The relationship between housing and children's socio-emotional and behavioural development in Australia

James O'Donnell
PhD candidate
School of Demography
Australian National University
james.odonnell@anu.edu.au

Meg Kingsley
PhD candidate
School of Demography
Australian National University
meg.kingsley@anu.edu.au

Keywords

Housing, hardship, child development, growth curve model, Australia

Acknowledgements

This research is supported by Australian Government Research Training Program (RTP) Scholarships. This paper uses unit record data from Growing Up in Australia, the Longitudinal Study of Australian Children. The study is conducted in partnership between the Department of Social Services (DSS), the Australian Institute of Family Studies (AIFS) and the Australian Bureau of Statistics (ABS). The findings and views reported in this paper are those of the authors and should not be attributed to DSS, AIFS or the ABS.

Abstract

Research often find significant associations between housing characteristics and child outcomes. These are hypothesized to reflect direct and indirect effects, however it is unclear whether these associations exist across the early life course or if they are explained by or mediated through other factors. We investigate this using multilevel growth curve modelling of Australian panel data, focusing on children's socio-emotional health over ages four to 15. We find that housing characteristics, namely residential instability, family composition, housing tenure and costs and the physical condition of the home dwelling have small significant associations with children's internalising and externalising behaviours that change over the course of childhood and adolescence. Financial stress and parenting also have associations with children's socio-emotional difficulties and explain some of the effects of the housing variables. Housing nevertheless remains significant, suggesting that housing disadvantage may compound and add to the effects of broader socioeconomic disadvantage on children.

Introduction

Understanding the factors that influence children's mental health and behaviour is important as it impacts their wellbeing now and in future. As a body of research has demonstrated, emotional and behavioural problems in childhood are related to psychopathology in adulthood (Repetti 2002), which may in turn, along with non-cognitive traits generally, influence social and economic success (Heckman et al. 2006). Of particular concern, children in families with limited financial resources are at greater risk of having poor socio-emotional and behavioural outcomes than children in wealthier families (e.g. Blanden et al. 2007; Bøe et al. 2014; Nicholson et al. 2012), risks that can extend into adulthood (Lynch et al. 1997) and affect educational attainment, labour market participation and earnings (Heckman et al. 2006). Poor outcomes of children in lower-income families, therefore, may limit their personal development, equality of opportunity and social mobility, thereby acting as a mechanism for the transmission of intergenerational disadvantage (Saunders 1990). This is concerning given evidence that socio-economic inequality is widening in a number of developed countries such as Australia (Leigh 2013).

A range of personal, interpersonal and distal factors are argued to shape the social and emotional outcomes of children. This is encapsulated in ecological models of child development in which social, economic and political factors impact on children directly and indirectly through their influence on home, neighbourhood, and school environments (Bronfenbrenner & Morris 2006; Leventhal & Newman 2010). Housing characteristics are potential factors affecting home environments, particularly those related to housing tenure, affordability, stability, quality and composition. Previous research has found associations between these and child outcomes, suggesting that housing disadvantage may compound and add to the effects of broader socioeconomic disadvantage on children. One area not well understood is in understanding how housing characteristics impact on development trajectories across childhood and early adolescence. Only in understanding these trajectories can we appreciate the extent to which children are being equipped with the social and emotional skills to navigate adulthood.

In this study, we seek to address this gap using panel data from Australia. Multilevel growth curve modelling is specified to investigate how several housing conditions are associated with children's socio-emotional health as they develop over the ages four to 15. We test whether these relationships are explained by individual and family variables, particularly the financial position of the household and parenting factors. The results reveal that residential instability, family composition, housing tenure and costs and the physical condition of the home dwelling have significant associations of varying size that change over the course of childhood and adolescence. Financial hardship of the household and mothers' psychological distress and parenting style help to explain some though not all housing associations. We conclude that housing conditions fit within the ecology of material factors impacting upon children's socio-emotional development.

Related Studies

Several aspects of housing have been studied for their potential impacts on child socio-emotional and behavioural development. Residential moves or housing instability is one of the most studied aspects. Instability is measured in a variety of ways, usually based on the number of residential moves over a child's lifetime or in a reference period (Jelleyman & Spencer 2008), depending on factors such as the study design and age at which children's outcomes are measured. Research to date, though somewhat equivocal, suggests small significant effects of housing instability. In a systematic review of the literature, Jelleyman and Spencer (2008) find reasonably strong evidence of an adverse association between residential moves and internalising and externalising behaviours among school age children (Wood et al. 1994; Simpson and Fowler 1994; DeWit et al. 1998; Kelley et al. 2003), though less so for younger children and adults. Another review by Leventhal and Newman (2010) uncovers similar evidence of short-term negative effects on children's school achievement and socio-emotional behaviour with particularly adverse effects for single parent and blended families. In more recent studies, Cutts et al. (2011) and Dockery et al. (2013) find multiple moves to be associated with poorer health for very young (less than three years old) and older

children respectively. Sanson et al. (2011), on the other hand, find that the number of family moves a child experiences by four to five years old is weakly linked to *better* social-emotional adjustment.

Socioeconomic context may have an important role in explaining these findings. Residential moves may be positive or negative for children and families – the planned result of the pursuit of economic opportunity and upward mobility or of unplanned and destabilising housing insecurity (Clark 2016). Research suggests lower income and more disadvantaged families are most likely to experience the latter (Clark 2016), indicating that children from these families are likely to bear a disproportionate share of the adverse impact of housing instability on social and emotional development. This has been borne out in recent literature, including Coley et al.'s (2013) study of low income families, in which children from families that moved more often were found to have significantly more socio-emotional difficulties than other children. In studying families from across the income distribution, Ziol-Guest & McKenna (2014) find that moving three or more times by the time a child is five years old is significantly associated with increases in socio-emotional and behavioural difficulties, though after taking income levels into account, this association disappears for all but children from families experiencing poverty. In the United Kingdom, Beck et al. (2016) and Gambaro and Joshi (2016) also find a link between moving and children's socio-emotional difficulties at age five; however, in both studies the association was explained by the stressful circumstances surrounding moves, such as changes in family structure, unstable housing tenure and financial hardship. The evidence would therefore suggest that housing instability is indeed related to children's wellbeing, however the link may be context-specific, often explained by proximal and distal socioeconomic factors.

Household size and composition may impact on socio-emotional development. In addition to the aforementioned evidence on one parent and blended families (Leventhal and Newman 2010) and the theorised link between family and household breakdown and children's outcomes (Clark 2016), multiple family, and by extension crowded, households may impact on children in diverse and competing ways. On the positive side, 'doubling up' with other families may allow parents to

pool income, afford higher standards of living including better quality housing and neighbourhoods and, particularly in extended and multi-generational family households, share child care responsibilities (Ahrentzen 2003; Pilkauskas et al. 2014). Conversely, such arrangements can restrict personal space, adversely affect physical health, contribute to household stress, be of a temporary nature and signal levels of socioeconomic disadvantage otherwise disguised in measures of household income and financial stress (Vacha and Marin 1993; Koebel and Murray 1999; Clark et al. 2000; Ahrentzen 2003; Skobba and Goetz 2015). A further complication is that multi-family and crowded households are most common among migrant and Indigenous – as well as low income – families (Myers et al. 1996; Myers and Lee 1996; Clark et al. 2000) whose children are likely to face unique challenges adjusting to school and neighbourhood environments. Perhaps not surprisingly then, the evidence on the effects of household size and composition is mixed (Cutts et al. 2011; Solari and Mare 2012; Dockery et al. 2013).

