing children living in neighbourhoods with concentrated poverty is further multiplied by the fact that families who experience risky conditions within their own home are also liable to be facing risky conditions in their neighbourhoods (Jargowsky 1997; Massey & Denton 1993; Wilson 1987).

3.2 Interrelationships among factors shaping childhood development

The factors shaping childhood development and wellbeing are complex, often interrelated and frequently multiplied by coincident factors (Saegert & Evans 2003). As a result, housing can impact on children's development and wellbeing through both direct and indirect mechanisms. This section highlights the interrelationships among various housing variables that have been uncovered in the existing literature. The following figures illustrate interrelationships among the housing variables and pathways through which these impact child development. In these figures:

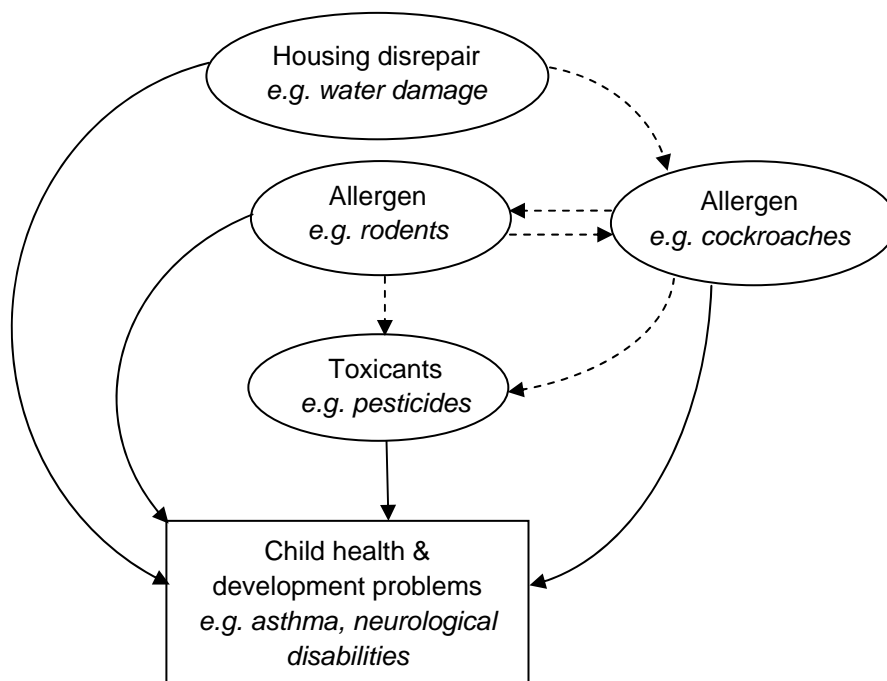
- The continuous arrows (—▶) represent direct pathways through each variable that impacts on child development
- The dashed arrows (---▶) represent interrelationships between two housing variables
- The dotted arrows (.....▶) represent interrelationships between a non-housing factor and a housing factor.

3.2.1 Interrelationships among housing disrepair, allergens and toxicants

Studies generally find that asthmatic children tended to be exposed to multiple allergens or neurotoxicants simultaneously. Crain et al. (2002) reported that among children residing in inner-city home environments with moderate to severe asthma problems, more than 50 per cent of children skin-tested positively to at least three allergen groups, cockroaches were reported in 58 per cent of homes, exposure to a smoker in 48 per cent, mice or rats in 40 per cent, and furry pets in 28 per cent. Bradman et al. (2005) concluded that the odds of indoor rodent infestations increased with housing disrepair, including peeling paint and water damage. These are particularly likely to have adverse effects on young children, who spend most of their time indoors at home. Using a sample of low-income Dominican or African-American families with children in New York City, Rauh et al. (2002) concluded that the levels of indoor household allergen are positively related to the degree of disrepair in the home, after controlling for family attributes such as income and socio-cultural factors. Some asthmatic children might be especially vulnerable to multiple health risks from exposure to toxic pesticides in the home. Pest infestations increase the likelihood of home pesticide use resulting in a neurotoxic effect on humans, including among pregnant mothers and children. Whyatt et al. (2002) reported widespread pesticide use in inner-city home environments in the United States during pregnancy due to pest infestations. Eighty-five per cent of the women interviewed reported having used pest control measures at home while pregnant, mostly for cockroach control. At least three pesticides were detected in all women surveyed.

Figure 2 illustrates the interrelationships between housing disrepair, allergens and toxicants.

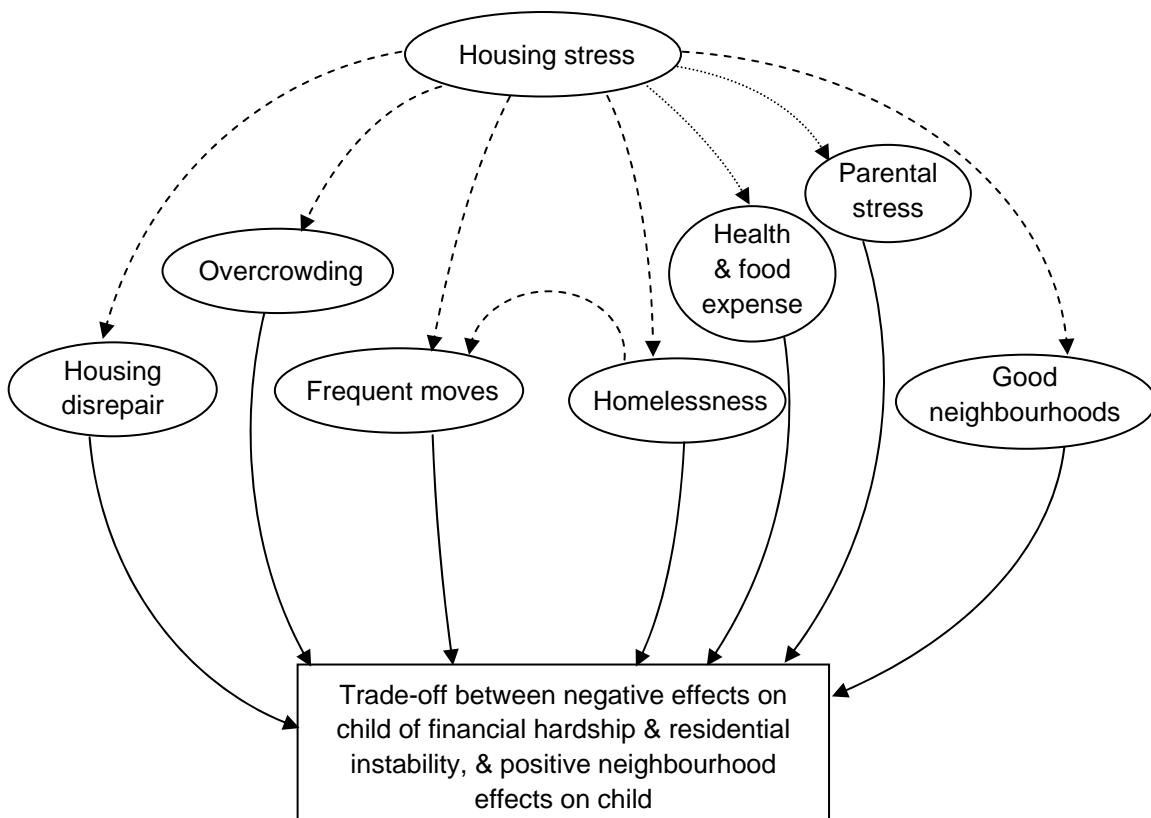
Figure 2: Interrelationships between allergens, toxicants and other housing variables



3.2.2 Interrelationships between housing affordability and other variables

Inability to afford housing can contribute to residential instability as lower-income families may be forced to make frequent moves, share housing with other families resulting in overcrowding, or undergo periods of homelessness (Anderson et al. 2003). Despite the risk of financial hardship, some families still decide to allocate a large proportion of their income towards meeting housing costs in order to secure quality housing and/or live in good neighbourhoods. This trade-off and resultant compromises may explain some of the mixed findings that have surfaced in relation to research undertaken into how high housing costs impact on the wellbeing of children. Although the children of these families are likely to be directly advantaged by the favourable neighbourhood conditions, these beneficial effects may be offset by the negative outcomes that might result from the family's income being stretched to such an extent that it becomes difficult to adequately cover health and food expenses or the costs involved in maintaining the physical quality of their homes. The results of one study indicated that children belonging to families that paid more than half their income to cover housing expenses, were more likely to be in fair or poor health compared to children from other families, but were less likely to be involved in accidents or incur injuries requiring medical attention (Vandiver et al. 2004). The interrelationships between housing affordability and other variables are reported in Figure 3.

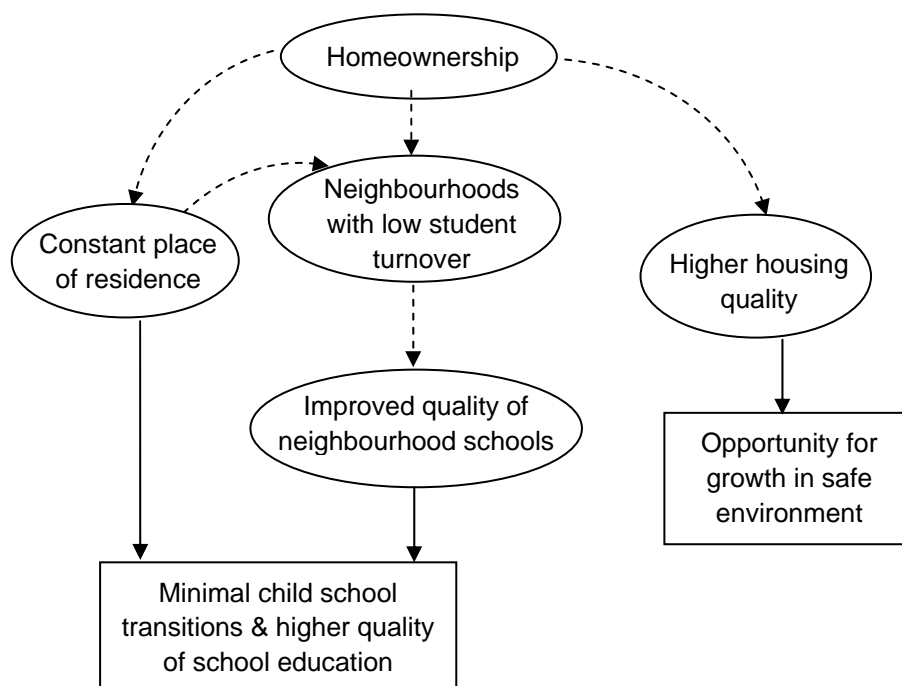
Figure 3: Interrelationships between housing affordability and other variables



3.2.3 Interrelationships between homeownership and other housing variables

Children of parents who are homeowners are likely to move less frequently than children of renters. Homeownership promotes longer tenures in a constant place of residence and therefore generally minimises the number of school transitions that children have to undergo (Aaronson 2000; Rumberger 2002; Scanlon & Devine 2001). Owner-occupied homes also tend to be clustered in common neighbourhoods, translating into lower student turnover in neighbourhood schools which, in turn, improves the quality of the schools' environment. Owner-occupiers also have greater incentive to invest in their homes resulting in higher quality of housing (Newman 2008). The interrelationships between homeownership and other variables are reported in Figure 4.

Figure 4: Inter-relationships between homeownership and other housing variables



3.2.4 Indirect effects of housing on children via parental influence

All of the interrelationships described above can exert strong indirect influences on children's development via influences on parental practices. This is especially the case for infants and young children, who spend most of their time indoors under parental supervision.

Studies such as Wachs (1990) and Eamon (2000) have found that home environments that are unclean, cluttered or unsafe may result in parents placing greater restrictions on children's activities. Children living in less than ideal housing environments that contain potential hazards are more likely to experience a restraining of their natural inclinations to explore and learn due to greater parental restrictions on explorations of their surroundings (Bartlett 1998). Residence on higher floors may result in parents placing greater restrictions on outdoor play on younger children (Churchman & Ginsberg 1984). Heightened fear among parents living in dangerous neighbourhoods for the safety of their children means that they are less likely to promote or permit their children to participate in outdoor play and other activities that would increasingly expose them to the surrounding environment (Molnar et al. 2004).

As noted previously, the adverse psychological effects of overcrowding on adults may lead to increased conflict between children and parents (Fuller et al. 1993; Loo & Ong 1984; Youssef et al. 1998). For example, in more crowded homes, parents are less responsive to young children (Evans et al. 1999; Wachs & Camli 1991) and use less sophisticated speech to young children (Evans et al. 1999). The need to use television to pacify restless and unsettled children is increased (Bartlett 1998), and punitive parenting practices are more likely to be implemented (Parke 1978).

Repeated housing-related moves have been associated with reduced social connectedness for children and parents (South & Haynie 2004). This has also been found to be the case with regard to children's connections with their parents, as well as in relation to parents' connections to their child's school (Pribesh & Downey 1999).

3.3 Housing assistance and child development

Most studies on housing assistance have focused on the effects of housing assistance on adults, rather than children. There is now a small but growing pool of literature examining the impact of housing assistance on child development and wellbeing. The majority have focused on children's educational and health outcomes. Most stem from the United States and look at the impacts of place-based assistance in the form of public housing versus tenant-based assistance in the form of vouchers that allow recipients to relocate into better neighbourhoods, with the vouchers making up the difference between market rent charged by private landlords and the rebated rent that a recipient is entitled to. To date, studies have uncovered both positive and negative effects of housing assistance on children's outcomes with no consensus on whether positive or negative effects dominate.

3.3.1 Public housing

As with all housing variables, public housing can impact on a child's wellbeing via direct or indirect effects. Four critical features of public housing have been highlighted by studies as impacting on child development and wellbeing.

First, public housing is subsidised so it promotes housing affordability. Research has confirmed that affordable housing costs frees up income that can be diverted to the purchase of food with higher nutritional value, medicine and health services (Fertig & Reingold 2007). This reduces food insecurity that has adverse effects on children's health (Cook et al. 2004; Cook et al. 2006). In a multivariate analysis that controlled for confounding influences, Meyers et al. (1995) found that only 3.3 per cent of children in families receiving public housing subsidies had low growth indicators as compared to 21.6 per cent of children on public housing waiting lists. In a more recent study, Meyers et al. (2005) found children from food-insecure families who received public housing subsidies had higher weight for age when compared with similarly food-insecure families not receiving public housing subsidies. Unaffordable housing costs can also have an indirect impact on educational outcomes because it contributes to malnutrition and increased vulnerability to illnesses and poor appetites, which in turn affects school performance and cognitive development (Fertig & Reingold 2007). Harkness and Newman (2005) postulated that unaffordable housing costs could have an indirect negative influence on child development by creating greater parental stress, thereby adversely affecting their parenting and nurturing skills.

The second feature of public housing that has been shown to impact on child development is the housing quality effect. Conclusions on the quality of public housing have been rather mixed in nature. Currie and Yelowitz (2000) found that children who live outside of public housing are more likely to suffer from overcrowding, which has been shown to be related to health (Galpin et al. 1992; Mann et al. 1992; Coggon et

al. 1993; Baker et al. 1999) and educational outcomes (Phibbs & Young 2005). Phibbs and Young (2005) point to the size of dwelling as the most important link between housing and children's educational outcomes as it reduces the likelihood of overcrowding and lack of private space that can inhibit cognitive development and learning. The study found that after moving into public housing, children had more space to do their homework without disturbances from their siblings. Fertig and Reingold (2007) argued that the close regulation within the public housing sector ensures that residents in public housing are less exposed to health hazards such as lead or pest infestation. However, the study also noted that there is potentially wide variation in the quality of the public housing stock. Hence, some public housing units could in fact be of poorer quality than private housing units, resulting in a negative influence on health.

Third, the greater security of tenure provided to public housing tenants may directly enhance the sense of security felt by a child. Because the availability of a subsidy makes it easier for the assisted family to bear its housing cost burdens and because it may be more difficult to evict families living in public housing than those in the private market, children do not have to make frequent moves and therefore are less likely to change schools frequently (Newman & Harkness 2000). The positive benefits of the security of tenure provided by public housing on educational outcomes are also documented in an Australian study by Phibbs and Young (2005).

The fourth feature of public housing commonly brought up in the literature as having links to child development is neighbourhood environment. Once again, here, findings have been controversial. Low-income households residing in public housing neighbourhoods can provide informal support to one another by sharing information on activities and services that provide assistance to the poor. Some studies have found these informal support networks to be important for public housing and low-income families in general (Edin & Lein 1997; Venkatesh 2000). However, public housing is often situated in low-income neighbourhoods and its residents can be subject to negative peer influences. Neighbourhood effects have been found to be particularly strong for adolescents due to peer influences (Ellen & Turner 1997). Negative peer effects, known as ghetto-specific behaviour triggered by isolation from mainstream influences, can result in criminal activity and low-achieving schools in the neighbourhood (Hannerz 1969; Wilson 1987). Fertig and Reingold (2007) point to the prevalence of youth gangs and drug trades in public housing neighbourhoods in the United States. Children in such neighbourhoods are more likely to be involved in crime themselves because of negative peer influences (Case & Katz 1991).

Finally, public housing has an indirect impact on child development via parental influences (Bridges et al. 2003). The availability of housing subsidies may blunt work incentives for parents. Evidence suggests that public housing is also poorly located in terms of access to employment opportunities (Kelly et al. 2005). Parents in public housing may struggle to find employment and parents with poor employment histories may transmit this across generations to their children. However, the receipt of public housing subsidies may reduce the financial stress borne by parents. To the extent that public housing is located in dangerous neighbourhoods, parents in dangerous public housing neighbourhoods may restrict their children's outdoor play opportunities (Anderson 1990).