The type and condition of housing is also a potential influence on children. Dockery et al. (2013), for instance, find that children living in separate houses have better socio-emotional outcomes across ages zero to nine compared with those living in apartments and town houses. They also find that children living in dwellings in good external condition (as rated by the interviewer) had better outcomes. This latter finding supports those of Gifford and Lacombe (2006) and Coley et al. (2013) who report significant associations between the physical condition of housing and child socio-emotional outcomes. On the other hand, Gifford and Lacombe (2006) find no association between housing type and socio-emotional health of children aged nine to 12. While the link between housing conditions and children's wellbeing appears strong, as noted by both Dockery et al. (2013) and Gifford and Lacombe (2006), the mechanisms through which poor building conditions might affect children's behaviour are unclear. One potential mechanism is through the effect of building defects on physical health, including respiratory conditions, and subsequently socio-emotional health. Evidence on the relationship between defects and physical health, however,

is mixed (Leventhal and Newman 2010). Another possible explanation is that the associations are spurious, related to other factors such as financial hardship.

Evidence on the relationship between housing tenure and affordability and child development is limited. Boyle (2002), Haurin et al. (2002) and Dockery et al. (2013) find that children living in housing owned by the parents have fewer behavioural problems than those living in rented housing. However, the effects are generally small, particularly after controlling for socioeconomic factors. Grinstein-Weiss et al. (2012) suggest that home ownership has positive impacts on child behaviour in neighbourhoods with high population density and negative impacts in low density neighbourhoods. Some studies also suggest the effects are likely to vary significantly by age (Cairney 2005; Coley et al. 2013) and be affected by selection bias (Leventhal and Newman 2010). Coley et al. (2013) find that home ownership is associated with fewer problems among young children but no effect among adolescents. With respect to housing affordability, Coley et al. (2013) and Leventhal and Newman (2010) uncover little evidence of an effect on children, though Dockery et al. (2013) find that children living with families who report difficulties paying their rent or mortgage have significantly poorer socio-emotional wellbeing. As Leventhal and Newman (2010) note, housing affordability stress may be the consequence of larger investments in housing quality and location, the benefits of which potentially outweigh adverse consequences of financial stress. This points to the importance of the trade-offs families make in their housing decisions.

Theoretical Orientation

Research on the relationship between housing and child socio-emotional development sits within a larger body that seeks to identify the determinants of child wellbeing. Ecological perspectives of child development highlight the different levels of social contexts in which children are embedded (Bronfenbrenner & Morris 2006; Leventhal & Newman 2010). Children directly interact with proximal settings, which include the home environment, and indirectly with more distal contexts. These multiple contexts can intersect or jointly influence children to varying degrees through their early life course and thus, shape their development trajectories. Mechanisms through which

socioeconomic factors impact on children have been hypothesised. The family process model, for example, posits that broader socioeconomic factors create stresses for parents that impair their psychological wellbeing, their parenting abilities, practices and time and subsequently, their children's development (Bøe et al. 2014; Yamauchi 2010; Yeung et al. 2002). In this view, aspects of housing including tenure, stability and affordability may affect children through their effects on parental wellbeing. The investment model (Becker 1981) postulates that income enables families to purchase material goods that directly benefit children. Investments in good quality and stable housing and neighbourhoods, for example, may have direct beneficial effects on children, mediating the effect of income and financial wellbeing.

Housing features are therefore hypothesised to have both direct and indirect effects on children, influencing their socio-emotional and behavioural development through several potential pathways. Housing may directly affect children through the physical space, amenity, stability and safety it provides children and indirectly through its impacts on parental stress and wellbeing. Additionally, some component of the observed associations between housing and child development may be explained by the influence of financial and socioeconomic factors on both. Poverty, for example, is likely to directly and indirectly impact housing choices and child development. A related view is that housing is a dimension of financial and socioeconomic position. Families and households experiencing poverty and financial constraints generally make housing decisions that potentially involve trade-offs between living arrangements, financial stress and housing types, tenure, location, quality and affordability. Families, for example, may choose to take on a higher rent burden to attain better quality housing. Likewise, moving into poorer quality housing may offset housing and financial stress through reduced rent and mortgage costs. The effects on parents and children must then be weighed up in the context of these decisions and trade-offs.

Research aims

This paper aims to contribute to the evidence base on the relationship between housing and children's wellbeing. In particular, this study analyses how a set of housing characteristics are associated with children's socio-emotional health as they develop over the ages four to 15, and whether the relationships may be explained by the financial position of the household and parenting factors. The study addresses the following research questions:

- How are housing conditions related to children's mental health and behaviour as they age?
- To what extent do the financial position of the household and parenting factors explain the relationship between housing conditions and children's mental health and behaviour as they age?

The study contributes to existing knowledge by considering the relationship between housing and children and their mediating factors across the early life course. This is achieved through multilevel growth curve modelling of socio-emotional development trajectories across early childhood and adolescence. This reveals potentially important information on the immediate and long run effects of housing, including as children transition into early adulthood. Housing decisions and trade-offs are controlled for by simultaneously modelling associations between multiple aspects of housing and children's socio emotional behaviours.

Methods

Data

The data source for the analyses is Waves 1 to 6 of *Growing Up in Australia: the Longitudinal Study of Australian Children* (LSAC). LSAC is a large scale, nationally representative Australian study of children and families that follows the experiences and wellbeing of two cohorts of children and their families, from infancy to the threshold of adulthood. LSAC obtains the perspectives of mothers and fathers, and collects information on a broad range of influences on child and family wellbeing. The children in the LSAC were aged zero to one years (the B cohort) and four to five years (the K cohort) at the first wave of the study in 2004. Around 5,000 children in each cohort

participated in Wave 1. The families are visited once every two years when they are interviewed and direct observations and assessments are conducted (Australian Institute of Family Studies 2015). The analyses in this study are based on data from both cohorts over child ages four to 15. The B cohort were aged four to five in Wave 3 and ten to 11 in Wave 6. The K cohort were aged four to five in Wave 1, and were aged 14 to 15 in Wave 6. This study is based on an unbalanced panel. There are 40,143 child-year observations for the outcome measure. After accounting for sample loss due to missing data on the independent and control variables, the final analytic sample is 37,166 child-year observations.

Measures

Children's Socio-Emotional and Behavioural Problems

Children's socio-emotional and behavioural outcomes are measured at each wave of LSAC using the Strengths and Difficulties Questionnaire (SDQ). The SDQ can be completed by parents and teachers of children aged four to 16 and by youth aged 11 to 16 (Goodman et al. 2010). These analyses utilise the SDQ data provided by the parent who knows the child best (usually the mother), as there are higher rates of missing data for the teacher reports.

We use the total SDQ score, which combines emotional, peer, conduct and hyperactivity problems. Emotional problems include things such as feeling depressed or worried. Peer problems include having few friends and tending to play alone. Conduct problems include behaviours such as losing their temper often or fighting with other children. Hyperactivity problems include having a poor attention span or being easily distracted. Emotional and peer problems are often referred to as internalising problems, while conduct and hyperactivity problems are externalising problems. Scores on the total scale range from 0 to 40, with higher scores indicating more problems. Children's SDQ scores are treated as continuous variables in the analyses. In growth curve models, it is appropriate to use measures in their raw form (as opposed to standardised scores) to highlight changes in behaviour over time (O'Connor et al. 2014). However, as the variable is skewed and the level-2 residuals are skewed, it is transformed by adding a constant of one to all values (because the

scale includes zero) and then logging the derived variable. Predicted scores presented in the results section are corrected to concord with the original scale. The results of models using the raw variable and the unadjusted log variable (in which zero values are dropped) are similar but the models using the adjusted log variable offer a substantially better fit to the data.

Children's Age

A key aim of this study is examining effects on children as they age. Child's age in years is included as a continuous variable in the models. Child's age is centred such that the initial status refers to age 4, allowing an interpretable intercept within the range of data collection. Child's age is interacted with other key variables to test whether the effects change over time. Exploration of the relationship between children's SDQ scores and age over the ages of four to 15, shows that while problems generally decline as children, there is a slight increase in problems in early adolescence. Therefore, a cubic slope for age is allowed for in the analyses.

Household Composition

The number of parents and other adults living in the child's home is derived for each wave. The variable has four categories: one parent, one parent plus other adults, two parents, and two parents plus other adults. The variable is derived from information on partnership status of parents, the number of people in the home and the number of resident children at each wave. This variable is included to capture situations where children's homes include members outside of their immediate family, and is thus a proxy for families living 'doubling up' often with extended family or friends.

Number of Homes Child Has Lived In

To measure moves, the number of homes the study child has lived in since birth is collected as a continuous variable. Having lived in one home indicates the child has never moved.

Dwelling Type

The type of dwelling the child was living in at the time of each wave is included. The categories are: Separate house, semi-detached house, flat/unit/apartment and other (due to small cell sizes includes caravan/cabin, house or flat attached to an office or shop).

Dwelling Condition

The external condition of the dwelling the child was living in at the time of each wave is included. The categories are: Well kept, fair condition, and poor condition or badly deteriorated (combined due to small cell sizes). The physical condition of the home is based on an interviewer's assessment.

Tenure and Housing Costs

Tenure type and the amount spent on housing costs each week is collected at each wave. These two variables are combined to create a composite variable, as some respondents demonstrate collinearity on tenure type and proportion of income spent on housing per week. In particular, those who own their own home have zero weekly housing costs. The variable used in the analysis has five categories: own home outright, paying off a mortgage, renting and paying less than 30 per cent of weekly income on housing, renting and paying 30 per cent or more of weekly income on housing, and other or not stated.

Financial Hardship

Previous research suggests that an important link in the pathway from income to children's socio-emotional difficulties is material hardship (Gershoff et al. 2007). Financial hardship has been used in other papers to measure differences by disadvantage and evidence suggests it mediates the relationship between socio-economic factors and health (Crowe & Butterworth 2016). Household experiences of financial hardship are gathered at each wave of LSAC. The variable is provided in continuous form (version two) and includes the number of 'yes' responses to the questions: Over the last 12 months, due to shortage of money, have any of the following happened: not been able to pay gas, electricity or telephone bills on time, could not pay the mortgage or rent on time, adults or children have gone without meals, have been unable to heat or cool your home, have pawned or sold something, sought assistance from a welfare or community organisation. The original scale ranges from zero to six, and is positively skewed, so the following categories are created for analysis: No experiences of hardship, one experience, two experiences, and three or more experiences.

Weekly Household Income

Household income is included as a continuous variable. This is calculated by combining the income of all adults (including non-parents) in households. Income at each wave is adjusted to the June 2014 Consumer Price Index (CPI) (Australian Bureau of Statistics 2014). This variable is included in its centred and logged form in the analyses.

Mothers' Psychological Distress

Mothers' psychological distress is explored as a mediating variable. It is measured using the Kessler 6 depression scale. The scale consists of six items that ask the parent how often in the past four weeks they experienced symptoms of anxiety and depression, ranging from one (All of the time) to five (None of the time). The mean of these responses is used in the analyses. In the original data, lower scores on the Kessler 6 scales indicate more distress; therefore, in the statistical analyses, the scale is reverse coded so that higher numbers indicate higher levels of psychological distress (similar to the children's outcome variable).

Mothers' Parenting Style

Mothers' parenting style is also included as mediating variables. Parenting styles are multidimensional categories of behaviours and attitudes which classify parents on a spectrum of some specific parenting dimensions (Darling & Steinberg 1993). In LSAC, a number of parenting dimensions are measured, including how often the parent demonstrates examples of warm, angry and consistent parenting (Zubrick et al. 2014). These parenting dimensions are measured at each wave using self-report responses to questionnaires. Warmth is measured using the Child Rearing Questionnaire (Paterson & Sanson 1999), while the anger and consistency items are sourced from the National Longitudinal Study of Children & Youth (Statistics Canada 2000). The summary scales for these dimensions, provided in the LSAC dataset, are included as continuous variables in their original form. Higher scores on the warm and consistent scales indicate more warm and consistent parenting while higher scores on the angry scale indicate a more angry parenting style.

Covariates

The models control for child and family variables which could affect children's socio-emotional development. These are described below, with descriptive statistics presented in the results section.

Child variables. Child's sex is included in the models and the reference category is boys. The sex of the study child is controlled for because boys and girls may have different socio-emotional and behavioural trajectories, although the evidence is mixed (Bao et al. 2016, Chen 2008, Eisenberg et al. 2001, Findlay et al. 2009, Garaigordobil 2009). Children's health status could affect their mental health and behaviour (Cadman et al. 1987); therefore, whether the child has any medical conditions or disabilities that had lasted or were likely to last for six months or more is assessed at each wave and included as a categorical variable. Whether the child was breastfed until at least 6 months of age is included as a time-invariant categorical variable, given evidence breastfeeding is associated with later childhood socio-emotional and behavioural outcomes (e.g. Lind et al. 2014; Rochat et al. 2016).

Family variables. Whether there is a non-biological parent living in the household is included as a categorical variable at each wave, because some research suggests living with a non-biological parent may be associated with poorer emotional well-being for children (Amato 2005, Bramlett & Blumberg 2007). For single parent families where the parent was biologically related to the child, the answer was coded to 'No'. Whether there is an infant (child aged less than one year old) in the household at each wave is included as a categorical variable. The number of resident children in the household at each wave is included as a categorical variable (one child, two children, three or more children). The number of children, or an infant, in the household may affect the behaviour of the children in the household.

The variables are formatted and entered in the analyses so that the reference child represents a realistic scenario. For binary and categorical variables this is determined by considering the most common category in the data set. For continuous variables, this means that they are centred on the sample mean before being included in the final models.

Empirical Approach

As a panel survey, in the LSAC dataset there are two basic levels: each child, and each occasion at which they are assessed. Whilst some researchers pool the observations across children and waves for analysis, this fails to account for the dependence or correlation of units that belong to the same cluster. Multilevel analysis, on the other hand, accounts for observations that are clustered by child, and therefore likely to have correlated errors. Growth curve models, a type of multilevel model, explicitly model the shape of trajectories of individuals over time and how these trajectories vary by covariates, and randomly (Rabe-Hesketh & Skrondal 2012). Theoretically, socio-emotional and behavioural trajectories are likely to vary across children. Growth curve models are also flexible and efficient for unbalanced and variably spaced longitudinal data[1], and predictors can be time-invariant or time-varying (Singer & Willett 2003). For these reasons, estimation of the association between housing and financial conditions and children's socio-emotional and behavioural trajectories is conducted in this paper using mixed effects multi-level growth curve modelling. Analyses are estimated with Level 1 as age (i.e. within individual effects) and Level 2 as children (i.e. between individual effects).