3.3.2 Tenant relocation programs

Research on tenant relocation programs has mainly focused on the impacts of moves into low-poverty neighbourhoods on the educational outcomes of children in those families. Examples of tenant relocation programs that have been widely studied are the Movement to Opportunity (MTO) and Gautreaux programs in the United States,

which are based on the assumption that poor public housing tenants would benefit if they were relocated into low-poverty neighbourhoods. The evidence on the impacts of tenant relocation programs has been mixed.

Under the Gautreaux program, families who moved to suburban locations were compared with those who moved to other city locations. Evaluations of the Gautreaux program show that only 5 per cent of children who moved to suburbs dropped out from high school compared to 20 per cent among those who moved to another city location. Fifty-four per cent of suburb-movers enrolled in college, compared to 21 per cent of city-movers (Rosenbaum 1991b; Rosenbaum 1995). These results suggest that access to wider opportunities in the suburbs is an important determinant of differences in educational performance, though self-selection into better suburbs needs to be considered as a factor as well.

Under the MTO program, public housing families were randomly assigned into three groups. The treatment group was given housing vouchers that could be used to subsidise housing costs in low-poverty neighbourhoods only. A comparison group comprised families given vouchers with no neighbourhood restrictions. The third group was a control group of families not given vouchers, but who were still eligible for public housing (Sanbonmatsu et al. 2006). A series of studies of the MTO program found that the children of housing assisted families from disadvantaged neighbourhoods who were permitted to move to anywhere they wished did not experience an improvement in educational outcomes (see Ladd & Ludwig 1997 for a Baltimore study; Katz et al. 2001 for a Boston study). This was because they generally made moves to other neighbourhoods where school quality was no better than their previous neighbourhood. In a 2004 United States study of children who moved out of public housing due to demolitions under the Hope VI program, Jacob (2004) also found the move to have no effect on children's educational test scores as they moved to neighbourhoods that closely resembled the neighbourhoods they left. MTO studies found that if housing assisted families under the MTO program were required to move to low-poverty neighbourhoods, their children would experience an improvement in educational outcomes. However, MTO studies noted that the positive effects of such compulsory moves to low-poverty neighbourhoods tended to be offset by the negative effects of broken social networks with old neighbours and difficulties associated with forming new bonds.

Sanbonmatsu et al. (2006) covered multiple MTO sites including Baltimore, Boston, Chicago, Los Angeles and New York and found that families offered vouchers in the MTO program moved on average to more affluent neighbourhoods and their children went to schools that were of moderately higher quality. However, the study did not find improvements in their reading or maths scores or in their behaviour or school engagement on average. The study postulated that this may have been due to subsequent moves that led families to live in neighbourhoods that were less affluent than their original placement neighbourhoods at the time of follow-up. Another potential explanation was that while families in the treatment group moved to more affluent neighbourhoods, most moved to ethnically segregated neighbourhoods. The study speculated that these neighbourhoods may have limited high-quality schools or services due to discrimination against minority groups.

3.4 Summary of the literature review

This chapter explores the key connections between housing and child development by providing a detailed review of existing studies drawn from a range of disciplines. Strong links between various housing variables and multiple child developmental outcomes have been uncovered by the existing literature. Some of these effects are

irreversible and continue on into adulthood. Furthermore, variations in the effects of a housing characteristic at different stages of a child's life course exist. For example, the negative effects of environmental allergens resulting in asthma and other respiratory illnesses have been found to be strongest during infancy and early childhood. Neighbourhood effects have been found to be strongest on adolescents, in particular their educational outcomes due to the influence of peers.

The factors shaping childhood development and wellbeing are complex, often interrelated and frequently multiplied by coincident factors. As a result, housing can impact on children's development and wellbeing through both direct and indirect mechanisms. For example, inability to afford housing can result in frequent moves, shared housing with other families, crowding, or even homelessness. All of the interrelationships can exert strong indirect influences on children's development via influences on parental practices. This is especially the case for infants and young children, who spend most of their time indoors under parental supervision.

There exists a small but growing pool of literature examining the impact of housing assistance on child development and wellbeing. The majority have focused on children's educational and health outcomes. To date, studies have uncovered both positive and negative effects of housing assistance on children's outcomes with no consensus on whether positive or negative effects dominate.

There is noticeably a lack of nationally representative published empirical research conducted in Australia on the links between housing and child development, with the rare exception of an Australian study by Edwards and Bromfield (2008) examining the role of neighbourhoods on young children's conduct. Hence, much of the literature reviewed is from overseas. Given that Australia has its own unique socio-demographic, economic and institutional environment, overseas evidence may have limited application in Australia. However, the findings from this study will provide crucial foundational information that will help identify key links between housing and childhood development. In the next chapter, key housing issues and policies that pertain to Australian children are highlighted using available Australian statistical data and policy sources to provide a preliminary indication of whether these links exist within the Australian policy context.

Table 1: Summary of findings by existing studies on impacts of housing circumstances at various stages of child development

<i>Housing factors</i>	<i>Impacts identified by existing studies</i>	<i>Stage of childhood development during which impact is greatest</i>
Environmental allergens	Asthma and other respiratory illnesses, which in turn triggers future development of respiratory illnesses.	Infancy and early childhood.
Toxicants	Lower birth weights and lengths among infants, behavioural and social problems, impaired neurological development and growth, IQ reductions, poorer academic outcomes and juvenile delinquency among adolescents.	All stages of child development, though young children are most susceptible. Effects tend to be irreversible effects and continue into adulthood.
Cleanliness, housing disrepair and safety	Unclean, unsafe and low quality housing results in reduced cognitive development, falls, internalising behaviour due to parental restrictions on physical behaviour.	Young children, who spend most of their time indoors at home.
Building height and opportunities for outdoor play	Behavioural and social problems, reduced independence, reduced motor skill competencies and ability to perform routine tasks, poorer academic outcomes.	Young children due to parental restrictions.
Crowding	Reduced sense of autonomy, social withdrawal, health and developmental problems, poorer school performance and behavioural adjustment at school, psychological distress. Psychological distress in adults, leading to increased conflict between children and parents.	Negative effect on mental development at 18–24 months of age, reduced verbal and perceptual development at 30, 36 and 42 months, and poorer language development at 39 months. Reduced IQ scores at age 30 months. Impaired semantic memory among toddlers. Less persistence and vigour in solving complex and challenging puzzles in young children. Lower task-performing motivation in children aged 6–12 years old. Poor cognitive development and poorer reading test performance among elementary school children. Negative impact on learning in elementary and middle school.
Housing affordability	Unaffordable housing leads to poor health outcomes due to lower quality housing or reduced consumption of other basic necessities, increased stress due to a higher likelihood of inconsistent or punitive parenting practices by parents bearing the burden of financial hardship. Detrimental effects of unaffordable housing are strongest in early childhood due to its negative impact on the family to access	Health impacts strongest among 6 to 17-year-olds, and behavioural impacts among 12 to 17-year-olds.

<i>Housing factors</i>	<i>Impacts identified by existing studies</i>	<i>Stage of childhood development during which impact is greatest</i>
	basic necessities.	
Homeownership	Favourable effects on emotional and social wellbeing, behaviour, health, academic performance and lifetime prospects.	Not stated in the literature.
Frequent residential moves	Negative impact on educational outcomes and behaviour, reduced social connectedness	Not stated in the literature.
Homelessness	Psychological distress including depression and anxiety, personal, social and language developmental difficulties, emotional developmental delays, health and hunger problems, poor academic performance	Not stated in the literature, though emotional developmental delays are found to be particularly prevalent among pre-schoolers,
Neighbourhoods	Poor neighbourhoods are linked to greater exposure to health risks, higher crime and poverty rates, drugs and reduced access to quality education and health services, conduct problems among four-to-five year olds, reduced opportunities for outdoor play, poorer educational outcomes.	Effects strongest for adolescents due to the influence of peers, in particular effects on educational outcomes, though neighbourhood effects on infants and preschool children also operate indirectly through impacts on parents.

Source: Studies reviewed in this chapter

4 HOUSING AND CHILD DEVELOPMENT IN AUSTRALIA: KEY ISSUES FOR POLICY CONSIDERATION

The literature review in the previous chapter clearly indicates that there is currently a dearth of empirical research findings on the impacts of housing on child development in Australia. In this chapter, key housing issues and policies that pertain to Australian children are highlighted using available Australian statistical data and policy sources. Section 4.1 presents broad existing Australian statistical data that shows the links between some housing aspects uncovered in the literature review and child developmental outcomes in Australia. The plight of Indigenous children is highlighted in Section 4.2 as adverse outcomes are disproportionately likely among Indigenous children than non-Indigenous children. Section 4.3 provides a description of housing assistance programs in Australia with a focus on features that are especially relevant to households with children. In Section 4.4 we comment on the key issues facing Australian policy-makers based on existing Australian statistics, provide some observations on the applicability of overseas findings within the Australian context, and highlight the value of future research to Australian housing policy.

4.1 Statistics on housing and child development in Australia

This section presents broad existing Australian statistical data that shows the links between key housing aspects uncovered in the literature review and child developmental outcomes in Australia. These statistics are preliminary findings that will provide some insight into how important various housing conditions are as pertains to child development in Australia. Statistical data is available that point to links between environmental allergens and toxicants, housing affordability, overcrowding and homelessness on child development and wellbeing. The focus in this section is on the housing conditions of Australian children in general. Specific attention is paid to Indigenous children, a clearly highly disadvantaged group, in section 4.2.

4.1.1 Environmental allergens and toxicants

In 2004–05, 37 per cent of children aged 0–14 years lived in households with a regular smoker and 10 per cent resided in households where at least one person regularly smoked indoors (ABS 2006b). Existing data shows that there is a higher rate of household exposure to smokers among Australian children with asthma than those without asthma (AIHW 2005). In 2004–05, 40 per cent of children aged 0–14 years with asthma lived in households with smokers compared to 36 per cent of children without asthma (ABS 2006a).

Children are commonly recognised as a population subgroup that is particularly susceptible to the adverse effects of toxicants. However, data on the extent of children's exposure to pesticides in Australia has been sparse. A study that documented children's exposure to pesticides in Coffs Harbour, a New South Wales coastal town located in an area where the major agricultural activity was bananas, found that a cluster of cleft and lip palate were observed in local children and this was possibly caused by exposure to agricultural chemicals used in that area. The evidence suggested that toxic residues from the use of organochlorine chemicals were building in Coffs Harbour. Organochlorine levels were found in the blood of seven children in the area and these levels were generally higher than those used in a comparison group of United States adults (Beard et al. 1995). The ABS (2004) reported that there has been a decline in the use of environmentally friendly products from 63 per cent in 1992 to 51 per cent in 2001 to 46 per cent in 2004. Approximately 29 per cent of

households use pesticides or weedkillers when growing fruit or vegetables in their gardens.

4.1.2 Housing affordability

In 2002–03, 862 000 households in Australia were paying more than 30 per cent of their income for housing and were in the lowest two quintiles of the equivalised disposable household income distribution. Among these, more than 354 000, or 40 per cent were households with children. Among lower-income Australian households, that is, those in the bottom two quintiles, the incidence of housing stress (paying more than 30% of income in housing costs) was higher than average among sole parents. The incidence of housing stress was 36 per cent among sole parents, compared to an average of 28 per cent among lower-income households (Yates & Gabriel 2006).

A recent study by Wood and Ong (2009) that tracked Australian households over the period 2001–06 found that precarious housing affordability circumstances are particularly evident among younger couples with dependent children, a stage in the life cycle that is associated with pressing spending needs. The study found that over 80 per cent of couples without dependent children who were in housing stress would escape housing stress within a year and, after four years, all would have escaped. However, just under 60 per cent of couples with children escape housing stress in a year, and after five years around 30 per cent remain in housing stress. The study found that after controlling for other factors, housing stressed Australians with young children aged 0–4 years have a 40 per cent less chance of escaping housing stress than those with no dependent children. The study found that large numbers of housing stressed owner purchasers with dependent children have been encouraged by the recent house price boom and new financial instruments to release housing equity to meet the expenses accompanying a growing family. As a result, they have suffered from reduced chances of escaping housing stress, which is to be expected given rising interest rates over the period 2001–06.

There has been a noticeable decline in housing affordability in Australia over the last 20 years and sharp increases in house prices and rents have been witnessed in recent years (Wood & Ong 2009). There are two key aspects of current economic conditions that can impact on housing affordability. These are the rising housing price and rising unemployment. The rising housing price is likely to affect both lower and middle socio-economic strata by reducing their capacity to pay for the rent or mortgage. One scenario is involuntary relocation or homelessness. Unemployment in working parents can lead to reduced or loss of household income, which reduces their capacity to pay for the rent or mortgage. Some families may forgo or reduce their spending on nutritious food and preventative health care in order to maintain their ability to pay for the existing housing, while others may relocate to cheaper but poorer housing. Increased financial strains and stress associated with relocation will in turn negatively impact on children at various stages. It has been found that maternal experience of residential mobility in pregnancy is associated with a reduction of breastfeeding in infants (Li et al. 2008) and life stress events including relocations that mothers experienced in pregnancy, which is linked to poor child mental health at ages two and five (Robinson et al. 2008).

4.1.3 Overcrowding

The Canadian National Occupancy Standard is used internationally as an indicator of housing utilisation, which in turn indicates the extent of crowding in the home. This measure specifies that:

→ There should be no more than two persons in each bedroom.

- Children under 5 years old and of different gender may share a bedroom.
- Children under 18 years of age and of the same gender may share a bedroom.
- Single household members aged 18 years or over, parents and couples, should have a separate bedroom.

Where the above standards are met, households are not considered to be overcrowded. Only 2.8 per cent of Australian households in 2005-06 were assessed as requiring extra bedrooms to meet the Canadian National Occupancy Standard. On the other hand, 78 per cent of households had at least one bedroom above the number required to meet this standard. Data on housing utilisation shows that Australian households are becoming smaller on average, but dwelling size as measured by the number of bedrooms is increasing. The average number of persons per household fell from 3.1 in 1976 to 2.5 in 2005 (ABS 2008c).

4.1.4 Homelessness

Existing data indicates that children make up a significant proportion of the homeless in Australia. In 2004-05, 68 100 or 43 per cent of people who access Support Accommodation Assistance Program (SAAP) services were children. A large proportion of the people who access SAAP services are children. Most were children accompanying a parent or guardian who was accessing the service; around 17 per cent were unaccompanied children aged less than 18 years. Adults with children were commonly seeking assistance because of domestic violence, and unaccompanied children commonly sought assistance because of family or relationship breakdown (AIHW 2006).

Table 2 shows the characteristics of homeless children accessing SAAP services in 2004–05. These were equally divided by gender, and the majority were aged under 12 years. The median length of support (accommodation) was 21 (16) days. Unaccompanied children were older, with the majority being aged 16–17 years, and required shorter periods of support and accommodation on average. Around 60 per cent were females.

Table 2: Characteristics of homeless children accessing SAAP services in 2004–05

<i>Characteristic</i>	<i>Number</i>
<i>Accompanied children</i>	
Total	56 800
Male	28 300
Female	28 400
0–4 years	25 000
5–12 years	23 900
13–15 years	5 500
16–17 years	2 000
Median length of support (days)	21
Median length of accommodation (days)	16
<i>Unaccompanied children</i>	
Total	11 300
Male	4 200
Female	7 000
Under 12 years	400
12–13 years	500

<i>Characteristic</i>	<i>Number</i>
14–15 years	2700
16–17 years	7700
Median length of support (days)	17
Median length of accommodation (days)	10

Source: AIHW (2006)

A school census was conducted in a study on youth homelessness by Chamberlain and McKenzie (2002). The study reported that there were 12 230 homeless secondary school students during the census week. The numbers of homeless were highest in New South Wales, Victoria and Queensland at over 2800 in each state. Ninety-three per cent of homeless secondary school students were in the state school system.

4.2 Indigenous children

Existing statistics clearly show that the housing experiences of Indigenous children are significantly worse than those experienced by non-Indigenous children. Children in remote Indigenous communities may experience more difficulties in accessing basic housing and services due to their isolation from large population centres. In 2006, there were 80 000 people in 1112 discrete Aboriginal and Torres Strait Islander communities in remote areas of Australia. Indigenous people have higher rates of illness due to poor housing conditions and overcrowding than the rest of the Australian population. While ABS data show that the housing conditions of Indigenous remote communities have generally improved between 2001 and 2006, the housing conditions of Indigenous people still remain below the standard enjoyed by the average Australian (ABS 2008a). Health problems related to inadequate housing in remote communities such as inadequate water supplies, sanitation and overcrowding have the greatest impact on Indigenous children. These diseases include skin infections and infestations, respiratory, eye and ear infections, diarrhoeal diseases and rheumatic fever (ABS 2008b). Available statistical data points to links between environmental allergens, housing disrepair, cleanliness and safety, overcrowding, frequent residential moves and homelessness and the development of Indigenous children.

4.2.1 Environmental allergens

In 2004–05, 35 per cent of non-Indigenous children aged 0–14 years lived in households with a regular smoker and 9 per cent lived in households where at least one smoker regularly smoked indoors. The figures are more alarming for Indigenous children; 66 per cent lived in households with regular smokers and 28 per cent lived in households where smokers regularly smoked indoors (ABS 2007).

4.2.2 Cleanliness, housing disrepair and safety

In 2006, 3400 or 4 per cent of Indigenous people in remote communities were living in temporary dwellings such as sheds or humpies. Even among those who lived in permanent dwellings, a large proportion had problems with poor dwelling conditions. In 2006, 24 per cent of dwellings managed by Indigenous housing organisations in remote communities required major repairs and 9 per cent required replacement; 32 per cent of all Indigenous households in remote and very remote areas needed at least one extra bedroom to sufficiently accommodate all household members; 54 per cent of Indigenous people in remote regions relied on bore water and 62 per cent remained reliant on community generators as the main source of electricity. A significant proportion also experienced multiple interruptions to their water and

electricity supply in a 12-month period, whereas 40 per cent experienced sewerage system overflows or leakages (ABS 2008a).