The general growth curve model, for the repeatedly measured variable y_{ti} of individual i at occasion t, may be expressed as follows:

$$y_{ti} = (\beta_1 + \zeta_{1i}) + (\beta_2 + \zeta_{2i})Age_{ti} + \beta_3 X_{ti} + \epsilon_{ti}$$

where β_1 is the mean intercept; β_2 is the mean slope, or predicted change in y_{ti} for each one year increase in age; ζ_{1i} is a random cluster intercept for child i, the deviation of child i's intercept from the mean intercept β_1; ζ_{2i} is a random slope for child i, the deviation of child i's slope from the mean slope β_2; X_{ti} is a level 2 predictor for occasion t for child i; β_3 is the predicted change in y_{ti} for a one unit change in X_{ti}; and ϵ_{ti} is the individual error term.

[1] Children are not all the same age at each wave (e.g. some children were just over 4 at Wave 1, while others were nearly 6) and the time between waves varies for each child.

Preliminary analyses are conducted to analyse within and across child variation in SDQ scores. First, an unconditional means model is run on SDQ scores with only individual-level random intercepts and no explanatory variables. The results indicate that around two-thirds (65 per cent) of the variance in SDQ scores is due to differences across children, with the remaining proportion attributable to differences within children themselves. Second, an unconditional growth model adds child age to the model with a random slope. The results indicate that the difference in within-child variation in SDQ scores attributable to age is 20 per cent.

The main analyses consist of a sequence of four models. The first regresses child SDQ scores on the number of houses the child has lived in, dwelling type, dwelling condition, household composition and the control variables. Given the research interest of understanding the effect of the housing and finances on children as they age, interactions between children's age and the key variables are included. The second model adds tenure type and affordability as explanatory variables to estimate the effect of housing affordability stress and whether that may explain any associations found in the first model. The third model adds household income and financial hardships to estimate of how much of the associations between housing variables are explained by household finances. The fourth model adds the measures of parenting skills and psychological stress to test whether these may explain or mediate associations between housing variables and child SDQ scores as hypothesised by the family stress model.

The models allow for a random intercept and a random slope for age. These effects allow for between child variability in initial levels of children's difficulties and in the way they change as they age. Only the lower order (linear) term for age used in the fixed part of the model is allowed to vary randomly between children. This is deemed to be a reasonable approach in the literature (Rabe-Hesketh & Skrondal 2012). An unstructured covariance matrix is specified for the random effects. The significance of the random effects in each model are systematically examined by comparing nested models and conducting likelihood ratio tests in STATA (Hamilton 2013). To evaluate model fit, three goodness of fit indices are used: the deviance statistic (-2 log likelihood),

Akaike Information Criterion (AIC), and Bayesian Information Criterion (BIC). Smaller numbers on all three measures indicate a better model fit.

Results

Descriptive Analyses

The distribution of the sample by the analytic variables is summarised in Table 1. The family variables demonstrate changes in family structure that occur as the study child ages, such as a decreasing proportion of children living in two-parent only families and an increasing proportion children with a non-biological parents in the household. Most households in the sample have not experienced financial hardship. The majority of children live in well-kept separate houses, which their parents are paying off through mortgages. Not surprisingly, over the waves of the survey, the proportion of who children who have moved several times increases.

Table 1. Distribution of sample variables for children with complete data on all variables (37,166 observations)

	Age group					
	4-5 n=7799	6-7 n=8057	8-9 n=7421	10-11 n=7217	12-13 n=3564	14-15 n=3108
Key variables						
SDQ score (mean)	8.7	7.9	7.7	7.7	7.3	7.1
Child's age (mean in years)	4.8	6.8	8.9	10.9	12.9	14.9
Housing variables						
Family composition (%)						
1 parent	9.3	10.3	10.9	12.2	13.2	13.4
1 parent & other adults	1.7	2.4	2.1	1.7	2.1	2.0
2 parents	84.2	82.2	80.3	80.7	76.5	79.0
2 parents & other adults	4.7	5.0	6.6	5.3	8.1	5.6
Number of homes lived in (mean)	1.9	2.1	2.2	2.4	2.4	2.5
Dwelling type (%)						
Separate house	89.4	90.2	90.8	91.3	90.7	90.7
Semi-detached house	4.7	4.1	3.9	3.5	3.8	4.3
Flat/unit/apartment	3.0	2.7	2.1	2.1	2.1	1.8
Other	2.8	3.0	3.2	3.2	3.4	3.2
Dwelling condition (%)						
Well kept	75.0	76.6	74.2	76.1	73.0	76.8
Fair condition	21.3	20.4	22.5	20.3	22.4	19.9
Poor condition or badly deteriorated	3.8	3.0	3.3	3.6	4.6	3.3
Tenure & housing costs (%)						
Own outright	11.5	12.5	14.1	15.0	16.6	18.3
Mortgage	61.6	63.1	62.5	62.7	61.8	62.3
Renting & paying <30%	17.3	15.3	13.9	12.9	13.2	10.6
Renting & paying >=30%	6.0	6.2	6.7	7.0	6.3	6.7
Other or not stated	3.6	3.0	2.8	2.4	2.2	2.1
Financial stress mediators						
Financial hardship experiences (%)						
None	76.8	82.5	83.4	83.6	83.1	83.8
One	13.8	11.0	10.4	10.2	10.4	9.9
Two	5.9	4.2	4.3	4.0	4.3	4.0
Three or more	3.4	2.3	2.0	2.2	2.1	2.3
Total weekly income (mean in $)	1974	2154	2351	2432	2493	2642

Table 1. Distribution of sample variables for children with complete data on all variables (37,166 observations)

	Age group					
	4-5 n=7799	6-7 n=8057	8-9 n=7421	10-11 n=7217	12-13 n=3564	14-15 n=3108
Parenting mediators						
Mother's psychological distress (K6) (mean)	4.4	4.5	4.5	4.5	4.5	4.5
Mother's parenting style (mean)						
Warm	4.5	4.5	4.4	4.3	4.2	4.0
Angry	2.2	2.2	2.2	2.1	2.1	2.1
Consistent	4.1	4.2	4.2	4.2	4.1	4.1
Covariates						
Gender (% boy)	51.4	51.4	51.2	50.9	51.0	50.5
Medical condition (% yes)	14.9	11.7	6.2	6.9	4.6	4.9
Breastfed at 6 months (% yes)	57.8	57.9	58.8	59.9	60.3	61.9
Presence of non-biological parent (% yes)	3.0	3.9	6.3	7.5	8.4	9.0
Infant in household (% yes)	9.8	5.6	2.9	1.8	1.4	0.6
Number of children (%)						
1 child	10.6	8.5	8.2	8.0	9.1	11.2
2 children	49.7	46.1	44.5	44.9	45.2	46.2
3 or more children	39.7	45.5	47.4	47.2	45.7	42.6

Source: Authors' calculations based on LSAC Wave 6 data release. Notes: Income is included in its centred and logged form in the analyses. Mother's psychological distress (Kessler 6) score included in reversed form in the analyses. The distress and parenting variables range from 1 to 5. Totals may not sum to 100% due to rounding.

Growth Curve Analyses

The results of the analyses are shown in Table 2. The main effect of children's age indicates that problems decrease as children age, however, the higher order terms are significant, indicating a cubic relationship between socio-emotional problems and age.