Using a measure of housing quality based on the healthy living practices documented in the National Framework for Indigenous housing, the Western Australian Aboriginal Child Health Survey (WAACHS) create an index of housing quality. This index is based on the need for Indigenous homes to have certain essential elements of housing to be in working order (including, but not limited to, safe in-house water delivery and functioning home infrastructure, such as bathroom and hot water, laundry with water, toilets, sinks, drains, rubbish removal and kitchen with functioning stove, smoke alarms etc.). The WAACHS assigned 16 per cent of dwellings with Indigenous children as being of poor quality (Silburn et al. 2006).

McDonald et al. (2009) completed a study between May 2002 and May 2005 that analysed the health of Indigenous children living in a remote Aboriginal community in north-western Arnhem Land using a mixed quantitative and qualitative methodological approach. The results of this research indicated that the high incidence of infection experienced by children living in the community was largely induced by the interplay of several factors including non-functional essential housing infrastructure, crowding and poor domestic and personal hygiene practices. It was also concluded that these findings may be more widely applicable and consistent within many other remote Indigenous communities due to the commonality in their shared characteristics.

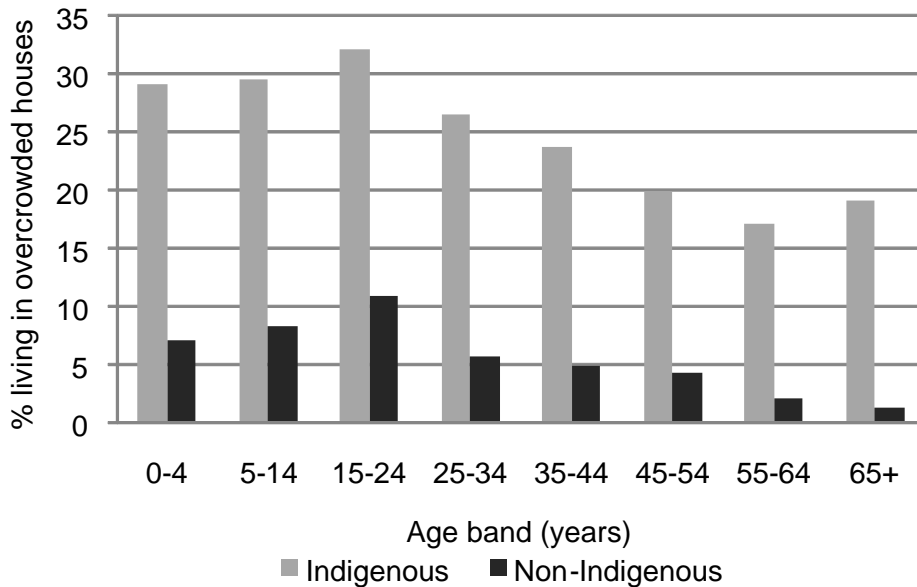
The results of another study of three remote Aboriginal communities in the Northern Territory published by Bailie et al. in 2005 revealed that the skin infection rates among children in housing that was deficient of functioning facilities that removed faeces, or which had concrete flooring, could be up to two times higher than was the case for children living in other dwellings. The evidence also seemed to indicate that crowding exacerbated the latter association. The risk of skin infections for younger children living in older housing was also found to be almost double. Furthermore, the findings of the study indicated that the provision of newer and more modern dwellings in remote Indigenous communities can contribute to reducing the incidence of skin infections among children, particularly when the provision of such housing decreases crowding and improves the effective removal of human waste.

4.2.3 Overcrowding

Just over 15 per cent of Indigenous households with children were classified as having high household occupancy or overcrowding in the WAACHS. In the WAACHS, Indigenous households were measured as having high occupancy if there were five or more people sleeping in one bedroom, six or more people sleeping in two bedrooms, and so on until nine or more people were sleeping in five or more bedrooms (Silburn et al. 2006). The WAACHS results are similar to the estimate of the overcrowding rate among Indigenous households in Western Australia derived by the ABS using the Canadian National Occupancy Standard which is 16 per cent (ABS 2008b).

The figure below compares the percentage of Indigenous and non-Indigenous people living in overcrowded homes, based on the Canadian National Occupancy Standard for housing appropriateness. The figure clearly shows two key patterns. First, Indigenous people are more likely to live in overcrowded homes than non-Indigenous people across all age groups. Second, children and young adults aged 15–24 years are more likely to live in overcrowded homes than adults aged 25 years or over. The highest rates of overcrowding occur at around 30 per cent among Indigenous children and Indigenous young adults (SCRGSP 2009).

Figure 5: Per cent of Indigenous and non-Indigenous people living in overcrowded homes, by age band, 2009



Source: SCRGSP (2009)

Among Indigenous households, overcrowding could be due to the influence of cultural preferences where household members from multiple generations and extended family often prefer to live together. A high mobility rate among Indigenous people means that homes are often shared with visiting relatives and overcrowding may be periodic rather than constant. However, overcrowding could also be due to inadequate or poorly maintained housing, especially in remote regions where it is more expensive and more difficult logistically to build and maintain infrastructure (SCRGSP 2009). It was reported in the WAACHS that overcrowding was associated with poor housing quality, higher levels of life stresses and overuse of alcohol. However, interestingly, it was reported that Indigenous children living in households with a high household occupancy level were only half as likely to be at risk of clinically significant emotional or behavioural difficulties as those residing in homes with a low household occupancy level (Silburn et al. 2006).

4.2.4 Frequent residential moves

In a Kuranda study, Henry and Smith (2002) documented that as many children as adults had moved between the two survey periods. Though the children moved to within their kinship network, the study pointed out that these residential moves were not just due to cultural preferences or emphasis on individual autonomy, but were also a response to inadequate housing, poverty and destitution.

4.2.5 Homelessness

Indigenous children are over-represented among homeless children, making up about a quarter of children accompanying an adult to seek SAAP support and over 18 per cent of unaccompanied children aged under 18 years (AIHW 2006). Table 3 shows that Indigenous children (girls and boys) are over-represented across all age groups.

Table 3: Indigenous homeless children accessing SAAP services, number and proportion of homeless children accessing SAAP support, 2004–05

<i>Characteristic</i>	<i>Number</i>	<i>% of homeless children accessing SAAP support</i>
<i>Accompanied children</i>		
Total	13 600	23.9
Male	6600	23.3
Female	7000	24.6
0–4 years	6400	25.6
5–12 years	5800	24.3
13–15 years	1000	18.2
16–17 years	300	15.0
<i>Unaccompanied children</i>		
Total	2100	18.6
Male	700	16.7
Female	1400	20.0
Under 12 years	100	25.0
12–13 years	100	20.0
14–15 years	500	18.5
16–17 years	1300	16.9

Source: AIHW (2006)

4.3 Housing policies in Australia that affect households with children

This section contains a description of housing assistance programs in Australia with a focus on features that are especially relevant to children or households with children. The types and parameters of housing assistance programs in Australia in the form of Commonwealth Rent Assistance (CRA) and public housing have been widely documented in housing reports (see for example, Wood et al. 2007; Dockery et al. 2008). Hence, only a summary of the key features of housing assistance in Australia is provided, followed by a discussion of particular features of housing assistance in Australia that pertain to children.

4.3.1 Public housing

Housing assistance in the form of public housing is provided and managed by state and territory housing authorities. Applicants must generally be Australian citizens or permanent residents, must not own residential property, and have to be living in the state or territory where the application is made. Public housing allocations are rationed according to eligibility criteria, and all state and territory housing authorities operate wait lists in order to prioritise access. Hence, to qualify for public housing, the applicant household's income must be below an income eligibility threshold, which also differs by state and territory. State and territory housing authorities usually have more than one wait list, so that applicants can be sorted into different segments of need according to household type and location. Applicants with the most acute housing needs such as domestic violence victims, the homeless, or those with urgent medical conditions are put onto a priority wait list (Wood et al. 2007; Dockery et al. 2008).

Public housing typically targets the most disadvantaged families. Hence, children in families with urgent housing needs, such as children of domestic violence victims or homeless children, have priority access to this form of housing assistance. Typically, public housing rents are income-related, currently set at 10–15 per cent of assessable family payments and 25 per cent of other assessable income, capped at the market rental rate (Wood et al. 2007). As a result, the public housing rent formula ensures that public housing families with low incomes do not pay excessively high housing costs burdens. This enables low-income families to enjoy affordable housing in a location of their preference.

State or territory housing authorities also operate pest policies that are within government health department guidelines. For example, in Western Australia, it is the policy of the state housing authority to engage only licensed pest control operators who abide by the regulations of the health department and this policy is enforced via periodic checks that are undertaken by arrangement with the health department to check that pest control operators are abiding by the regulations. This provides safeguards against the use of levels and types of pesticides that are harmful to children's health (WA Department of Housing 2009a).

Public housing policies generally ensure that each applicant household is allocated a property containing the number of bedrooms to match household size. This reduces the potential for overcrowding, especially among families with children. For example, in Western Australia, while lone persons are allocated bedsits or one-bedroom properties, and couples are allocated one or two-bedroom properties, families with children are usually given preferential access to larger dwellings. Families with one child are usually allocated two-bedroom properties but may be allocated three-bedroom properties as well. For families with two children, the gender of children is taken into consideration (together with the availability of suitable housing stock) when determining whether a family should be allocated two or three bedrooms. Families with three children are allocated three bedrooms. For those with four or more children, children's gender is again specifically considered. An extra bedroom may be allocated to families where there is a considerable age gap between children of the same gender. Pregnant applicants may also be eligible for extra bedrooms. Applicants who have access arrangements for children at about 50 per cent or more of their time will also be allocated an appropriate bedroom number to accommodate their children during visits (WA Department of Housing 2009b).

In WA, public housing applicants with young children are given the option of accepting flats in upper floors, but are advised of the potential dangers and difficulties associated with locating children in higher floors. Departmental policy specifically states that any allocation of apartment or flat properties to applicants with children aged under 12 years should be carefully considered with reference to the history of the building or complex, and the lack of play facilities and safety concerns (WA Department of Housing 2009b).

4.3.2 Commonwealth Rent Assistance (CRA)

Housing assistance to private renters is provided in the form of Commonwealth Rent Assistance (CRA). Private renters with no dependent children must receive a pension or allowance in order to be eligible for CRA as a supplement to their pension or allowance. Private renters with dependent children must receive more than the base rate of Family Tax Benefit Part A to receive CRA as a supplement to their family payment. In addition, private renters only receive CRA if their rent payments exceed a minimum threshold, their CRA entitlement is capped at a maximum rate which varies across household type and number of children (Dockery et al. 2008).

Table 4 below shows the March 2009 CRA rates and thresholds for families with children. The maximum fortnightly CRA rate depends only on the number of children, where both sole parents and couples with one or two children receive \$130.48 and those with three or more children receive \$147.56. The rent threshold at which the maximum CRA is paid is dependent on family size, increasing from \$304.00 to \$389.00 from singles with one or two children to couples with three or more children. This ensures that larger families receive higher levels of CRA, helping to decrease the likelihood of large families having to crowd into housing with inadequate space due to the higher housing costs associated with raising a larger family.

Table 4: CRA rates and rent thresholds, by family size, March 2009, dollars per fortnight

<i>Family size</i>	<i>Maximum CRA rate</i>	<i>Minimum rent threshold</i>	<i>Rent threshold at which maximum CRA is paid</i>
Single, one or two children	\$130.48	\$130.06	\$304.03
Single, three or more children	\$147.56	\$130.06	\$326.81
Couple, one or two children	\$130.48	\$192.50	\$366.47
Couple, three or more children	\$147.56	\$192.50	\$389.25

Source: Centrelink (2009)

4.4 Key issues requiring research and policy attention

4.4.1 Key issues highlighted in Australian statistical data

The Australian statistical data on housing and child developmental outcomes and overview of Australian housing policies relevant to children in this chapter indicate that associations between various housing aspects and child developmental outcomes uncovered in the overseas literature also exist within the Australian context.

Current Australian statistics highlight the following:

- There is widespread practise of using pesticides when growing fruit or vegetables among Australian households while the use of environmentally friendly products has declined in Australia in recent years (ABS 2004). This has been accompanied by Australian evidence that a higher probability of asthma is found in children exposed to smokers (ABS 2006a; 2006b) and children exposed to agricultural chemicals are more likely to develop other diseases (Beard et al. 1995).
- Housing affordability has been in decline in Australia in the last 20 years (Wood & Ong 2009). Furthermore, there is a higher incidence of housing stress particularly evident among sole parents (Yates & Gabriel 2006) and couples with dependent children (Wood & Ong 2009) and recent research using Australian data has revealed that exposure to stressful life-events in the family, such as economic hardship, even before birth, can adversely impact children's development and wellbeing (Robinson et al. 2008; Kendall, Zubrick & Blair 2004).
- Children make up a significant proportion of the homeless in Australia (AIHW 2006).
- Neighbourhood cleanliness and belonging have a significant positive impact on pro-social behaviour among Australian children (Edwards & Bromfield 2008).

The Australian evidence also highlights the plight of Indigenous children as relates to their housing circumstances:

- 66 per cent of of Indigenous children live with regular smokers, compared to 35 per cent of non-Indigenous children.

- Fifteen per cent of Indigenous households with children live in overcrowded households (Silburn et al. 2006).
- Significant proportions of Indigenous households in remote communities live in housing that requires major repairs. They also experience multiple interruptions to water and electricity supply and sewerage system faults are not uncommon (ABS 2008a). There is a high incidence of infection suffered by Indigenous children in remote communities largely induced by deficient essential housing infrastructure, crowding and poor hygiene practices (Bailie et al. 2005; McDonald et al. 2009).
- Indigenous children are over-represented among homeless children across all age groups (AIHW 2006).

4.4.2 Preliminary policy implications

Three issues arise as being of particular concern for housing policy-makers and in urgent need of research attention in Australia based on existing Australian statistics. First, it is worrying that statistical data shows that children make up a significant proportion of the homeless in Australia. If the links between homelessness and child development as uncovered by the overseas literature applies in Australia, then the likely adverse effects in children will include psychological distress including depression and anxiety, personal, social and language developmental difficulties, emotional developmental delays among pre-schoolers, health and hunger problems, and poor academic performance. Hence, policy needs to be tailored—not just to the specific needs of homeless adults, such as provision of job search support to help them climb back into and maintain stable housing—but the potentially idiosyncratic impacts of homelessness on children have to be addressed as well. These include strategic programs to counter the developmental complexities associated with homelessness, such as social, language and emotional developmental difficulties.

Second, the housing experiences of Indigenous children are significantly worse than those experienced by non-Indigenous children. Children in remote Indigenous communities may experience more difficulties in accessing basic housing and services due to their isolation from large population centres. Indigenous children are also more likely to be exposed to indoor smoke, and a significant proportion living in poor quality housing. While overcrowding does not appear to be a problem for the general population, Indigenous people are more likely to live in overcrowded homes than non-Indigenous people across all age groups, and the incidence of overcrowding is over 30 per cent among Indigenous adolescents and youths aged 15–24 years. Indigenous children are also over-represented among homeless children in Australia. The disparity in the housing circumstances of Indigenous and non-Indigenous children is blatantly evident and in need of policy attention in light of the fact that the existing literature has shown many adverse effects of poor housing circumstances to be irreversible and to persist into adulthood. It is clear that housing policy is a critical instrument that will significantly impact the lifetime prospects of Indigenous children and narrow the gap between the Indigenous and non-Indigenous population. Future research is urgently required to provide a better understanding of the causal links between housing and developmental outcomes of Indigenous children and, in doing so, offer ideas for policy action for consideration by Australian policy-makers.

Third, findings reported in this chapter indicate that housing stress is particularly prevalent among households with children in Australia. Given the long-run decline in housing affordability in Australia and the fact that house prices and rents have risen significantly in recent years while labour markets have become increasingly precarious, housing unaffordability is an on-going problem that has plagued the Australian housing market both in the past and in contemporary times. The existing

literature confirms that the impact of housing stress on child development is multi-faceted and especially complex in nature. The inability to afford housing can contribute to multiple other housing factors, such as residential instability, overcrowding, or homelessness (Anderson et al. 2003). At the same time, the literature has also shown that homelessness has detrimental impacts on children via parental stress. Recent research using Australian data has revealed that exposure to stressful life-events in the family, such as economic hardship, even before birth, can result in problematic behaviour at two and five years of age (Robinson et al. 2008) and mental health issues at eight to nine years of age (Kendall, Zubrick & Blair 2004). Further research is therefore urgently required to gauge the extent to which housing stress has a detrimental effect on Australian children. Effective policy also requires a more nuanced evidence base of the housing and non-housing channels through which housing stress exerts its effects on children, thus research designs need to include multiple channels of influence (see Figure 3 on the interrelationship between housing stress and other variables like homelessness).

4.4.3 The case for further research

The findings to date within the Australian context parallel the findings from the United Kingdom and United States. Both are countries that have housing systems and housing finance markets similar to Australia's. However, not all findings arising from the international literature are wholly applicable to the Australian context. For example, there exists a plethora of overseas studies that have focused on the impact of housing on the development of children from different ethnic groups, in various countries. An example is a study completed by Brooks-Gunn et al. (1996) that analysed disparities in the intelligence test scores of five-year-old Caucasian and African-American children. The study reported that when differences in home environment were factored in, the ethnic differential associated with the higher IQ scores of the Caucasian children relative to their African-American contemporaries was reduced by 28 per cent. Another United Kingdom study conducted by Alwash and McCarthy (1988) found that accidents afflicting children aged less than five years was consistently associated with overcrowding for all three of the main ethnic groups analysed in the study (namely Caribbean, Asian and native British born). Research completed by Bazargan et al. (2005), based on a study of the mental and physical health of children living in public housing in the United States, found that publicly-housed children belonging to minority ethnic groups were particularly vulnerable as a sub-group in what were already often deemed to be underserved communities. The study results also documented how children living in public housing from Latino and African-American families were two to four times more likely to suffer from chronic mental and physical ailments when compared to the general population (Bazargan et al. 2005). Other related literature has also presented similar findings (Flores et al. 2002; Bradley et al. 1989). For the most part, these findings are of limited relevance to the contemporary Australian housing policy context, where the disparity in the circumstances of Indigenous versus non-Indigenous children is of primary policy concern rather than other ethnic minorities. The unique cultural context within which Australian Indigenous children are raised indicates that it would be impossible to devise policies that effectively target the deficiencies in their housing environments without government investment in research that is based on Indigenous-specific data. The existing overseas literature offers little that can contribute to an insightful understanding of the housing circumstances of Australian Indigenous children given the absence of similar cultures in countries like the United States or the United Kingdom. For example, in contrast to findings from overseas literature that overcrowding has multiple adverse effects on child development in general, Australian statistics have indicated that Indigenous children living in households with a high

household occupancy level are less likely to be at risk of clinically significant emotional or behavioural difficulties as those living in homes with a low household occupancy level (Silburn et al. 2006). This is likely to be tied in with the unique culture that Indigenous children grow up in and also indicates that Indigenous children might require particular physical designs in their housing that the overseas literature do not account for.

Another segment of the overseas literature that has limited applicability to Australia is the cluster of studies that have looked at the impacts of vouchers as a form of housing assistance on children's outcomes. While both Australia's CRA system and the United States' voucher system are tenant-based assistance (rather than place-based assistance such as public housing), CRA is available to all income-eligible private renters, while the United States' housing voucher regime is rationed with income-eligible renters required to join wait lists (Feeny et al. 2008). Furthermore, studies assessing the impacts of the housing voucher system on children's outcomes have been restricted to those focusing on tenant relocation programs where receipt of a housing voucher is tied to the requirement to relocate certain neighbourhoods. Such tenant relocation programs have not been implemented as a condition of CRA receipt in Australia. It is therefore difficult to generalise findings from the United States' housing voucher studies to the Australian CRA context due to the different assistance arrangements between the two countries. It is also obvious from the literature review and Australian statistics presented in this chapter that existing Australian statistics present patchy evidence at best as to the links between housing and children's outcomes and do not cover the full range of housing factors analysed in overseas literature that are potentially of significant policy concern in Australia.

For example, there is a conspicuous absence of published studies that examine the strength of statistical associations between homeownership and child development in Australia. While Australia has had historically high rates of homeownership, deteriorating housing affordability trends have sparked fears among younger generations that they may be locked out of the homeownership market and have to remain as lifetime renters. Furthermore, recent financial innovations, such as reverse mortgages, have made it possible for older homeowners to tap into their housing equity to generate income for consumption. Of course, the downside of unlocking housing equity is that such homeowners may be left with little or no housing equity to bequeath to the next generation in an era where entry into first homeownership is becoming increasingly difficult. If the positive results of home ownership on child development that have been reported in overseas studies hold within the Australian context, it should be of policy concern that rising numbers of families will have to raise their children in renter rather than owner households, thus depriving increasing numbers of Australian children of the potential benefits of homeownership, including behavioural and health benefits, and improved academic outcomes and lifetime prospects.

High-rise living has also been increasing in Australia's major cities in recent years. The number of residents who live in high-rise buildings comprises not just private renters or owners of high-rise apartments, but also residents who live in high-rise public housing estates. While residence in privately rented or owned apartments are viewed as a symbol of affluence, residents in public housing estates are often stigmatised and face issues of social exclusion (Henderson-Wilson 2008). Nevertheless, for both groups there are health implications, as have been evidenced in the literature. However, the effects of high-rise living on child development have not been statistically examined in Australia despite the continual trend towards construction of high-rise buildings across all housing tenures.

The overseas literature have also shown that size and type of impacts of housing factors, and the channels the impacts work through, vary across different stages of child development. For example, the summary presented in Table 1 indicates that neighbourhood effects are strongest for adolescents due to the influence of peers, in particular effects on educational outcomes. However, neighbourhood effects on infants and preschool children operate indirectly through impacts on parents. In-depth analysis needs to be conducted within the Australian context to uncover the range of impacts that various housing factors can have across all stages of child development in order for government resources to target housing factors that have the strongest impacts and to ensure that each policy is targeted on the appropriate age group.

While the existing Australian statistics are useful in uncovering associations between various housing factors and child developmental outcomes, without empirical analysis it is not possible to assess whether these associations are causal in nature after controlling for confounding factors.

The value of further research could supply more insights and evidence to support policy directions within the Australian context. The current scoping study relies on overseas evidence, and the somewhat patchy Australian statistics. Further empirical analysis that uncovers *causal* links will be required in order to address questions such as whether housing policy is on the right track to promote positive developmental outcomes for Indigenous and non-Indigenous children, and what modifications or additions to housing policy are required to more effectively influence child development in Australia.

In recognition of the importance of further research to generate a robust evidence base to inform policy-making, Chapter 5 presents findings from an audit of Australian data that can potentially be used for empirical analysis of the effects of housing factors on children's outcomes, highlights the methodological challenges of such analysis, and recommends potential approaches that can be used to address these challenges.

5 TOWARDS A RESEARCH STRATEGY

The literature reviewed to date leaves no question that housing-related circumstances are an important part of the wider environment that shapes the physical and mental wellbeing of children and their preparation for adulthood. Evidence of this is clear from extensive international studies and more limited Australian studies showing associations between child health and development and housing factors such as the state of repair of homes, security of tenure, adequacy of space, and neighbourhood amenities and characteristics. Given these associations between housing and children's wellbeing and development, ultimately we would like to be able to say something about how resources for housing should be allocated and managed in order to maximise the wellbeing of young Australians, given the competing demands for such resources. Such information would be highly valuable at many levels—from individual families, building companies and regulators, town planners, environmental regulators, public and community housing agencies, to numerous state and Commonwealth departments.

However, much of the evidence on factors determining child developmental outcomes arises from the international literature and may not be wholly applicable in the Australian context given Australia's unique socio-demographic, economic and institutional environment. Most importantly, however, the evidence required to inform such practices and policies requires more than empirical associations. It requires, at accepted levels of statistical confidence, evidence of causal effects from housing variables to child wellbeing and the magnitude of those effects. Establishing causality in social and economic research is always difficult and, for many reasons, is especially challenging in the area of housing. However, that is not to say that statistical results of a descriptive nature data are not of some value. They assist in the development of theory through the formulation and testing of hypotheses, and provide an indication of the likely bounds of causal effects. And even if housing factors, such as overcrowding or the socio-economic status of neighbourhoods, act only as a marker of other problems, they still provide valuable information for the targeting and delivery of programs.

This section first offers an overview of some of the key research questions identified in the preceding chapters and potential priorities for research and policy. Second, the methodological challenges that researchers face in answering these questions and providing an appropriate evidence base to inform policy and practice are discussed. An extensive audit of Australian datasets potentially suitable for such analyses is then presented. The section concludes with an assessment of the feasibility for empirical research to identify causal links between housing and child development in Australia and recommendations on future research directions.

5.1 Overview of the review findings

Sections 2 to 4 of this report review existing theory and literature on the connections between housing and childhood development and wellbeing. Here we summarise the findings against the specific research questions addressed in this report, namely:

- What aspects of housing and housing assistance have been demonstrated to influence children's development and wellbeing?
- What are the implications of this influence for housing policy and programs?

5.1.1 What aspects of housing and housing assistance have been demonstrated to influence children's development and wellbeing?

Chapter 2 described Bronfenbrenner's bio-ecological theory that provided the overarching conceptual framework for the literature review. It is premised on the belief that features outside the child's ecology or immediate environment can, and frequently do, impact on the child's development. Bronfenbrenner's bio-ecological theory challenges the predominant view that individuals always have the capacity to act independently and to make their own free choices by drawing attention to the proximal contexts of family, school and community and the distal structural components of society, culture, economic influence and politics that are largely outside the sphere of the child's and family's influence.

Aspects of the home that were empirically identified by the existing literature to influence children's development included:

- environmental allergens
- toxicants
- cleanliness, housing disrepair and safety
- building height and opportunities for outdoor play
- crowding
- housing affordability
- homeownership
- frequent residential moves
- homelessness.

We further reviewed five models explaining the mechanisms of influence, developed by studies on the impacts of neighbourhood conditions on the development of children. These five models were the contagion, collective socialisation, competition, relative deprivation and neighbourhood institutional resource models (Jencks & Mayer 1990; Brooks-Gunn et al. 1993; Leventhal & Brooks-Gunn 2000), as detailed in Chapter 2.

Against the backdrop of the framework discussed in chapter 2, chapter 3 outlined the key connections between housing and child development by providing a detailed review of existing studies drawn from a range of disciplines including sociology, epidemiology, economics, housing policy, social welfare, health, medicine, child development and psychology.

Strong links between various housing variables and multiple child developmental outcomes were uncovered. Some of these effects appear to be irreversible and continued on into adulthood, such as the adverse effects of allergens on respiratory illnesses and negative effects of toxicants on various child developmental outcomes, and the positive impacts of homeownership on lifetime prospects.

Variations in the effects of a housing characteristic at different stages of a child's life course were also uncovered. For example, the adverse effects of unclean and unsafe housing, housing disrepair and residence in high levels is greatest among young children who spend most of their time indoors at home under parental restrictions. Crowding was found to lead to negative effects in all stages of development, including reduced mental development at 18–24 months of age, reduced verbal and perceptual development at 30, 36 and 42 months, and poorer language development at 39 months, reduced IQ scores at age 30 months, and other varied effects as a child

grows, such as poorer reading test performance among elementary school children and negative impact on learning in elementary and middle school. Unaffordable housing was found to affect children most during early childhood via its adverse impact on the family's ability to access basic necessities. Neighbourhood effects appeared to be strongest for their educational outcomes in particular due to the influence of peers. A summary of the key links between housing variables and child development at various life stages as reported in the existing literature is reported in Table 1.

The literature review revealed the complexity of the factors shaping childhood development and wellbeing: they are often interrelated and frequently multiplied by coincident factors. As a result, housing can impact on children's development and wellbeing through both direct and indirect mechanisms. Links were found, for example, between housing disrepair and multiple allergens and toxicants. Inability to afford housing was linked to frequent moves, shared housing with other families, crowding, or even homelessness. However, there were also potentially positive neighbourhood effects. Homeownership reduced the frequency of moves and school transitions. Owner-occupiers also have a greater incentive to invest in their homes resulting in a higher quality of housing. All of these interrelationships can exert strong indirect influences on children's development through influences on parental practices, especially for infants and young children.

We reviewed a small but growing pool of literature examining the impact of housing assistance on child development and wellbeing. The majority focused on children's educational and health outcomes and were from the United States. These studies revealed both positive and negative effects of housing assistance on children's outcomes, with no consensus on whether positive or negative effects dominate. Four critical features of public housing were highlighted:

- Promotion of housing affordability through rental subsidy.
- Greater security of tenure.
- Housing quality.
- Neighbourhood effect.

Evaluations of tenant-based assistance programs suggest that relocating tenants to suburbs with wider opportunities has an important positive effect on educational performance. However, the positive effect on education is offset by negative effects of broken social networks with old neighbours and difficulties associated with forming new bonds when families move from one neighbourhood to another.

There is noticeably a lack of nationally representative empirical research conducted in Australia on the links between housing and child development, with the rare exception of an Australian study by Edwards and Bromfield (2008). Hence, much of the literature reviewed was from overseas.

5.1.2 What are the implications of this influence for housing policy and programs?

Available Australian statistics confirmed that associations between various housing aspects and child developmental outcomes uncovered in the overseas literature also existed in Australia. For example, existing data reported in chapter 4 showed that there is higher rate of household exposure to smokers among Australian children with asthma than those without asthma. Recent AHURI research findings on housing affordability indicated that low-income sole parents appear to experience a higher incidence of housing stress than other low-income households and that precarious

housing affordability circumstances are particularly evident among younger couples with dependent children, a stage in the life cycle associated with pressing spending needs. However, based on the Canadian National Occupancy Standard the proportion of Australian households living in overcrowded homes appears to be very low. Worryingly, existing Australian data indicated that children make up a significant proportion of the homeless in Australia.

Existing statistics clearly showed that the housing experiences of Indigenous children are significantly worse than those experienced by non-Indigenous children. Children in remote Indigenous communities may experience more difficulties in accessing basic housing and services due to their isolation from large population centres. Indigenous children are also more likely to be exposed to indoor smoke, and a significant proportion lived in poor quality housing. While overcrowding does not appear to be a problem for the general population, Indigenous people were more likely to live in overcrowded homes than non-Indigenous people across all age groups. The incidence of overcrowding is over 30 per cent among Indigenous adolescents and youths aged 15–24 years. Indigenous children are also over-represented among homeless children in Australia.

In Australia, public housing typically targets the most disadvantaged families. Hence, children in families with urgent housing needs, such as children of domestic violence victims or homeless children, have priority access to this form of housing assistance, which enables low-income families to enjoy affordable housing in a location of their preference. State or territory housing authorities also operate pest policies that provide safeguards against pesticides that are harmful to children's health. The potential for overcrowding is reduced in public housing due to policies that ensure that each applicant household is allocated a property containing the number of bedrooms to match household size, with families with children usually being given preferential access to larger dwellings. Housing assistance to private renters is provided in the form of CRA. The rent threshold at which the maximum CRA is paid is dependent on family size, increasing from \$304 to \$389 from singles with one or two children to couples with three or more children. This ensures that larger families receive higher levels of CRA, helping to decrease the likelihood of large families having to crowd into housing with inadequate space due to the higher housing costs associated with raising a larger family.

The Australian statistical data on housing and child developmental outcomes and the overview of Australian housing policies relevant to children reviewed in chapter 4 indicated that associations between various housing aspects and child developmental outcomes uncovered in the overseas literature also exist within the Australian context. However, without empirical analysis it is not possible to assess whether these associations are causal in nature. A review of housing policies that affect children provided in chapter 4 also showed that there were housing policies in Australia that aimed to promote positive developmental outcomes among Australian children. Again, without empirical analysis, it is not possible to identify the causal effect of current Australian housing policy settings on child development.

At this *preliminary* stage of the project, three issues arise as being of particular policy concern and in urgent need of research attention in Australia. First, it is worrying that the data shows that children make up a significant proportion of the homeless in Australia. If the links between homelessness and child development as uncovered by the overseas literature applies in Australia, then the adverse effects in children to be anticipated can include psychological distress (e.g. depression and anxiety), personal, social and language developmental difficulties, emotional developmental delays among pre-schoolers, health and hunger problems and poor academic performance.

Second, the housing experiences of Indigenous children are significantly worse than those experienced by non-Indigenous children. Coupled with the evidence that many adverse effects of poor housing circumstances may be irreversible and persist into adulthood, it is clear that housing policy is a critical instrument that could significantly impact the lifetime prospects of Indigenous children. Future research is urgently required to provide a better understanding of the causal links between housing and developmental outcomes of Indigenous children and, in doing so, offer ideas for policy action for consideration by Australian policy-makers.

Third, findings reported in this chapter indicate that housing stress in Australia is particularly prevalent among households with children. Further research is required to gauge the extent to which housing stress has a detrimental impact on Australian children, and the channels through which housing stress exerts its effects on children.

5.2 Methodological challenges

5.2.1 Interactions between housing and non-housing factors

The literature review has uncovered key methodological challenges in identifying causal relationships between housing circumstances and developmental outcomes for children. The methodological challenges can be generalised as shown in Figure 6. As with previous figures:

- The continuous arrows (—▶) represent direct pathways through which each factor impacts on child development.
- The dashed arrows (---▶) represent inter-relationships between two housing factors.
- The dotted arrows (.....▶) represent inter-relationships between a non-housing factor and a housing factor.

First, there is a wide range of potentially 'causal' housing factors. A simple hypothetical example of children being impacted by more than one causal housing factor is as follows. A low-income family may have insufficient income to meet their housing costs and hence suffer from both housing affordability stress and housing disrepair. In the diagram these multiple housing factors are represented by housing factor 1 and housing factor 2.

Second, there is a diverse range of direct and indirect channels through which housing factors might impact upon children. A housing factor may have:

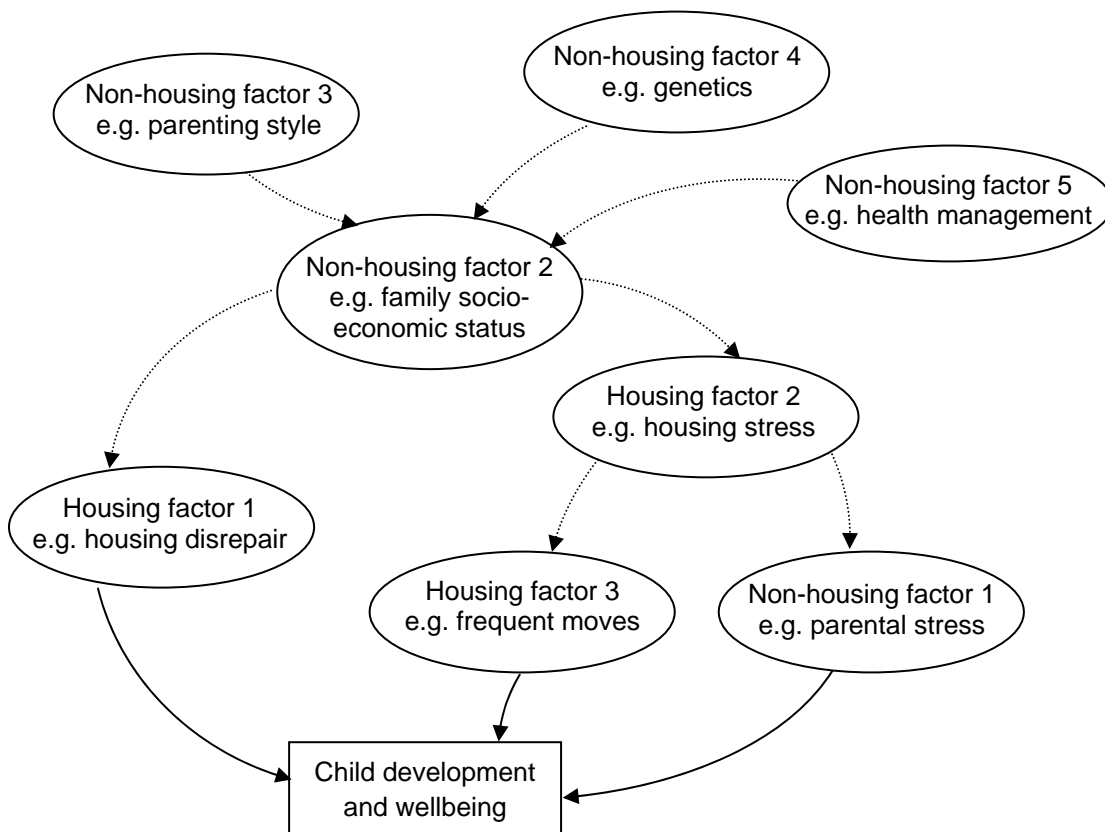
- A *direct* impact on child development, e.g. housing disrepair can increase the probability of injuries suffered by children at home (in Figure 6, housing factor 1 has a direct impact on children's development).
- An *indirect* impact on child development through other *housing* factors, e.g. housing stress can indirectly affect child development by necessitating frequent moves that in turn reduces stability for children (housing factor 2 has an indirect impact on children's development by creating housing factor 3).
- An *indirect* impact on child development through *non-housing* factors, e.g. housing stress can increase parental stress that can in turn adversely affect child development (housing factor 2 has an indirect impact on children's development through non-housing factor 1).