Table 2. Results of growth-curve models for children's socio-emotional and behavioural problems (adjusted logged SDQ score), ages 4-15

	Model 1 (obs. 39,161)	Model 2 (obs. 39,161)	Model 3 (obs. 39,607)	Model 4 (obs. 37,166)
Fixed effects	*b (SE)*	*b (SE)*	*b (SE)*	*b (SE)*
Intercept	2.119** (0.019)	2.123** (0.02)	2.113** (0.02)	2.168** (0.018)
Child's age	-0.088** (0.006)	-0.087** (0.006)	-0.079** (0.006)	-0.06** (0.006)
Child's age squared	0.011** (0.001)	0.011** (0.001)	0.01** (0.001)	0.006** (0.001)
Child's age cubed	-.0005** (.0001)	-.0005** (.0001)	-.0005** (.0001)	-.0002** (.0001)
Household composition				
1 parent	0.111** (0.017)	0.102** (0.018)	0.033† (0.019)	0.013 (0.019)
1 parent & other adults	0.148** (0.033)	0.134** (0.034)	0.088* (0.034)	0.046 (0.035)
2 parents (ref.)	-	-	-	-
2 parents & other adults	0.073** (0.021)	0.068** (0.022)	0.073** (0.022)	0.057** (0.021)
Household composition × child's age				
1 parent	0.004 (0.003)	0.002 (0.003)	0.007* (0.003)	0.007* (0.003)
1 parent & other adults	-0.002 (0.006)	-0.002 (0.006)	-0.001 (0.006)	0.004 (0.006)
2 parents (ref.)	-	-	-	-
2 parents & other adults	-0.005 (0.003)	-0.004 (0.004)	-0.005 (0.004)	-0.003 (0.004)
Number of homes lived in	0.027** (0.005)	0.021** (0.005)	0.021** (0.005)	0.013** (0.004)
Number of homes × child's age	-0.002** (0.001)	-0.001* (0.001)	-0.001* (0.001)	-0.001† (0.001)
Dwelling type				

Table 2. Results of growth-curve models for children's socio-emotional and behavioural problems (adjusted logged SDQ score), ages 4-15

	Model 1 (obs. 39,161)	Model 2 (obs. 39,161)	Model 3 (obs. 39,607)	Model 4 (obs. 37,166)
Separate house (ref.)	-	-	-	-
Semi-detached house	0.041† (0.023)	0.033 (0.023)	0.038† (0.023)	0.006 (0.022)
Flat/unit/apartment	0.053† (0.029)	0.041 (0.029)	0.035 (0.029)	0.009 (0.029)
Other	0.001 (0.027)	-0.002 (0.027)	-0.014 (0.027)	-0.005 (0.026)
Dwelling type × child's age				
Separate house (ref.)	-	-	-	-
Semi-detached house	-0.003 (0.004)	-0.004 (0.004)	-0.005 (0.004)	0.000 (0.004)
Flat/unit/apartment	-0.006 (0.005)	-0.007 (0.005)	-0.006 (0.005)	-0.005 (0.005)
Other	-0.003 (0.005)	-0.003 (0.005)	-0.001 (0.005)	-0.001 (0.005)
Dwelling condition				
Well kept (ref.)	-	-	-	-
Fair condition	0.069** (0.011)	0.066** (0.011)	0.051** (0.011)	0.034** (0.011)
Poor / badly deteriorated	0.074** (0.024)	0.069** (0.024)	0.045† (0.024)	0.040 (0.025)
Dwelling condition × child's age				
Well kept (ref.)	-	-	-	-
Fair condition	-0.003 (0.002)	-0.003 (0.002)	-0.001 (0.002)	0.001 (0.002)
Poor / badly deteriorated	0.002 (0.004)	0.002 (0.004)	0.004 (0.004)	0.003 (0.004)
Tenure & costs				
Own outright	-	-0.014 (0.015)	-0.011 (0.015)	-0.023 (0.015)
Mortgage (ref.)	-	-	-	-
Renting & paying <30% income	-	0.049** (0.014)	0.038** (0.014)	0.028* (0.014)
Renting & paying ≥30% income	-	0.033 (0.022)	-0.020 (0.023)	-0.011 (0.023)
Other or not stated	-	0.048† (0.027)	0.027 (0.027)	0.004 (0.027)
Tenure & costs × child's age				
Own outright	-	0.000 (0.002)	0.000 (0.002)	0.001 (0.002)
Mortgage (ref.)	-	-	-	-
Renting & paying <30% income	-	0.003 (0.003)	0.005† (0.003)	0.005† (0.003)
Renting & paying ≥30% income	-	0.006 (0.004)	0.010* (0.004)	0.009* (0.004)
Other or not stated	-	-0.006 (0.005)	-0.005 (0.005)	-0.001 (0.005)
Financial hardship experiences				
None (ref.)	-	-	-	-
One	-	-	0.063** (0.014)	0.048** (0.014)
Two	-	-	0.060** (0.021)	0.020 (0.021)
Three or more	-	-	0.113** (0.027)	0.073** (0.028)
Financial hardship × child's age				
None (ref.)	-	-	-	-
One	-	-	-0.002 (0.003)	-0.002 (0.003)
Two	-	-	0.006† (0.004)	0.008* (0.004)
Three or more	-	-	0.005 (0.005)	0.000 (0.005)
Weekly income (log)	-	-	-0.074** (0.009)	-0.064** (0.009)
Weekly income (log) × child's age	-	-	0.006** (0.002)	0.006** (0.001)
Mother's psychological stress	-	-	-	0.103** (0.008)
Mother's psych. stress × child's age	-	-	-	0.003† (0.001)
Mother's parenting				
Warm	-	-	-	-0.064** (0.01)

Table 2. Results of growth-curve models for children's socio-emotional and behavioural problems (adjusted logged SDQ score), ages 4-15

	Model 1 (obs. 39,161)	Model 2 (obs. 39,161)	Model 3 (obs. 39,607)	Model 4 (obs. 37,166)
Angry	-	-	-	0.266** (0.009)
Consistent	-	-	-	-0.095** (0.008)
Mother's parenting × child's age				
Warm	-	-	-	0.003ŧ (0.002)
Angry	-	-	-	0.001 (0.001)
Consistent	-	-	-	0.001 (0.001)
Child's gender (ref. = boy)	-0.147** (0.011)	-0.147** (0.011)	-0.146** (0.011)	-0.123** (0.009)
Child medical condition (ref. = no)	0.144** (0.010)	0.143** (0.010)	0.139** (0.010)	0.131** (0.009)
Child breastfed 6+ mths (ref. = yes)	0.145** (0.011)	0.141** (0.011)	0.131** (0.011)	0.104** (0.009)
Non-bio. parent in home (ref. = no)	0.120** (0.016)	0.113** (0.016)	0.101** (0.016)	0.098** (0.016)
Infant in the household (ref. = no)	0.025* (0.012)	0.025* (0.012)	0.021ŧ (0.012)	0.034** (0.011)
Number of children in household				
1 (ref.)	-	-	-	-
2	-0.003 (0.014)	-0.002 (0.014)	-0.002 (0.014)	-0.046** (0.013)
3 or more	-0.036* (0.015)	-0.038* (0.015)	-0.042** (0.015)	-0.101** (0.014)
Variance components	*σ (SE)*	*σ (SE)*	*σ (SE)*	*σ (SE)*
Level 1 error (within individual)	0.382 (0.002)	0.382 (0.002)	0.382 (0.002)	0.373 (0.002)
Level 2 (between individual)				
Rate of change	0.051**(0.001)	0.051** (0.001)	0.050**(0.001)	0.043** (0.001)
Initial status	0.450** (0.006)	0.449** (0.006)	0.440** (0.006)	0.358* (0.006)
Correlation between intercept and age	-0.073 (0.023)	-0.074 (0.023)	-0.063 (0.024)	-0.060 (0.030)
Model fit statistics				
Deviance	58,194	58,140	57,170	50,288
AIC	58,260	58,222	57,268	50,402
BIC	58,543	58,573	57,688	50,888
Wald Chi^2	2,107.45**	2,169.25**	2,419.32**	8,225.84**

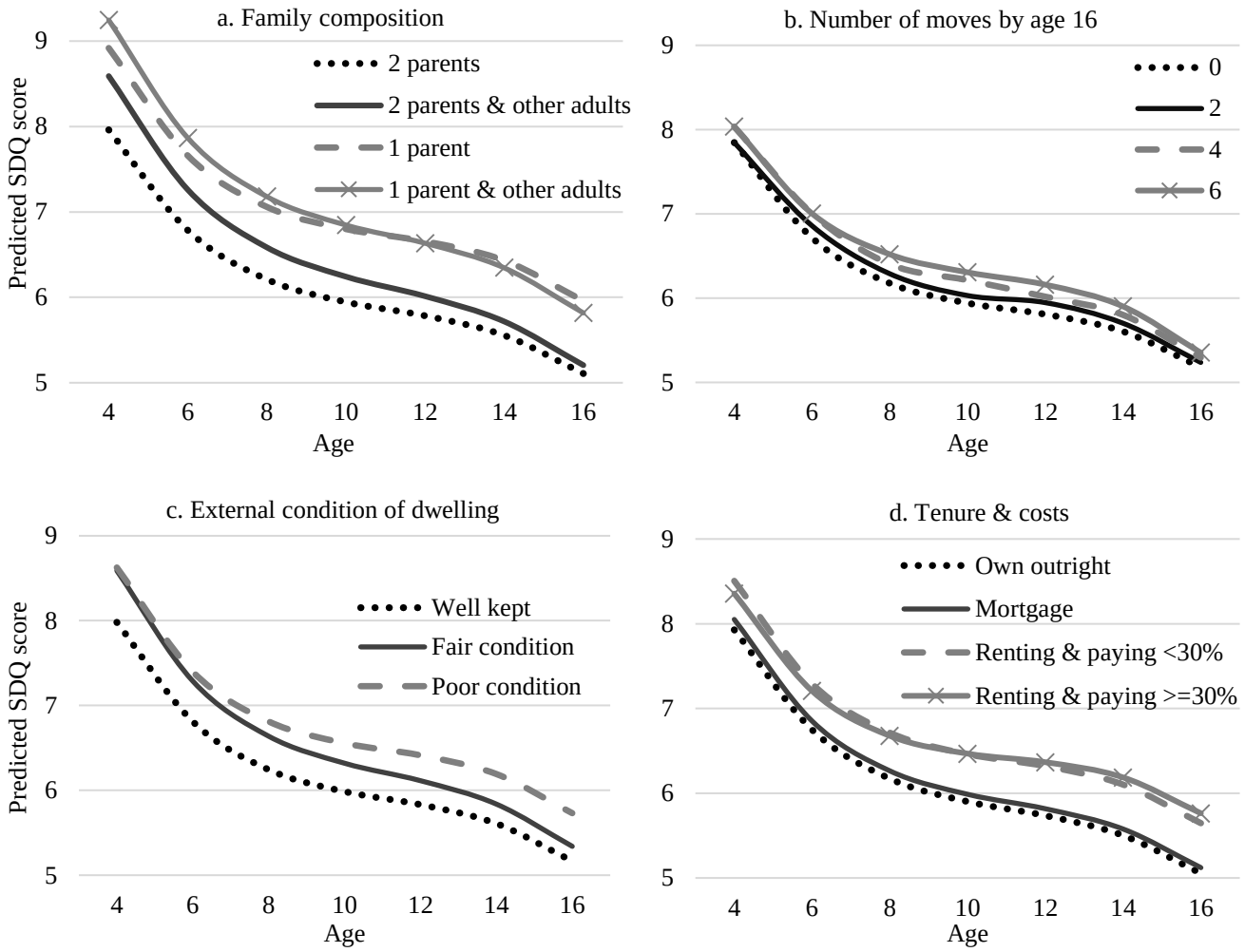
Source: Authors' calculations based on LSAC Wave 6 data release. *Notes*: $^{**}p<0.01$ $^{*}p<0.05$, ŧp<0.10. Results based on mixed-effects multi-level linear regression in STATA 14 SE; random effects vary by child with unstructured residuals.

In Model 1, family composition, number of homes lived in since birth, and dwelling condition are statistically significantly related to the level of children's socio-emotional and behavioural problems. Additionally, number of homes is related to how children change over time. The relationship between dwelling type and the level of children's difficulties is of marginal statistical significance. The results of Model 1 indicate that children living in households with only two parents have the lowest level of difficulties over time and children in one-parent households (largely regardless of the presence of other adult members) have the highest. Children in households with two parents plus other adults have comparable levels of difficulties to children in one-parent households at age four, however by adolescence they converge with children in two-parent only

households (noting the interaction with age is not statistically significant). With respect to moves, a greater number of homes lived in since birth is associated with a higher level of problems; however the effect of having lived in more homes understandably converges as children age. Children in homes which are well-kept have lower levels of problems as they age than children in homes which are either in fair or poor condition, with poor conditions associated with the highest level of problems, particularly into adolescence. The effect of dwelling type is marginal, with living in a separate house associated with lower levels of problems than living in a semi-detached house or an apartment, but, for otherwise average children, this effect is only apparent for children aged between four and ten.

In Model 2, housing tenure and costs are added to the model to investigate whether they account for any of the effects described above. Housing tenure and costs are statistically significantly related to the level of children's difficulties. The renting categories are both related to a higher level of difficulties than owning a home outright and paying off a mortgage. The effects of family composition, number of homes lived in since birth and dwelling condition are similar to Model 1, although the effect sizes are somewhat attenuated. The marginal relationship between living in an apartment and children's difficulties (relative to living in a separate house) over younger ages, which is observed in Model 1, is explained by the addition of housing tenure and costs in Model 2. Figure 1 displays children's socio-emotional and behavioural trajectories by the family composition (Figure 1a.), number of moves (1b.), dwelling condition (1c.) and tenure and costs (1d.) variables. For the moving variable, we have estimated trajectories for hypothetical children who, by age 16 (the oldest child in the sample), have moved zero, two, four and six times. For the purposes of the growth curve, we have assumed the moves are evenly spaced over the child's lifetime. The chart shows only slight differences in children's wellbeing by the number of times they have moved.

Figure 1. Children's predicted socio-emotional difficulties trajectories by the housing variables



Source: Authors' calculations based on LSAC Wave 6 data release. Note: Chart displays results of Model 2 holding all other variables at their means.

In Model 3, household financial hardship and income are added to investigate whether the relationships between housing conditions and children's difficulties seen in Models 1 and 2 are attributable to financial stress. Experiences of financial hardship are related to the level of children's problems, with more experiences of financial hardship generally related to higher levels of difficulties. The relationship with children's age is marginally statistically significant, with the effect of one or two hardships similar at age four, but diverging as children age with two hardships associated with more problems than one hardship by adolescence. Income is related to both the level and trajectory of children's problems, such that lower incomes are related to higher levels of problems at younger ages, however the effect of income reduces as children age.