Third, a housing factor may itself be driven by non-housing factors. For example, the example of the low-income family above clearly demonstrates that low income may be the starting point that results in housing stress and housing disrepair, which in turn results in adverse developmental outcomes for children (housing factors 1 and 2 can

both result from non-housing factor 2). Existing studies have shown that the most important integrating non-housing factor for these effects is parental or family socio-economic status, which itself is a multifaceted concept, but is most commonly measured through family income or parental education. It is well established that there is a steep gradient between family socio-economic status and children's health and it seems that much of this is transmitted through 'post-birth' parental factors in addition to pre-birth (genetic) factors (Case, Lubotsky & Paxson 2002; Björklund, Jäntti & Solon 2007).

This report has identified ten main aspects of housing that influence children's development, including cleanliness, crowding, affordability, homelessness and the surrounding neighbourhood (see Section 3.4). Variables relating to all ten of those categories will be affected by family socio-economic status. Those from higher socio-economic status will, on average, live in larger, cleaner homes that are in better repair, be more likely to be homeowners or free of housing affordability stress, and to live in safer neighbourhoods with better services and amenities. Moreover, socio-economic status is related to confounding variables unrelated to housing, such as available resources, parenting styles, ability to manage health issues, and genetics (in Figure 6, non-housing factor 2 is in turn affected by non-housing factors 3, 4 and 5).

Figure 6: Pathways through which housing and non-housing factors affect child development



Thus, it is extremely difficult to identify causal relationships running from housing variables to differences in wellbeing and developmental outcomes between children, or to disentangle the relative contributions of the various housing and non-housing factors. However, as outlined above, it is robust evidence of causal relationships and an appreciation of their magnitude that is necessary to inform policy. In theory, when there are numerous factors impacting upon an outcome variable, then as long as the analyst has robust measures for all the impacting factors, can correctly specify the nature of the relationships between the variables and has a sufficiently large number of observations, then it is possible to use multivariate techniques to isolate the independent impact of one factor while controlling for all the others. In practice, these perfect conditions rarely, if ever, apply and are even less likely than usual to be met in the current context.

5.2.2 Temporal nature of the relationship between housing and child development and wellbeing

A further complication relates to the temporal nature of the relationships between housing variables and outcomes. Many of the causal effects of housing factors will be cumulative, with the level of impact dependent upon the length of time living with those conditions. Developmental outcomes observed at any point in time may therefore be a result of previous housing circumstances rather than current ones. Similarly, the impact of housing conditions observed at any point in time may only materialise in the future. Yet, in most studies, observations on child outcomes and their housing circumstances are made at the same point in time.

5.3 Potential methodological approaches

5.3.1 Longitudinal and retrospective data analysis

Longitudinal data may assist researchers to isolate causal effects from the confounding effects outlined above. It allows controls for initial conditions by, for example, analysing *changes* in child developmental outcomes between two points of time. Other unobservable fixed effects are also controlled for when repeat observations are made on the same individuals. Observing the same child at two multiple points in time and controlling for unobservable fixed effects are not possible with cross-sectional data. In the housing context, the benefit of longitudinal data will be enhanced if we are able to observe the same child living in both 'good' and 'bad' housing circumstances over the data timeframe.

However, we acknowledge the main confounding factor of socio-economic status is persistent, so generally we do not observe the same child living in both low and high socio-economic settings and certainly any genetic traits passed on are immutable. Equally, in reality, in most datasets those of higher socio-economic status will remain in superior housing over those of low socio-economic status over time.

Longitudinal data helps to address the temporal nature of the relationships between housing and children's outcomes to the extent that a fuller history of housing circumstances can be constructed, and outcomes can be related to past (lagged) housing variables.³ Furthermore, some datasets gather recall information that allows researchers to reconstruct housing histories. For example, the HILDA Survey contains information on the number of times a person has changed address in the last ten years.

³ Even still, longitudinal measurement of housing variables may represent a very partial picture of housing circumstances, especially for families that move regularly.

At the very least, it is critical that information on the time in which the family has lived at the current address is available. This still involves the assumption that the characteristics of the current residence have remained relatively constant, which may not always hold.

For this research purpose, a key benefit of longitudinal data lies in the ability to develop richer histories, and thus superior measures, of housing circumstances and child developmental outcomes as opposed to the more usual benefits of a greater ability to identify causality.

5.3.2 Exploiting sources of exogenous variation

Apart from the use of longitudinal data, researchers are still likely to have to seek out and exploit other sources of exogenous variation in housing variables to identify causality. This can be done through the use of instrumental variables techniques, matching methods or natural experiments, which can be applied to both longitudinal and cross-sectional data. For example, to identify the impact of space for playing, one might use the variation in available space between housing in inner-metropolitan, outer-metropolitan and regional areas for families controlling for socio-economic status. While such an approach could be done equally with cross-sectional or longitudinal data, longitudinal data still offers advantages for analysing the impact of policy changes by providing observations on individuals both before and after the policy is implemented. This is particularly useful when some in the sample are affected by the policy change and some are not, allowing comparison groups to be constructed.

5.4 Data audit—national surveys

These challenges place strict requirements on datasets if they are to be suitable for empirical analysis of the links between housing and child developmental outcomes. First, and most obviously, the data must contain detailed information on indicators of childhood development and wellbeing outcomes as well as housing variables. Second, to have the capacity to inform policy development and evaluation, datasets would ideally satisfy the following criteria:

- Comprise large, representative samples so that findings from the data can be generalised to the Australian population, and to over-represent Indigenous Australians in the sampling frame if they are to be used to address Indigenous issues.
- Contain variables that allow confounding influences to be controlled for, so that the causal impact of housing on childhood outcomes can be effectively isolated. It is critical that datasets contain robust measures of parental/family socio-economic status.
- Be longitudinal. A longitudinal design facilitates better measurement of housing and child outcome variables, and offers some advantages in identifying causal pathways through which housing influences outcomes at different stages of childhood. It also allows the impacts of policy changes to be monitored and evaluated subsequent to the implementation of the program. If data are cross-sectional, it is imperative to at least have information on the time spent in the current residence and preferably additional information on housing histories.

Furthermore, for the analysis of outcomes for Indigenous children, we must accept that cultural differences may mean that the results from the general population cannot be assumed to extend to Indigenous populations, other than those founded in clear biological or deterministic processes. Overcrowding and transience, for example, may result from very different factors and have very different connotations for Indigenous

families as for non-Indigenous families. For modelling the impacts of housing variables on child outcomes, this implies that separate models need to be estimated for the Indigenous population for most purposes. Given the small proportion of Indigenous people in the population, this also means that specific surveys of Indigenous people or surveys that over-sample the Indigenous population, rather than general population surveys, will be necessary to provide sufficient sample sizes to support statistically robust analysis.

A number of datasets have been identified that meet at least some of these criteria and were assessed as having some potential for analysis to inform on the research questions of interest. These are:

- National longitudinal surveys
 - Longitudinal Study of Australian Children (LSAC).
 - Longitudinal Surveys of Australian Youth (LSAY).
 - Household, Income and Labour Dynamics in Australia (HILDA) Survey.
- Indigenous specific surveys
 - Longitudinal Study of Indigenous Children (LSIC).
 - Western Australian Aboriginal Child Health Survey (WAACHS).
 - National Aboriginal and Torres Strait Islander Health Survey (NATSIHS).
- State-based child health and wellbeing surveys
 - New South Wales (NSW) Child Health Survey.
 - Victorian Child Health and Wellbeing Survey (VCHWS).
 - Tasmanian Child Health and Wellbeing Survey (TasCHWS).
 - Western Australian Child Health Survey (WACHS).
 - Western Australian Pregnancy Cohort (Raine) Study.
- Upcoming surveys
 - Peel Child Health Study.
 - New Victorian Child Surveys.

In the data audit contained below each of these datasets is assessed against the criteria listed above. They are also assessed to ensure their capacity to identify causal links between housing and child developmental outcomes and to inform policy and practice in light of the methodological challenges discussed in this section.⁴

5.4.1 Growing up in Australia: the longitudinal study of Australian children (LSAC)

Survey background

Growing up in Australia: the longitudinal study of Australian children (LSAC), is managed jointly by the Department of Families, Housing, Community Services and Indigenous Affairs (DFaHCSIA), the Australian Institute of Family Studies (AIFS), and the Australian Bureau of Statistics (ABS). The study is designed to identify policy opportunities for improving support for children and their families and to inform

⁴ Note that in a preliminary report to this one, the Australian Temperament Project was flagged as one of the studies to be assessed, but upon investigation it was deemed that the housing information was too limited to warrant inclusion.

intervention and prevention strategies by addressing a range of key questions about children's development and wellbeing. Information is collected on the children's physical health and social, cognitive and emotional development, as well as their experiences in key environments such as the family, community, childcare, preschool and school settings.

The project employs a multiple cohort, cross-sequential, longitudinal design. Waves of data are collected every two years for two cohorts of children: infants (B cohort) at the commencement of the study and four to five-year-old children (K cohort) at the commencement of the study. The study commenced in 2004 and, as of 2009, has now completed three waves. Thus, data is currently available across three waves on children ranging in age from 0–9 years. The study will continue to follow these two cohorts of children to the ages of 14–15 years and 18–19 years. As at the most recent wave (Wave 3), the sample size is 8781 families (4386 B cohort aged 4–5 years and 4395 K cohort, aged 8–9 years). The sample was selected through the Medicare Australia database: the primary sampling unit was postcode stratified by state/territory and city/rest of state statistical division. In the two-stage cluster design, postcodes were selected first, followed by children (who are the sample focus). The LSAC sample is an Australian representative population matched to the ABS population estimates.

Information is collected from the children's parents, teachers, care providers and the older cohort children as of wave two. Data collection includes the main method of parent face-to-face interview, self-complete parent questionnaires, interviewer observations, direct physical measurements and assessments of cognitive development, time-use diaries, and mailed out self-complete questionnaires.

Key indicators of children's wellbeing and development

The LSAC has excellent variables on child health and developmental outcomes, and is exceptionally rich in indicators of development. For physical health, these include measures of general physical health and information available on hospitalisations and ongoing health conditions. There are also items asking about ongoing problems with difficulty breathing, sleeping difficulties, frequent headaches, abdominal pain, injuries and 'other infections', but no specific information on infectious diseases. Direct measures of weight, height and, for children over two, girth, are taken by the interviewer.

A range of established child development measures are included in the survey instruments covering physical, emotional and cognitive development. For the appropriate ages, these include the Parental Evaluation of Development Status (PEDS) measures for gross and fine motor skills and language skills; the 'Who am I?' test for general cognitive abilities; the Communication and Symbolic Behaviour Scales Development Profile; Peabody Picture Vocabulary Tests, the Australian Early Development Index; and the Matrix Reasoning Test. These items cover a wide range of outcomes such as behavioural development, social competence, regulation of emotion and attention. For those in school, indicators of literacy, numeracy and language development are available, along with teacher assessments of school achievement, self-esteem and self-efficacy.

Housing variables

For a social survey not specifically related to housing variables, the LSAC does contain quite rich data on housing circumstances and this extends to neighbourhood characteristics. More specifically, the data items include:

- Interviewer observations on internal and external conditions and repair of the home and surrounding buildings, and the number of high rise building and apartments in the area.
- Information on the dwelling type and, if an apartment block, how many stories.
- A Neighbourhood Liveability Scale plus other information on neighbourhood facilities, including parks, playgrounds and play spaces nearby, and whether or not the residence is on a main traffic route.
- Presence of pets.
- Information on the size of the property and number of residents, allowing measures of crowding to be constructed.
- Housing tenure (renting, owner with mortgage, owned outright) and housing affordability (rent/mortgage payments) and approximate value of the home, plus other indicators of family financial hardship.
- ABS generated socio-economic indices of the neighbourhood available at Collection District level.
- Mobility—number of moves by the family since the child's birth and the distance of the most recent move.

There is, however, no direct information on the presence of toxicants or periods of homelessness.

Control variables

The LSAC contains key control variables relating to parental demographics, socio-economic status and health behaviour and risk factors. These include parental education, occupation, work status and work patterns (e.g. whether works shift work). In addition to information on parental smoking and drinking, data are available on risk factors during pregnancy.

Accessing the data

The data is readily accessible at minimal cost. Researchers submit an application online and must sign a Deed of confidentiality. Once approved, the data is sent on a CD. There is generally a time lag between application and access of just two to four weeks. The costs for the most recent release were \$77 per person or \$330 for an institutional licence. Some data items are available only in a confidentialised file, which is much harder to access; researchers using the confidentialised file need to justify why this access is required and provide a high-security data storage facility.

Assessment of data's suitability for empirical analysis of the relationship between housing and children's wellbeing

The LSAC data set would appear to be the most suitable of the datasets reviewed for empirical analysis of the relationship between housing and children's wellbeing. It has a number of strengths. It is a large, Australian representative, longitudinal dataset that provides detailed, comprehensive information on indicators of childhood development and wellbeing outcomes with a large choice of variables to control for confounding influences. Although the information on housing is not as detailed as child outcomes, there appears to be adequate housing information to measure the effects of housing on childhood outcomes across the participant's childhoods. Thus, the dataset does fulfil the criterion of being able to inform policy evaluation and development, and allow the impacts of policy changes to be monitored. However, the dataset does have some weaknesses. It does not contain information on environmental allergens and toxicants, or details of infectious diseases. In addition, some child outcome measures

such as contact with the justice system, drug abuse, and whether they are in the state protection system due to abuse and homelessness is also not available.

5.4.2 The Longitudinal Surveys of Australian Youth (LSAY)

Information on the LSAY in this section have been sourced from the LSAY website, managed by the Department of Education, Employment and Workplace Relations (DEEWR) and the National Centre for Vocational Education Research (NCVER) unless stated otherwise.

Survey background

The Longitudinal Surveys of Australian Youth (LSAY) are nationally representative surveys that track young people as they move from school into further study, work or other destinations. The key aim of the LSAY is to assemble data on young people's education and training, their school to post-school destinations, and social development and wellbeing. The LSAY has tracked five cohorts of young people so far. The 1995 and 1998 cohorts were tracked from when they were in year 9, and the 2003, 2006 and 2009 cohorts were tracked from when they turned 15 years. Participants in each cohort are interviewed annually until they turn 25 years of age. Each cohort contains over 10 000 students in the initial wave of commencement. The LSAY are funded by DEEWR, with support from state and territory governments. LSAY data are currently collected through computer-assisted telephone interviewing (CATI) undertaken by the Wallis Consulting Group, and access requirements are managed by the Australian Social Science Data Archive (ASSDA).

The dataset contains a rich set of variables relating to learning achievements and social attitudes of youths aged 15 to 25 years, and their transition paths from school to work. It comprises large, representative samples with corresponding sampling and attrition weights so that findings from the data can be generalised to the Australian population.

Key indicators of children's wellbeing and development

The LSAY collect a range of indicators of young people's wellbeing and development. These include indicators of student achievement, school retention and social attitudes. Importantly, from 2003 onwards, the initial survey wave has been integrated with the Organisation for Economic Cooperation and Development (OECD) Programme for International Student Assessment (PISA) such that most of the 15-year-old students selected to participate in the PISA in a particular year also form the LSAY cohort in that year—e.g. most of the 2003 PISA participants also form the 2003 LSAY cohort, who are then tracked annually until they turn 25 years of age. The PISA administers assessments in mathematical literacy, reading literacy, scientific literacy and problem solving to students to provide information on school achievement. Social development and attitudes are captured through questions about young people's happiness with their social life, their relationships with others, etc.

Housing variables

The key housing variables available from the LSAY are variables related to space, which can be indicators for over-crowding. Key variables include whether participants have possession of their own room and possession of their own study place. In the initial wave of each survey, participants are living in their parental homes. It is possible to observe transitions into home ownership or renting when participants leave their parental homes. However, there is no information on the physical characteristics of the parental home or neighbourhood amenities, nor on the homes in which young people move into after leaving their parental home.