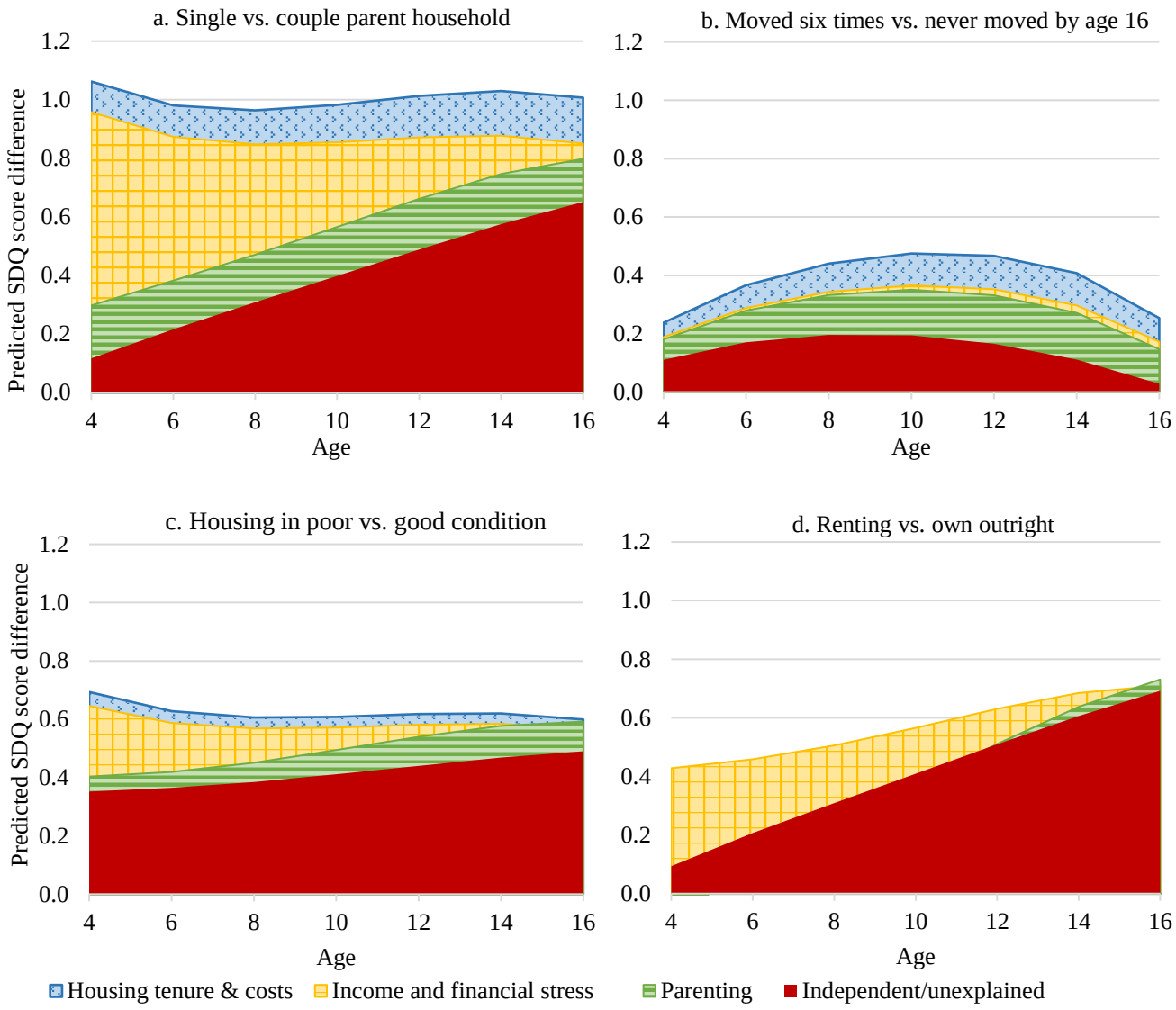
In Model 3, once financial variables are included, the effect of family composition changes slightly. After controlling for finances, having one parent is associated with a similar initial level of children's problems to having two parents, although the decline in problems is flatter. After controlling for financial conditions, having other adults in the home is associated with higher initial levels of difficulties, however the effect reduces over time. The relationship between number of moves and children's difficulties is unaffected by the addition of the financial variables in Model 3, while the effect sizes of the dwelling conditions categories are attenuated but remain statistically significant. Adding the financial variables largely explains the relationship between the tenure and costs variable and children's difficulties; however, the category 'Renting and paying less than 30 per cent' remains statistically significantly different from paying off a mortgage and is associated with the highest level of difficulties at younger ages after accounting for household finances. Furthermore, the relationship between children's age and the category 'Renting and paying more than 30 per cent' is statistically significant, indicating that the association changes as children develop. The results suggest that renting and paying a high proportion of income on housing is associated with an elevation in problems as children age.

Parenting variables are added in Model 4. Mothers' psychological distress and all included aspects of her parenting style (warm, angry, consistent) are associated with the level of children's problems. Children of mothers who are highly distressed, or who have parenting styles that are angry, not warm or inconsistent, have more socio-emotional problems across childhood. Mothers' psychological distress and warm parenting style are marginally related to the shape of children's trajectories as they age. The effect of mothers' distress strengthens as children age, while the effect of mothers' warm parenting style weakens. Once these factors are included in the analyses, the effects of housing tenure and costs, financial hardships, household income and dwelling condition are generally attenuated compared with the results of Model 3 (noting the effect of owning a home becomes stronger and the effect of two financial hardships on the shape of children's trajectories becomes stronger). The effects of family composition are slightly different, with the slight elevation

in initial levels in difficulties associated with having two parents and other adults in the home seen in Model 3 reduced in Model 4. In the final model, having other adults in the home, regardless of whether there is one or two parents, is associated with the highest initial level of children's problems; while in adolescence, having one parent, regardless of the presence of other adults in the home, is associated with more problems. In Model 4, the effect size of number of homes lived in since birth is reduced, and the effect of moving many times further converges as children age (noting the relationship between number of homes and children's age is marginally statistically significant).

The role of housing stress, financial variables, and mothers' psychological and parenting factors in explaining or mediating the association between children's difficulties and family composition, moves, dwelling condition and tenure and costs is examined by comparing trajectories across models. Figure 2 shows how the differences in predicted SDQ scores between categories of each of the four housing and household variables can be attributed to the other variables that are added to the model. Income and financial stress together explain and/or mediate a substantial proportion of the greater socio-emotional difficulties experienced by pre-adolescent children in single parent families compared with two parent families (Figure 2a.). Income and financial stress also explain or mediate a reasonable proportion of the disadvantage experienced by children in poorly kept housing (2c.) and in households paying 30 percent or more of income in rent (2d.), while income and financial stress explain a smaller proportion of the difference in scores between children who never move and those who move often (2b.) Overall, some evidence is found to suggest that psychological distress and parenting styles mediate associations between family composition, moving and dwelling condition and children's development; however, a substantially larger proportion of the associations is unexplained, particularly for dwelling quality, and family composition and affordability at older child ages. This suggests there may be unobserved factors or direct effects between housing and children's socio emotional problems.