Control variables

While there are a range of control variables available from the LSAY, these are primarily geared towards explaining education and early career outcomes. Standard individual control variables relate to the participants' own socio-demographic characteristics such as age, gender, Indigenous status and ethnicity, plus standardised scores on literacy and numeracy tests. The main controls available for family socio-economic status are parental education and occupation, but these are of relatively poor quality with a large number of missing cases and codings that provide limited information. The LSAY also contains data on participants' school characteristics, e.g. whether their schools are government, independent or Catholic, how they feel about their school environments. Participants' access to study related resources such as a desk, computer, literature or calculator are also recorded in the LSAY.

Accessing the data

The LSAY data are deposited with the ASSDA. The data is made available to data applicants for free if they belong to an institution that is a member of the Australian Consortium for Social and Political Research Incorporated (ACSPRI). Most Australian universities and several government institutions are ACSPRI members, including universities within the AHURI network (ACSPRI 2009).

Assessment of data's suitability for empirical analysis of the relationship between housing and children's wellbeing

The LSAY offers very limited scope for this purpose. In terms of child developmental outcomes, it is best suited to the analysis of educational outcomes and early career transitions. Even here, the key weakness of the dataset is the lack of variables relating to either concurrent housing and neighbourhood circumstances or those in earlier childhood. Hence, the dataset suitability is restricted to the analysis of the impacts of overcrowding and lack of personal study space on young persons' learning and early career outcomes. The data on family socio-economic background are also generally not adequate to allow controls for the many potential channels through which socio-economic status impact upon child outcomes. This is unfortunate given the other strengths of the data; namely large representative samples, a longitudinal dimension of up to 12 waves and several repeated cohorts.

5.4.3 Household, Income and Labour Dynamics in Australia (HILDA) Survey

Survey background

HILDA is Australia's first nationally representative household panel survey and commenced with the Wave 1 surveys of a sample of private residences in 2001 (see <http://www.melbourneinstitute.com/hilda/> and various annual reports). The main objective of the survey is to support research into three main areas—income dynamics, labour market dynamics and family dynamics. The survey consists of a number of survey instruments: a person survey completed by interview with each individual in the household aged 15 and over; a self-completion form completed by those same individuals, and a household form completed by one adult member of the household. The same individuals are interviewed each year, and the sample frame is designed such that the sample grows in line with household dissolution and formation—new people entering a HILDA household or turning 15 become part of the survey, and when individuals leave a HILDA household to form new households, the members of that new household come into the scope of the survey. The Wave 1 survey collected information from 7682 households and 19 914 individuals, and Wave 8 data (from surveys in 2008) became available early in 2010.

Key indicators of children's wellbeing and development

A major limitation of the HILDA data is that information on child wellbeing and developmental outcomes is not available for household members until they turn 15 and come into the scope of the survey. Children under 15 are, however, enumerated, so their presence in the household and basic demographic information such as age, gender and relationship to other household members is known. Once young people become respondents, there is only a limited number of variables relating to wellbeing and developmental outcomes—self-assessed health and change in health, presence of long-term health conditions, educational attainment and labour market outcomes, subjective wellbeing—satisfaction with life and in a range of life domains, and the questions from the SF-36 (Medical Outcomes Study Short-Form Instrument) which can be used to generate an overall measure of health, and of physical and mental health.

Housing variables

Available housing variables include the ABS socio-economic indices for the collection district; interviewer observations of the type of dwelling, assessment of external condition, number of high rise flats visible around dwelling; self-reported housing tenure, satisfaction with 'the home in which you live' and 'the neighbourhood in which you live', time in current residence and reasons for moving in the past 12 months.

The self-completion questionnaire asks respondents to assess how adequate their housing is for their current needs with respect to: living space, number of bedrooms, comfort (e.g. light, temperature, dampness, distance from public transport, access to services and for housing needs in general). It also asks how common a series of things are in the neighbourhood, including neighbours helping each other out, loud traffic noise, homes and gardens in bad condition, rubbish and litter lying around, antisocial behaviours and crime.

Control variables

As most young people in the HILDA survey live with their parents, who are respondents to the survey, very detailed parental and family socio-economic data is available, covering educational attainment, occupation, work patterns, income and wealth. There is also some information on parenting styles/attitudes and self assessment of the quality of relationships between parents and children. Measures of physical and mental health of parents/guardians are also available.

Accessing the data

The data is readily accessible on a CD subject to completion of an application form to DFahCSIA setting out the intended use of the data and signing of a deed of licence. For individual users, the charge for the Wave 8 release (which incorporates all previous waves) is \$77 for individuals and \$330 for an organisational licence. The process of acquiring the data generally takes around two weeks. More detailed versions of the data can be obtained, but with stricter data protection and security requirements.

Assessment of data's suitability for empirical analysis of the relationship between housing and children's wellbeing

The main way that the HILDA data can be used for this purpose is to relate outcomes observed for adolescents coming into the scope of the survey to earlier recorded housing and other circumstances. The LSAY is similarly limited in not having child wellbeing and development measures at younger ages, however, it has a much larger cohort of young people. In HILDA, there are typically only around 200 15-year-old

respondents in each wave, and empirical analysis is likely to need to rely on *stacked* cohorts. The potential for analysis will increase as the longitudinal dimension grows—for example, the circumstances of the 15-year-olds responding in Wave 8 can now be traced back for every year from when they were aged 8. The controls for various components of socio-economic status are excellent, but the outcome variables are not as rich as in other datasets and this would limit the ability to identify causal channels between housing variables and youth outcomes.

5.5 Indigenous specific surveys

5.5.1 Footprints in time: the Longitudinal Survey of Indigenous Children (LSIC)

Survey background

The purpose of the LSIC is to collect high quality data on the circumstances of Indigenous children and their families, therefore enabling researchers to heighten their understanding of those circumstances and to improve the policy responses required to ‘close the gap’ in socio-economic outcomes between Indigenous and non-Indigenous Australians. An extensive consultation process was undertaken to incorporate Indigenous viewpoints and priorities in the development of the questionnaires. Four main research areas are identified as (DFaHCSIA 2009a, p.6):

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

The LSIC follows a similar sampling frame to the LSAC in that it will follow two cohorts, one a cohort of babies (mostly aged less than three years) and the other a child cohort (mostly aged three or four years). The target sample was 1650 children, consisting of 150 children from each of 11 sites chosen to allow representation of urban, regional and remote areas. Commencing from April 2008, data were collected from face-to-face interviews with the primary carer, typically the parent who knows the child best, but a secondary carer may also be interviewed if necessary. The other main survey instrument is the Child Questionnaire, involving direct observations of the study child made by the interviewer and covering items such as vocabulary and picture tests. Supplementary data were collected from teachers, child care centres and day care providers.

The survey is longitudinal, with the same carers and children to be interviewed annually. However, only one wave of data is currently publicly available, with the Wave 1 data having been released in October 2009. The Wave 1 interviews collected information from 1687 parents or primary carers responding with respect to 960 children from the baby cohort and 727 children from the child cohort, and around 1500 child questionnaires were completed (DFaHCSIA 2009a, p.18)

Key indicators of children’s wellbeing and development

As it is designed specifically to address questions about how early childhood circumstances affect later life outcomes, the LSIC contains a number of indicators of survey children’s wellbeing and development, and the survey instruments incorporate

a number of established tests of child development. Most data on child health come from the carer survey, and this includes the parent's/carer's assessment of the child's general health, history of health problems and conditions, hospitalisations and sleeping patterns. Weight, height and length measurements are taken directly by the interviewer if possible, or otherwise recorded from information provided by the carer.

The carer survey also includes a version of the Parental Evaluation of Developmental Status (PEDS) instrument. Other indicators of development are generated through direct tests and observations on the child by the interviewers. These include picture based assessments of vocabulary, the 'Who am I?' test for general cognitive abilities. For the child cohort (aged three and a half and upwards) questions from Goodman's 'Strengths and Difficulties' questionnaire relating to child behaviour are asked.

Housing variables

Housing related data are limited, but several of the key variables of interest are included. Information on the child's housing circumstances is collected through the Parent/Carer questionnaire and interviewer assessment of dwelling type and street traffic. The information collected from the carer includes mobility since birth of the child; ownership or rental status; major instances of disrepair; and assessment of the community neighbourhood for playing and safety. Data on the number of occupants and bedrooms permit the generation of overcrowding measures.

Control variables

The survey data includes important control variables that may potentially confound or mediate the relationships between housing and child outcomes. These include good quality measures of parental socio-economic status (education, employment status, financial circumstances), maternal risk factors during pregnancy or early childhood (e.g. drinking, smoking, diabetes) and parenting behaviour. Data on the child's gestation term, birth weight, breastfeeding patterns, diet and attendance in childcare offer other potentially important control variables for isolating housing effects.

Accessing the data

As with the LSAC, the data is readily accessible through DFaHCSIA at a nominal charge to cover administrative costs. Researchers submit an application on-line and must sign a Deed of Confidentiality. Once approved, the data is sent on a CD. The costs for the most recent release were \$77 per person or \$330 for an institutional licence.

Assessment of data's suitability for empirical analysis of the relationship between housing and children's wellbeing

The LSIC provides the best publicly available dataset for assessing the link between housing and the developmental outcomes of Indigenous children. With Indigenous people comprising around 2.5 per cent of the Australian population, there are typically far too few observations in population-based surveys to support detailed, separate analysis of the Indigenous population. Other Indigenous specific surveys, such as the 1994 and 2002 ABS National Aboriginal and Torres Strait Islander Social Surveys, and surveys with expanded Indigenous samples, such as the ABS National Health Survey (Indigenous) do not contain the richness of information on either housing or child health and development that is contained in the LSIC. The Western Australian Aboriginal Child Health Survey (see below) is richer in health related outcomes and control variables, and also has excellent housing data, but is not longitudinal nor as readily accessible.

The LSIC does not contain information on homelessness or environmental allergens and toxicants, and evidence on the amenability of the surrounding neighbourhood for play is approximate at best. The ability of the data to support longitudinal analysis is as yet untested, as the retention and response rates for Wave 2 are not yet publicly available.

5.5.2 Western Australian Aboriginal Child Health Survey (WAACHS)

The data provider and administrator for the WAACHS is Professor Steven Zubrick, Head of the Population Science Division, Telethon Institute for Child Health Research and the Kulunga Research Network. The main information sources for the data audit below are two reports by Steven Zubrick and others from 2005. The development of the LSIC drew extensively on the experiences of the WAACHS.

Survey background

The primary objectives of the WAACHS were to identify developmental and environmental factors that enable competency and resiliency in Aboriginal children and young people. The specific aims of the survey were to:

- Define the health and wellbeing of WA Aboriginal and Torres Strait Island children and young people aged 0–17.
- Estimate the prevalence and distribution of the commonly occurring chronic illnesses and disabilities (e.g. asthma, visual and hearing impairments including intellectual disabilities); the prevalence and distribution of the functional impact of physical health and social and emotional problems in Aboriginal children and young people and their families; prevalence and distribution of risk taking behaviours (smoking, alcohol and drug abuse), prevalence and distribution of early school leaving, conduct problems and juvenile offending.
- Describe the access to, effective use of and satisfaction of the health care, educational, juvenile justice, housing and social services.
- Identify factors that lead to good outcomes despite adversity (resilience).
- Develop markers that identify Aboriginal children and youth at risk.

The WAACHS is a cross-sectional survey. It was based on a stratified multi-stage sample using an area-based sampling frame which was necessary as there was no list of Aboriginal children from which a sample could be selected. The sampling frame was compiled from the 1996 census and included all census collection districts (CDs) where there were at least two children of Aboriginal or Torres Strait Island descent enumerated in the 1996 census. According to the 1996 census, this selection criterion would have excluded 1.4 per cent of the population of in-scope children living in CDs where there was only one Aboriginal child. An important feature of the survey process is that each sampled CD was searched by going door-to-door to identify eligible families.

The survey process: Pilot survey in October 1999; dress rehearsal in April 2000; the main survey between May 2000 and June 2002. The key sampled groups are:

- 5289 children (96% of eligible children)
- 2113 primary carers (95% of eligible carers who identified as the person who knew most about the child)
- 1040 secondary carers (83% of other eligible carers)
- 1073 young people aged 12–17 (73% of all eligible youth).

School principals and teachers provided information about the mental health and academic performance of the participating children and young people.

Key indicators of children's wellbeing and development

All the following variables are available in the dataset:

- physical health, especially infectious and respiratory diseases that are often related to poor housing conditions
- physical functioning and disability
- mental health
- behavioural development
- regulation of emotion and attention
- literacy and numeracy
- achievement of school and work-related goals
- social competence
- self-esteem and self-efficacy
- child obesity and overweight
- drug abuse
- contact with justice system (e.g. offences)
- contact with the state protection system due to maltreatment or abuse etc.

Other important variables include: life stress in the family, cultural participation, a new measure of remoteness called 'Level of Relative Isolation' (LORI) and access to and use of health and social services.

The data has been linked with state wide databases such as the WA Housing Department and Education, the WA Hospital Morbidity Data System, and the Maternal and Child Health Research Database.⁵ Data are linked through probabilistic matching, using identifiers such as full name, address, date of birth and gender that are common to all data sets. Only de-identified data are provided to researchers following multiple reviews by relevant ethics committees and with the approvals of these committees for researchers to access the linked data. The linkage is carried out by the Western Australian Data Linkage Branch, located within the Department of Health of Western Australia, which links Western Australia's core population health datasets. There is a Memorandum of Understanding (MOU) and agreements between the Data Linkage Branch and the data custodians about how the data should be linked and accessed by researchers.⁶

Housing variables

The rich data on child health and developmental outcomes is supplemented by a wide range of housing variables collected through the survey and relating to the physical housing facilities, mobility, characteristics of the neighbourhood and housing tenure, along with matched ABS indices relating to the collection district. Specifically, the data items include:

⁵ At the time of writing of this report, linkages between the WACHS are in the process of being arranged with the WA Juvenile Justice department as well.

⁶ For further details, see Western Australian Data Linkage Branch website <http://www.data-linkage-wa.org.au/>

- crowding; number of people living in the house and the number of bedrooms
- housing affordability; difficulties in renting a place
- homeownership
- months living in the current home per year
- choice of a place to live
- type of housing: private rental, Homewest, Aboriginal Housing Authority, family's place, community housing
- whether or not they have been forced to leave the place where the family was staying and reasons for that
- postcode, suburb and town of the housing
- location variables, e.g. area of usual residence, that is, whether the respondent lives in the capital city, balance of major urban areas, other urban areas or rural areas, and the index of relative socio-economic disadvantage decile within which the collection district of the respondent falls
- location of the housing: level of isolation and remoteness (LORI)
- location of the housing in relation to access to services and transport
- characteristics of the neighbourhood: crime, violence and theft, family violence, child abuse, drug and alcohol problems and juvenile offending, unemployment, family split up, isolation from families and friends, noise and racism
- housing quality: facilities in the house such as running water, heating, cooling, bathroom with shower and toilets and garbage collection
- carers' comments on how their housing can be improved.

Control variables

The WAACHS has very good data on the standard socio-demographic control variables (e.g. age, place of birth, marital status, first/second language, existence of any disability or handicap) and parental socio-economic status (e.g. parents' labour force status, whether sole parent). In addition, it contains information on parents'/careers' mental health, social connectedness, experience of forced removal, cultural participation, use of Aboriginal languages, and living arrangements.

Accessing the data

WAACHS data access costs are \$105 per hour for the production of customised tables (or \$40 for students). For longer-term requests, there is a data laboratory facility—which is \$110 per hour. There are no additional costs. For full details see the ICHR web site <http://www.ichr.uwa.edu.au/files/user1/WAACHS_pricing_policy.pdf>. Applications for access are subject to an initial review and then the approval will be sought from Kulunga Research Network located at the Telethon Institute for Child Health Research (TICHR). The time lag to access depends on staff availability and how many other jobs are in the queue. For full details on issues of access, see <http://www.ichr.uwa.edu.au/files/user1/WAACHS_information_policy.pdf>.

Assessment of data's suitability for empirical analysis of the relationship between housing and children's wellbeing

While WAACHS is not a longitudinal survey, it is the best of all available datasets for research on housing and child development in Aboriginal children and young people in WA and, along with the LSIC, the best in the nation. It is unique in many aspects:

largely representative of the WA Aboriginal children and a wide range of relevant variables available and it has strong Aboriginal input in the design (especially questionnaires) and conduct of the survey. It has an excellent range of outcome variables, measures of a variety of different aspects of housing circumstances and relatively good controls for confounding variables.

5.5.3 National Aboriginal and Torres Strait Islander Health Survey (NATSIHS)

Survey background

The NATSIHS is a household-based survey conducted by the ABS and designed to be nationally representative of the Indigenous population. Its objectives as stated by the ABS (2006d, p.1) are to:

- Provide broad information about the health of Indigenous Australians, by remoteness, and at the national and state/territory levels.
- Allow for the relationships across the health status and health related actions of Indigenous Australians to be explored.
- Provide comparisons over time in the health of Indigenous Australians.
- Provide comparisons with results for the non-Indigenous population from the NHS.

The scope of the survey was Indigenous persons who were usual residences of private dwellings, with adults and children chosen randomly from within the selected households (up to a maximum of two adults and two children from any one household). In non-remote areas, the interviews were conducted using Computer Assisted Interviewing, while in remote areas paper questionnaires were used and some changes in questions made to accommodate language and cultural issues.

The NATSIHS collected information for 9785 Indigenous persons, and the confidentialised unit record file also contains data from 654 Indigenous persons interviewed as part of the National Health Survey. For children aged 0–14 years, and for those aged 15–17 years for which consent for a personal interview was not granted, health information on the child was collected from an adult in the household, termed the 'child proxy'. Thus, the best information on child wellbeing and developmental outcomes comes from that provided by the child proxy, for which the data collection method is constant. Data were collected for 4114 children aged up to 14 years.

Key indicators of children's wellbeing and development

Extensive information on health and health-related behaviours are available for young people aged 15 and over. However, with the survey being a cross-section and no past history on housing circumstances, it is not feasible to relate these conditions to housing. For children aged 14 and under, data is collected on:

- A variety of long-term health conditions (which have or are likely to last six months or more).
- Recent injuries (type, how and where occurred).
- Eyesight, hearing, oral health.
- Time off school due to injury or illness in past two weeks.
- Hospitalisations in last five years, recent visits to doctors.
- Weight and height.

Housing variables

The limited information on housing is collected through the questionnaire completed by the adult household spokesperson. Important information not included relates to the amenability of the neighbourhood for child play, safety and the state of repair for the home. The main variables included are:

- Whether people smoke regularly in the house.
- Housing tenure.
- Over-crowding (number of usual residents and number of bedrooms).
- Interviewer observation of the type of dwelling.
- ABS socio-economic indices for areas (collection districts).

The user manual also warns that ‘... care should be taken in relating the health characteristics of respondents with their housing characteristics, since information is not available from the survey to indicate their length of residence in that dwelling’ (ABS 2006c, p.131).

Control variables

Relevant controls collected through the child survey and reported by the child proxy are dietary behaviour and, for 0–3 year olds, breastfeeding history. Due to there being no information collected directly on the child’s parental and wider family backgrounds, many of the typical controls desired are not available for the main population of interest, namely the children aged 0 to 14 years. Household financial stress is collected through the household spokesperson. Basic demographic information (gender, age, language spoken) is collected about the child proxy. The relationship between the child proxy and the child is recorded, and hence this basic demographic information can be determined as relating to the survey child’s parents or step-parents in most cases.

Accessing the data

The confidentialised unit record files can be accessed through the ABS Remote Data Access Laboratory, and this is freely available to most university researchers following the completion of standard application and undertaking forms. The process typically takes one to two weeks before a username and password is provided, allowing the user to interrogate the data over the internet.

Assessment of data’s suitability for empirical analysis of the relationship between housing and children’s wellbeing

The NATSIHS is ill suited for statistical analysis of this kind. While good measures of child physical and general health status are available, there are no indicators of child development for children aged under 15 years. There is only very limited data on housing variables and inadequate controls for potentially confounding variables, such as family socio-economic status and parenting styles. The lack of historical housing data or longitudinal dimensions largely precludes relating the available housing variable to child health outcomes. The NATSIHS may be useful in providing comparative benchmarks on health status and the prevalence of health conditions for the Indigenous population for researchers working with other datasets.

5.6 State-based child health and wellbeing surveys

5.6.1 The NSW Child Health Survey

Survey background

The NSW Child Health Survey is a survey conducted between March and September 2001 with the chief aim of providing data on the health and wellbeing of children aged 0 to 12 years in NSW. It was conducted by the NSW Department of Health, NSW area health services and NSW Commission for Children and Young People through CATI. Households were randomly selected, and from each household one eligible child was selected (again randomly) and the child's main carer was interviewed. The final sample contains information on 9425 children. Weights are provided so that the sample when weighted is representative of the NSW children population characteristics (Centre for Epidemiology and Research 2002).

Since 2003, the NSW Child Health Survey has been included as a child component of children aged 0–15 years in the 2003 and 2005–06 NSW Population Health Surveys. In the 2005–06 Survey, information was collected on 4578 children (Centre for Epidemiology and Research 2008).

Key indicators of children's wellbeing and development

The surveys contain a myriad of variables linked to child wellbeing and development. First, the survey offers a range of variables on child health, including general health, health service use, asthmatic conditions, dental health, physical activities, and food security and hunger. It also offers variables on behavioural problems, including difficulty concentrating, frequency of lying or cheating. Variables describing moods and feelings of the child are available, including feelings of loneliness, nervousness etc. (Centre for Epidemiology and Research 2002).

There are some variables that are available from the 2001 Child Health Survey that are not available from the child components of the Population Health Surveys. For example, data related to drowning and sports injuries, and satisfaction with school and life, are available from the 2001 Survey only, but not in the Population Health Surveys (Centre for Epidemiology and Research 2002; 2008).

Housing variables

The 2001 NSW Child Health Survey offers information relating to the neighbourhood environment. Data is offered on safety in the local community or neighbourhood, including whether it is safe walking in the area after dark, whether most people in the local area can be trusted, and whether the area has a reputation for being a safe place. Information on the availability and locations of play space for children in the neighbourhood is also available from the survey. The survey also contains detailed suburb and postcode data, as well as the length of stay in the local area, which provides an indication of residential stability. The survey offers data on smoking in home as indicators of the level of environmental allergens (Centre for Epidemiology and Research 2002).

The Population Health Surveys contain some similar variables as the 2001 Survey such as postcode and suburb data. In addition, it contains detailed information on housing tenure and dwelling type not offered in the 2001 Survey (Centre for Epidemiology and Research 2008).

Control variables

The NSW Child and Population Health Surveys contain information on non-housing social determinants of child health that act as controls. These include standard socio-demographic variables such as child age, gender and Indigenous status. Other control variables include those that represent parental characteristics, such as parents' qualifications, employment status and Indigenous status. Information on family functioning and social support received by parents are also provided, as well as parental health behaviour variables, such as smoking during pregnancy, nutrition during pregnancy, breastfeeding, etc. (Centre for Epidemiology and Research 2002; 2008).

Accessing the data

Confidentialised unit record data can be accessed from the NSW Department of Health through specific requests to the Chief Health Officer. Data users are required to submit drafts of their publications to the Centre for Epidemiology and Research for approval before publication (NSW Department of Health n.d.). Departmental staff from the NSW Health Survey Program have confirmed that the data can be accessed for free, and that a confidentiality agreement has to be signed by the Departmental Head of the organisation applying for use of the datasets.

Assessment of data's suitability for empirical analysis of the relationship between housing and children's wellbeing

The surveys contain a rich set of variables relating to the health and behavioural development of children aged up to 12 years and 15 years in the Child Health Survey and Population Health Survey respectively. Weights are provided so that the samples are representative of the NSW children population. There are sufficient variables that can act as controls so that the causal link between housing and child development can be determined. The data is not longitudinal, and while repeated over several years, is not perfectly comparable. However, the Child and Population Health Surveys remain valuable sources of data for the purposes of analysing housing and child development links due to the plethora of child, housing and control variables that the data offers and the healthy data sample sizes.

5.6.2 The Victorian Child Health and Wellbeing Survey (VCHWS)

Survey background

The VCHWS is the first survey that is representative of the child population in Victoria. It was first conducted in 2006 and will be repeated every three years. The VCHWS's key aim is to provide data that supports policy planning and evaluation in relation to child health, wellbeing and development in Victoria. It is conducted by The Social Research Centre on behalf of the Victorian Department of Human Services. The primary carers of randomly selected children aged 0–12 years in Victoria are surveyed through CATI. Interviews for the 2006 VCHWS were conducted from October 2005 to March 2006. Five thousand interviews were completed, divided almost equally between metropolitan and rural households (Statewide Outcomes for Children Branch 2007).

A local level version of the VCHWS, called the Local Level Child Health and Wellbeing Survey, was subsequently conducted between February and June 2007 to provide local level data on child health and wellbeing. This survey is calibrated to be comparable to the state-wide VCHWS data. The survey was conducted in 25 local government areas where the Victorian Best Start early childhood initiative operates, that is, Ballarat, Bass Coast, Brimbank, Cardinia, Casey, Central Goldfields,

Dandenong, Darebin, Frankston, Greater Geelong, Greater Nillumbik, Greater Shepparton, Hume, Latrobe, Maribyrnong, Melton, Mildura, Moorabool, Mornington Peninsula, Wellington, South Gippsland, Swan Hill, Whittlesea, Wyndham and Yarra Ranges (Best Start 2009).

Key indicators of children's wellbeing and development

The VCHWS contains a range of health variables, including variables on general health status, oral health, asthma conditions, nutrition (such as food shortage), as well as special health care needs and asthma management. Child activity data is available, such as the length of time spent playing outdoors, as well as injuries. Learning development data is made available through indicators such as whether the child regularly reads for pleasure, and behavioural development data covers emotional or conduct problems, evidence of hyperactive behaviour, relationships with peers and whether the child's behaviour is pro-social (Statewide Outcomes for Children Branch 2007).

Housing variables

The VCHWS has a rich array of indicators of neighbourhood quality. These include whether the neighbourhood is safe, clean, has good street lighting and footpaths and roads that are in good condition, and whether traffic in the street is heavy or not. The VCHWS also contains data on neighbourhood access to essential services such as good quality and affordable public transport, basic shopping, banking and medical facilities, and parks and play spaces. One is able to distinguish between whether the dwelling the child lives in is owner-occupied or rented, and exposure to environmental allergens through smoking in the home can be observed from the data (Statewide Outcomes for Children Branch 2007).

Control variables

The VCHWS contains information on parental characteristics, which are critical control variables for isolating the impacts of housing on child development and wellbeing. Parental characteristics that are observable include the degree of social support received by parents, parent's general and mental health, and mothers' health during pregnancy such as whether the mother smoked, drank alcohol or binge drank while pregnant. Standard child socio-demographic variables such as age, gender and Indigenous status are readily observable (Statewide Outcomes for Children Branch 2007).

Accessing the data

Raw data from the 2006 VCHWS can be accessed by researchers through a formal application for data access to the Department of Education and Early Childhood Development Research Coordinating Committee outlining the research proposal (Statewide Outcomes for Children Branch 2007). There is no charge for accessing the data.

Assessment of data's suitability for empirical analysis of the relationship between housing and children's wellbeing

The VCHWS contains a rich set of variables relating to the health and behavioural development of children aged up to 12 years. It is a state-wide representative survey. Hence, observations from the survey can be generalised to the Victorian child population. There are sufficient variables that can act as controls so that the causal link between housing and child development can be determined. The data is not longitudinal, but will be repeated every three years reflecting contemporary child population characteristics. Its wide range of neighbourhood variables is very useful for

empirically investigating the links between neighbourhood conditions and child development. The effect of home ownership on child wellbeing and development can also be tested using the survey.

5.6.3 The Tasmanian Child Health and Wellbeing Survey (TasCHWS)

Survey background

The TasCHWS was commissioned by the Tasmanian Department of Health and Human Services in response to the Project Plan for the Kids Come First Blueprint, a Tasmanian Government initiative designed to develop an outcomes-based framework for Tasmanian children using key indicators of child health and wellbeing for Tasmanian children. The survey comprises 1228 adults in Tasmania who are primary care-givers of children aged 0–12 years. It was conducted through CATI by the Social Research Centre in March and April 2009. The survey contains weights to ensure that estimates from the survey closely represent those of the actual population of Tasmanian children. Geographical variation was achieved by ensuring that at least 300 interviews were conducted in each of the Department of Health and Human Services' North, North-west, South-east and South-west regions (The Social Research Centre 2009).

Key indicators of children's wellbeing and development

The TasCHWS contains a range of health variables, including variables on general health status, dental health, food intake and shortage of food, asthma conditions, etc. Child physical activity data is available, such as how many days during the week the child is physically active for a total of at least one hour in a day. Emotional and behavioural development variables offer information on aspects of the child's emotional state or behaviour, such as whether the child is considerate of others' feelings, evidence of hyperactive behaviour, nervousness etc. (The Social Research Centre 2009).

Housing variables

The TasCHWS contains variables on neighbourhood quality such as whether medical facilities and parks or play space are readily accessible, and exposure to environmental allergens through smoking in the home (The Social Research Centre 2009).

Control variables

The TasCHWS contains information on parental characteristics, which act as control variables for isolating the impacts of housing on child development and wellbeing. Parental characteristics that are observable include the degree of social support received by parents, parent's employment status and qualifications. Standard child socio-demographic variables such as age, gender and Indigenous status are available (The Social Research Centre 2009).

Accessing the data

Access to the TasCHWS can be applied for by contacting the Kids Come First project, a Tasmanian Department of Health and Human Services initiative that aims to improve Tasmanian children's health and wellbeing (The Social Research Centre 2009). Given the very recent release of the TasCHWS, there are no established procedures in place yet for accessing the data. Access to the data would have to be requested by contacting the department directly.

Assessment of data's suitability for empirical analysis of the relationship between housing and children's wellbeing

The TASCHWS contains a rich set of variables relating to the health and behavioural development of children aged up to 12 years. It is a state-wide representative survey. Hence, observations from the survey can be generalised to the Tasmanian child population. There are some useful housing variables for analysis, though being a new survey conducted for the first time in Tasmania, these variables tend to be more limited than the housing variables contained in the longer running VCHWS and NSW Child Health Surveys. The data is not longitudinal, and has only been conducted once. However, it would be a useful survey when used in conjunction with other state surveys to conduct comparisons across states.

5.6.4 The Western Australian Child Health Survey (WACHS)

The description of the WACHS data below was sourced from Zubrick et al. 1995, Silburn et al. 1996 and other documents provided personally by Professor Steven Zubrick.

Survey background

The Western Australian Child Health Survey was a large scale epidemiological survey of the health and wellbeing of Western Australian children undertaken by the Institute for Child Health Research in 1993. The primary objectives of the WACHS were to:

- Build a quantitative knowledge-base on the prevalence of physical and mental health, social and educational problems and their contributing factors in WA children aged 4 to 16.
- Inform the development of priority targets for existing health, education and social services and of preventive strategies to facilitate the social, emotional, academic and vocational competency of young people.

The survey placed a great emphasis on identifying the developmental and environmental factors that enable and develop adolescent competency, resiliency and employment readiness.

The WACHS is a cross-sectional survey. Because no complete list of Western Australian children exists, area sampling was employed. The survey framework was the set of geographic divisions of the state made for the 1991 Census of Population and Housing, and counts of children on Census night were used in constructing the sample. The pilot survey of 260 Perth metropolitan households with 4 to 16 year-old children was first conducted between 24 August and 7 September 1992 to test the survey methodology and it established the community acceptance.

The main survey commenced in July 1993 and was completed towards the end of September 1993. A random sample of 1776 households throughout metropolitan and country regions of Western Australia was approached and 1462 (82%) consented to participate. A total of 2737 children aged 4 to 16 years were surveyed. Data were gathered from consenting families from three main sources:

- the principal caregiver
- adolescents aged 12 to 16 years
- the school principal and teacher(s) of surveyed children.

A total of 413 schools state wide were involved and 96 per cent of all school survey materials were returned.

Key indicators of children's wellbeing and development

The WACHS collected extensive data on physical and mental health, behaviour and developmental outcomes. Carers were asked questions about pregnancy and birth complications, breastfeeding, immunisations, developmental milestones, child injuries and poisoning, asthmas, migraine, severe headache, general physical health, use of health care and use of child care. Carers were also provided information about their own general health. Other specific indicators available include:

- Physical functioning: good data on disability, sensory and motor functional problems.
- Mental health: prevalence of mental health problems and self-assessments of mental health and wellbeing/feelings about life.
- Child behaviour checklist.
- Stress and its relationships with school, physical health and mental health.
- Suicidal thought and self-harm behaviors.
- Literacy and numeracy: speech and language problems.
- Achievement of school and work-related goals.
- Social competence.
- Measures of self esteem and self-efficacy.
- Relationships with parents, friends, teachers.
- Child obesity and overweight: BMI and physical activities.
- Drug abuse, alcohol consumption and smoking in adolescence.

Housing variables

The WACHS has a range of variables covering important aspects of housing that are potentially related to child development, including good data on the immediate neighbourhood as assessed by the carer. The main housing variables available are:

- Homeownership.
- Type of housing: separate housing, semi-detached, single storey unit, townhouse, farm and other.
- Geographic location of the housing (metropolitan, rural, remote).
- Socio-economic status of the housing location (SEIFA at Census Collection District) is potentially available.
- Length of occupancy (in years).
- Choice of the housing location.
- Principal carers' satisfaction with the location of the housing.
- Neighbourhood characteristics in terms, safety, quietness, privacy, easy access to services, public transport and to work, number of bedrooms, parks, whether or not it is on major traffic, how close to friends' dwelling.
- Problems in the neighbourhood: violence, crime and social problems (marital problems, child abuse, poverty, unemployment, domestic violence, school truancy, isolation and drug abuse).

Control variables

The WACHS has excellent control variables, including in the key areas of family functioning, parenting, parents' mental health, drug use and self-efficacy. The key socio-demographic variables are available and robust indicators of parental socio-economic status, including family income, parents' education levels, labour force status and whether sole parent. Diet and nutrition information is available for adolescents along with adolescent health risk behaviours.

Accessing the data

Access to the data is currently administered through the Population Science Division, Telethon Institute for Child Health Research. There is no monetary cost involved in accessing the WACHS data. The data has been archived and is available in SPSS. However, it will be much easier to access and best to utilise the data if a future project using the WACHS data involves the data custodian as an investigator.

Assessment of data's suitability for empirical analysis of the relationship between housing and children's wellbeing

The WACHS data would be highly suitable for empirical analysis of the link between housing and child health and wellbeing. The strengths of the data are the excellent measure of child wellbeing and developmental outcomes combined with quality data on a range of aspects of housing circumstances (inc. time in current residence) and good control variables. The sample is large and the result may be generalised to the WA child population. However, it is cross-sectional and does not have the advantage of longitudinal dimensions for isolating causal relationships between housing and child outcomes. The data custodian and the team are pursuing funding to replicate the survey in a recent WA child cohort (ages 4 to 16). With such follow up data, the WACHS data collected in 1992–94 would become more suitable for empirical analysis of the relationships between housing and child outcomes.

5.6.5 The Western Australian Pregnancy Cohort [Raine] Study

Survey background

The Raine Study is an ongoing longitudinal study following 2868 children, the oldest of whom are now 20 years. The study started as a pregnancy cohort in which 2900 women were enrolled at or before the 18th week of gestation from the public antenatal clinic at the principal obstetric hospital in Perth, Western Australia, or nearby private practices. Approximately 100 women per month were enrolled from August 1989 to April 1992. The criteria for enrolment were gestational age between 16 and 20 weeks, sufficient proficiency in English to understand the implications of participation, an expectation to deliver at the hospital, and an intention to remain in Western Australia so that follow-up through childhood would be possible. The women delivered at the obstetric hospital and the babies were examined at two days of age by a paediatrician or midwife. The cohort has been followed-up by questionnaire and assessment at 1, 2, 3, 5, 8, 10, 13 and 17 years. The Raine study is conducted by a collaborative team of researchers from the University of Western Australia's School of Women's & Infants' Health, School of Medicine & Pharmacology, Telethon Institute for Child Health Research, and Centre for Genetic Epidemiology; Curtin University; and the University of Notre Dame. Since its inception in 1989, more than \$14.9 million has been invested in the Raine Study. This funding has been received from 42 grant applications from 12 funding bodies. The largest sums of funding for the Raine Study have come from the NHMRC (\$11.1m) with other sources of funding including the: Raine Foundation; Healthway; Canadian Institutes for Health Research; Asthma

Foundation; Telstra Foundation; Australian Arthritis Foundation; Ada Bartholomew Medical Research Trust and Rotary.

Key indicators of children's wellbeing and development

In more recent times, a variety of reliable and well validated measures have been implemented at strategic time points to capture information regarding the developmental and intellectual status of the children, and the psychological functioning of the children's family. These measures include the:

- Infant/Child Monitoring Questionnaires
- Toddler Temperament Scale
- Denver Developmental Screening Test—Second Edition
- Peabody Picture Vocabulary Test—Revised
- Wechsler Intelligence Scale for Children—Third Edition—Block Design
- Parent, teacher, and self reported—Child Behaviour Checklist
- Raven's Coloured Progressive Matrices
- Symbol Digit Modalities Test
- Clinical Assessment of Language Fundamentals-3
- McCarron Assessment of Neuromuscular Development
- Life Stress Questionnaire; Maternal Social Support Index
- McMaster Family Assessment Device
- Bradburn Happiness Scale
- Perceived Self-Efficacy Scale (parent and child)
- Parenting Scale
- Abbreviated Dyadic Adjustment Scale
- Depression-Anxiety-Stress Scale.

Adding to the formal measures of interest are child's birth weight and gestational age; child's plurality; child's health (ICD-9), child's weight and height; child's school performance (teacher reported); child's literacy and numeracy (year 7 Education Testing Centre data).

Housing variables

Housing variables include: residential moves, ABS collection district, postcode, age of house, number of bedrooms, bathrooms, and toilets, number of adults and children living in the house, home ownership, perceived air quality, air-conditioning, heating, gas, swimming pool, fencing, garden, perceived neighbourhood safety, perceived neighbourhood disorder. Data on exposure to potential environmental and recreational toxins (alcohol, illicit drugs, medications and smoking) and allergens (pets, dust, chemicals, foods) were also obtained from each parent at enrolment and, in the mother's case, updated during the 34th week of pregnancy.

Control variables

There are a range of socio-demographic and psychosocial variables available to control for non-housing risk and protective factors that can impact on both housing environments and child wellbeing and development. These include comprehensive data on social and demographic factors, and medical and obstetric history. The large

number of socio-demographic variables relating to the child, the family, and the community include the following: child's sex and race; total gross family income; maternal age; parental education; parental occupation and work schedules; family structure; number of siblings; parental hours in paid employment; child care; parental smoking; parental use of alcohol and drugs; parental physical health; parental mental health; school physical and social environment—characteristics of the school and community setting, the student population, staffing, and pastoral care arrangements (principal reported).

Accessing the data

Established Raine Study Principal Investigators (and their students including Masters, Bachelor of Medical Science, PhD and Post Doctoral Research Fellows) who have contributed to data collection and are employed by institutions that provide funds for Raine Study Core Management are exempt from fees associated with access to Raine study data provided their data requests are reasonable and they do not place an unreasonable burden on the Raine Study Data Manager. These institutions are University of Western Australia, TICHR, Women and Infants Research Foundation (WIRF), Raine Foundation and Curtin University. Data sets are housed at the TICHR and the Western Australian Genetic Epidemiology Resource (WAGER).

Assessment of data's suitability for empirical analysis of the relationship between housing and children's wellbeing

The dataset contains a rich set of variables relating to child and adolescent health and development, and the sociodemographic and psychosocial characteristics of the family. At eight years, 82 per cent of children remained available for follow-up and 75 per cent participated. Eight years after recruitment, the characteristics of the cohort continued to mirror those of the general Western Australian population into which they were born, except for a higher prevalence of pre-term and low birth weight children, twins and triplets and those who took longer to achieve spontaneous respiration at birth. All evidence of a cohort at higher than usual obstetric risk (Kendall 2003). Their sociodemographic characteristics also mirrored those of the general Western Australian population, except for the lower proportion of fathers employed in managerial positions and the higher proportion of fathers employed in professional positions. At 13 years 79 per cent of children remained available for follow-up and 65 per cent participated. Importantly, the data is longitudinal in nature, assisting researchers to identify the causal pathways through which housing influences wellbeing and development from before birth to late adolescence. It appears to be one of the few available datasets with information on air quality and on exposure (albeit parental exposure) to potential environmental toxins and allergens.

5.7 Upcoming surveys

5.7.1 The Peel Child Health Study

Survey background

The Peel Child Health Study has recently received funding from the Australian Research Council and a number of Commonwealth and State Government Departments to establish and study a new pregnancy cohort. The first phase involves the recruitment of 400 families with a first trimester pregnancy who are living in the Mandurah/Peel region between 2009 and 2011, and their follow-up during pregnancy and the first three years of the birth child's life. The study is measuring community services, facilities, resources and patterns of access and utilisation; norms of reciprocity, trust and connectedness; interagency collaboration and community partnerships; and Indigenous participation. Within the family, the study is measuring

sociodemographic and psychosocial characteristics, parental health and functioning, environmental exposure to toxins, foetal growth and newborn and sibling's health and development using validated and reliable instruments currently employed in other local, national and international studies.

Key indicators of children's wellbeing and development

The study is measuring children's health and development using the Ages and Stages Questionnaires (ASQ) and other validated and reliable instruments currently employed in the LSAC. Supplementary pregnancy, birth, and health data are obtained for participants through linkage to the Maternal and Child Health Research Database (MCHRDB) housed at the TICHR and the Hospital Morbidity Data System from the Western Australian Department of Health Western Australia. The data linkage is carried out by the Western Australian Data Linkage Branch, which also conducts linkages between the WACHS and other dataset's housing variables.

Housing variables include residential moves, ABS collection district, postcode, number of adults and children living in the house, home ownership, type of dwelling (separate house, flat, etc.), age of house, number of bedrooms and bathrooms, building materials, type of floor covering, renovations, type of heating and cooling, type of cooking appliances, use of chemicals for pest removal, dampness, garaging, perceived neighbourhood safety, perceived neighbourhood disorder, access to public transport, distance to major road, level of traffic, and proximity to industry.

Control variables

There are a range of socio-demographic and psychosocial variables available to control for non-housing risk and protective factors that can impact on both housing environments and child wellbeing and development. Detailed socio-economic and demographic information is collected for all family members (date of birth, sex, race/ethnicity, language spoken at home), for adults (marital/relationship status and history, education level, income, transfer payments, financial strain, and for children (relationship to carers and other children living in the home, current child care experience and history, current school experience and history). Details of parents' labour market activities are also sought (occupation, type (e.g. fly-in-fly-out), unemployment, working hours, job security and satisfaction) taken from the HILDA Survey. In addition to the information listed above, parents complete an inventory of their physical and mental health including major illnesses/disabilities according to the international classification of diseases (ICD-10); general health and wellbeing (Short Form 36); health service use; objective (allostatic load) and subjective experience of stress, such as stressful life events, state anxiety, trait anxiety, perceived stress, depression, post-natal depression; parental relationships; family functioning; parenting; fathering; parental consumption of alcohol, drugs and cigarettes; social support and discrimination.

Supplementary pregnancy, birth, and health data is obtained for participants through linkage to the Hospital Morbidity Data System. Physiological and biochemical measures include: foetal anthropometry; uterine and umbilical blood flow; maternal, paternal and child basal cortisol and cortisol circadian rhythm; maternal, paternal, and child functional genetic polymorphisms related to cortisol sensitivity and resistance; and placental morphology and stress-sensitive gene-regulatory control.

Accessing the data

Principal Investigators (and their students including Masters, Bachelor of Medical Science, PhD and Post Doctoral Research Fellows) have access to Peel Child Health

Study data. Data sets are housed at Murdoch University and the Western Australian Genetic Epidemiology Resource (WAGER).

Assessment of data's suitability for empirical analysis of the relationship between housing and children's wellbeing

When available, the dataset will contain a rich set of variables relating to child health and development, and the socio-demographic and psychosocial characteristics of the family. As future waves are completed, researchers will also have available the benefits of longitudinal data. Some major strengths of this data set are exceptionally rich physiological and biochemical measures, both parental and child, which may be seen either as control or outcome variables associated with housing circumstances, depending upon the research focus, and a number of housing variables not readily available in other datasets, such as floor coverings, building materials, and chemicals used for pest removal. The collection of data on various dimensions of *community*, such as reciprocity, trust and connectedness, offers considerable potential for innovative research and hypothesis testing not possible with existing Australian data.

5.7.2 New Victorian child surveys

At the time of writing of this report, the Victorian Government is conducting a rolling program of new child data collections. A new parallel survey to the VCHWS is the Victorian Adolescent Health and Wellbeing Survey, which targets a representative sample of more than 10 000 high school students in Victoria. Fieldwork for this survey commenced in 2009. There are other related surveys of potential interest that the Victorian Government is conducting, such as the Child and Family Services Outcomes Survey, which targets children and youths who have accessed child protection or family services, or who have been in out-of-home care. The Children with Disabilities Survey is also being developed (DEECD 2009).

5.8 Recommendations for future research

From the data audit, it can be seen that the LSAC and a number of the state based surveys provide excellent opportunities for investigating the links between housing and child developmental outcomes within the general population, as do the LISC and the WACHS for the Indigenous population. However, research funding and other resources are scarce and any proposal must compete against many other potential research pursuits. An important first step is to highlight the significance and potential benefits of research in this area and to identify research priorities. One key motivation for any such research is the potential to improve child health outcomes. A second is the implication for addressing social inequality given housing's potential role in transmitting intergenerational gradients in socio-economic status. While it may be argued that a proportion of social inequality should be dismissed as a matter of individual responsibility for those of lower status, one can hardly argue that the children from families of lower socio-economic status deserve poorer opportunities in life, and Bronfenbrenner's model further highlights that many causal influences of socio-economic disadvantage lie outside the sphere of the child's and family's control. Note that all three of the priority policy issues identified in the review—homelessness, poor housing conditions of many Indigenous children and housing affordability stress—are strongly related to socio-economic status.

We have noted the need for empirical evidence specific to Australia, rather than drawn from the international literature, to establish these priorities and highlight their potential significance. As an initial step, which we refer to as a Stage 1 study, it is recommended that the LSAC and LSIC be used to show the general magnitude of the relationships (i.e. the elasticities) between the range of available housing variables

and key child development variables using essentially descriptive statistics. Where there is evidence of a strong correlation between housing circumstances and child outcomes, those outcomes variables can then be used as dependent variables in multivariate models to further refine estimates of the 'independent' effects of the housing variables. The role of these housing variables in mediating the gradient between parental socio-economic status and child development can then be explored through analysis of bivariate associations and by separately entering controls for socio-economic status and housing in the multivariate models.

The variables contained in the LSAC and LSIC would permit the Stage 1 study to cover an excellent range of child developmental outcomes, covering physical health, behaviour and established developmental and cognitive tests as set out above. The available housing variables, while somewhat limited, do cover the key housing factors of state of repair, dwelling type, crowding and neighbourhood/community. For Indigenous children, data is currently only available for children in their early childhood (up to four years). So while the LSIC and LSAC do have some limitations, they are chosen for the Stage 1 study primarily because they have large samples, are nationally representative, and are very readily accessible. With quite standard descriptive statistical tests and multivariate regression models, the Stage 1 study will provide, for both the Indigenous and non-Indigenous populations, a broad indication of:

- Which aspects of child wellbeing and development are most sensitive to housing circumstances.
- Within the different spheres of child development, which housing factors have the greatest impact.
- The gradient between parental socio-economic status and child developmental outcomes in Australia, the aspects of child development through which this is transmitted, and the potential contribution of housing-related factors to this gradient.
- The potential contribution of housing-related factors to the poorer development and wellbeing outcomes of Indigenous children relative to non-Indigenous children.

This information will provide an evidence base from which to demonstrate the potential social benefit and significance of further research and to identify the priorities in terms of the specific relationships between housing factors and developmental outcomes that warrant further investigation. For each of the key relationships identified, it will then be possible to assess which of the datasets reviewed is most suited for a more sophisticated *Stage 2* analysis. To reiterate, the results of the initial analysis of the LSAC and LSIC may be consistent with, but would not prove, causal links from housing factors to developmental outcomes. Evidence of causation would be pursued in the Stage 2 studies, informed by a more focused review of the literature and of the theoretical foundations for such a relationship.

As argued above, even with the benefits of longitudinal data, identifying strong evidence of causal effects is likely to require researchers to seek and exploit exogenous sources of variation in the specific housing factor being studied through approaches such as instrumental variables or 'natural experiments' and, most importantly, this needs to be independent of socio-economic status. Some potential sources of such variation in housing variables may include policy changes (either over time or between jurisdictions); changes in housing affordability associated with temporal changes in housing costs; or, as noted above, variation in housing factors by region (e.g. metropolitan versus regional areas). Several of the state-based child

health surveys offer very rich datasets for the Stage 2 studies, and it may even be possible to use differences between housing circumstances across the states to help identify causal relationships.

The poorer housing experiences of Indigenous children were identified above as one area requiring urgent policy attention. For Indigenous Australians, the most promising opportunities for more detailed studies following the Stage 1 analysis are further analysis of the LSIC as more waves of data become available and analysis using the richer set of variables on housing and outcomes contained in the WA Aboriginal Child Health Survey. A critical factor that impacts upon a disturbingly large number of Australian children, and especially Indigenous children, is homelessness. Unfortunately, none of the datasets appear well suited to studying the effect of periods of homelessness on child outcomes, although some inferences may be drawn from the effect of frequent moves.

Data on allergens and toxins are available in neither the LSAC nor the LSIC, and hence an assessment of the impact of these on child development would not be possible in the recommended Stage 1 analyses. The WA Pregnancy Cohort Study and the upcoming Peel Child Health Study appear to offer the most promising opportunities to study these effects. The Stage 1 and follow up studies will also highlight other knowledge gaps that cannot be addressed with existing statistics. In this case, opportunities should also be sought to have input into the questionnaire design and other data collection process for newly initiated studies, such as the Peel study and new Victorian child surveys, and for upcoming waves of existing longitudinal studies.

6 SUMMARY AND CONCLUSION

The characteristics of families' homes and the surrounding neighbourhoods have a pervasive relationship with child outcomes extending from early health and development to educational achievement and the transition to adulthood. These operate through a complex set of interactions covering biological, cultural, social, economic, institutional and political processes, many of which extend beyond the sphere of control of families. Nine key housing-related factors known to exert an influence on child developmental outcomes have been identified from a review of the international literature. These are:

- environmental allergens
- toxicants
- cleanliness, housing disrepair and safety
- building height and opportunities for outdoor play
- crowding
- housing affordability
- homeownership
- frequent residential moves
- homelessness.

However, there is very little direct empirical evidence on the extent to which housing-related factors may be impacting negatively or positively on Australian children, and it is unclear how applicable international evidence is to the Australian context, given Australia's unique social, cultural and institutional setting. This is despite the obvious importance of such information for decisions made by private individuals and companies, building regulators, town planners and the various state and Commonwealth departments with responsibility for housing-related policy. Based on the international evidence on the impact of housing circumstances on children's outcomes and available statistics for Australia, three areas of potential concern for Australian housing policy programs are highlighted: the significant proportion of homeless Australians who are children, the poor housing conditions in which many Indigenous Australians live, and the proportion of Australian families with children who are living in housing affordability stress.

This scoping study has assessed the possibilities for using existing datasets to improve our understanding of the links between the housing circumstances of Australian families and the developmental outcomes of their children. For empirical research to offer definitive policy implications, ideally evidence of causal relationships between housing variables and child outcomes would be established. However, this is a particularly daunting task in the housing context. In light of the methodological challenges in identifying causal relationships, an audit of potential datasets for analysis was undertaken looking in particular for datasets offering good housing and child development variables; good controls for parental socio-economic status and other potential confounding variables; large and representative samples; and a longitudinal dimension.

A number of national, state and Indigenous-specific datasets have been identified with various strengths and weaknesses, but overall offering excellent potential for analysis. Based on the audit of these datasets, a two-staged program is recommended as being the most fruitful approach for future research. The first stage involves relatively

simple statistical analysis of the relationships between the housing, socio-economic status and child development variables available in the Longitudinal Survey of Australian Children and the Longitudinal Survey of Indigenous Children. This will serve to highlight the potential significance of the role that housing factors play in transmitting intergenerational inequality in Australia and to identify the key relationships between housing and child outcomes that will then become the priorities for more focused attempts to establish causal relationships and a robust evidence base for policy. These second-stage studies will need to draw on the unique strengths of a number of the available national, state and Indigenous-specific datasets and to be creative in seeking and exploiting exogenous variation in housing circumstances using instrumental variables or ‘natural experiment’ approaches—in this particular research context, the standard panel techniques that exploit the availability of longitudinal data will generally not be sufficient to identify causation.

The research process should also inform the design of ongoing longitudinal surveys and future child health studies and surveys to ensure that any important and unresolved research questions can be answered in the future. One such issue, which it appears cannot be adequately addressed with the datasets reviewed, is the prevalence and impacts of periods of homelessness for Australian youth.

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