Figure 2. Explaining the effects of the housing variables of children's predicted socio-emotional difficulties scores



Source: Authors' calculations based on LSAC Wave 6 data release. Note: Chart displays results of Model 4 holding all other variables at their means.

Variance Components and Model Fit

The variance components are presented in the middle section of Table 2 as standard deviations and can be interpreted on the same scale as the fixed effects. The random effect for the intercept indicates that initial levels of problems are diverse in the sample. The random effects of children's age suggest there is some variability between children in the way they change over time. However, the negative correlation between variability in children's initial levels and the variability in the rate of change in all models indicates the differences between children diminish over time. The results suggest it is important to keep in mind that the trajectories presented above are for average children, and children vary in their socio-emotional trajectories. Adding the variables in Models 2 and 3

explains a small proportion of the variance in children's initial status and in the effect of children's age, while adding the parenting factors in Model 4 explains a larger proportion of the variance. The model fit statistics indicate that the addition of variables in each stage of modelling helps to explain variance in children's difficulties over ages four to 15, and Model 4 provides a better fit to the data than Models 1, 2 or 3.

Summary

In the first model, statistically significant predictors of children's socio-emotional difficulties are family composition, number of homes lived in since birth and dwelling condition. Dwelling type is only marginally associated with children's difficulties. When housing tenure and costs is added in Model 2 it is a significant predictor of the level of children's difficulties, and explains the relationship between dwelling type and children's socio-emotional and behavioural problems. While the addition of tenure type and costs attenuates the relationship between family composition, number of homes and dwelling condition and children's difficulties, the associations remain statistically significant.

When financial hardship and income are added in Model 3 they are statistically significant predictors of children's socio-emotional difficulties and mainly explain the effect of housing tenure and costs. They also attenuate and alter the effect of family composition and attenuate the effect size of dwelling conditions, but do not affect number of homes lived in since birth. Once parenting factors are added in Model 4, the effects of tenure and costs, financial hardship, income and dwelling condition, family composition and moving are all attenuated.

The results indicate that housing and household characteristics have modest, significant effects on children's socio-emotional wellbeing. Residential instability, family composition, housing tenure and costs and the physical condition of the home dwelling have small significant associations that change over the course of childhood and adolescence. Financial stress and parenting explain some of the effects of the housing variables, but there remain effects that are unexplained.

Discussion

The results of this study imply that housing is related to children's socio-emotional and behavioural development in Australia. Children appear to benefit from stable and independent living arrangements, good quality housing, home ownership and, to a lesser extent, residential stability. There is some variability in the relationship between housing and children's difficulties by children's age with the associations between household composition and housing quality and tenure appearing to increase with age, particularly after controlling for income and financial stress. The mediation analysis suggests that housing and financial stress interact in potentially different ways, particularly for young children, while parenting factors may be mechanisms through which housing conditions influence children. None of the effects of the housing variables are fully explained in the final model, suggesting that housing may have direct effects on socio-emotional development or that there are other unidentified pathways.

Household composition has the largest observed associations with socio-emotional problems. Children in single parent families have persistently higher predicted problems than those in two parent families. Housing tenure and affordability, income and financial stress explain a large proportion of this difference particularly in early childhood. Parental wellbeing and parenting practices explain a reasonable amount across childhood and adolescence. This provides evidence that these factors may mediate the relationship between single parenting and children, suggesting that material hardship and parental stress have direct effects on child wellbeing in single parent families. Interestingly, doubling up has modest positive associations with socio-emotional problems, especially in early childhood. The associations are larger for two parent families than one parent families, perhaps indicative of the greater financial and child care benefits single parents derive from doubling up. The associations with doubling up reduce over time, such that their effects on children appear to disappear by age 16. These findings extend those of Cutts et al. (2011) who analyse associations between household crowding and doubling up and child development risk of very young children in low income families. However, while we find significant adverse

associations at age four, Cutts and colleagues find no associations among slightly younger children. This might be a consequence of the different sample frames and measures used.

Housing tenure and quality have larger observed associations than residential stability and rental affordability. Moving house has modest associations, much of which is explained by housing tenure and affordability and parenting practices, particularly at older ages. While parental stress is likely to mediate the relationship between moving and child wellbeing, the effect of housing tenure and affordability may result from renters having greater mobility and instability than homeowners. The lack of significance of rental affordability, while consistent with the literature (Coley et al 2013; Lenvethal and Newman 2010), is nevertheless interesting in that it comes despite controlling – or attempting to control – for investments in housing tenure, stability and quality. In other words, we do not find evidence that adverse effects of rent stress are offset by positive effects of better housing, as Leventhal and Newman (2010) suggest. This, in turn, has interesting implications for housing tenure. As others have found (Boyle 2002; Dockery et al 2013), children who live in rented households across their early life course are predicted to face greater problems than those whose families own their home, even after controlling for housing quality, instability and affordability. While income and financial stress explain a large proportion of the associations in early childhood, this is predicted to disappear over time such that there is a sizable unexplained association between renting and socio-emotional problems at age 16. Like Gifford and Lacombe 2006; Coley et al 2013; Dockery et al 2013), we also find that housing quality has moderate and sustained associations with socio-emotional problems. These findings provide evidence for the hypothesis that housing tenure and quality have direct effects on children, perhaps existing as a dimension of wealth and socioeconomic position that is not otherwise captured by measures of income and financial stress.

As discussed, observed associations between household composition, housing quality and tenure and child wellbeing grow as children age. This is predicted to be the case particularly after controlling for income and financial stress, which explains a larger proportions of these associations at younger ages. The fact that associations grow over age may appear to conflict with existing

literature. In Leventhal and Newman's (2010) review, the authors find evidence that younger children are affected by housing characteristics more than older children, which they hypothesise may be due to younger children spending more time in and having greater attachment to the home. Paradoxically, our findings do not necessarily run counter to this hypothesis. Indeed, they may point to an important effect of prolonged housing disadvantage. That is, even if adverse effects diminish over time, developmental trajectories will continue to diverge so long as they remain adverse, albeit at a slower rate. Thus, the cumulative effect of persistent disadvantage across the early life course may lead to wide differences in socio-emotional problems as adolescents transition to adulthood.

Limitations of this research include a general population sample and relatively small differences in children's wellbeing by the independent variables of interest; they are, however, on par with the effect sizes of the covariates included in the models. Additionally, it should be noted that children's socio-emotional difficulties are based on parental reports in which there is potential bias (Johnson et al. 2013). Furthermore, although this study utilises longitudinal data, it examines concurrent relationships, and causal interpretation cannot be placed on the results. The variance components of the multi-level modelling approach indicate there is variability in children's initial socio-emotional difficulties, and in their trajectories, that is not fully accounted for by the variables considered in these analyses. Whilst we have attempted to include a thorough raft of variables in the models presented in this paper, other factors could affect the relationship between housing conditions and children's socio-emotional difficulties. Future analyses could investigate the moderating role of financial hardship or investigate the role played by other mediators. Other parent-level mediators, such as those associated with instability and disadvantage (family breakdown, job loss), could be a target for future research on the mechanisms linking housing conditions to children's socio-emotional and behavioural development.

Conclusion

This study complements previous research by examining the relationship between housing conditions and children's mental and health and behaviour over a 10 year period, from preschool

age to mid-adolescence. Utilisation of mixed effects multi-level models with prospective panel data allows both time-invariant and time-varying covariates to be controlled for, as well as the clustering observed in longitudinal data. This study finds that housing and household characteristics have modest, significant effects on children's socio-emotional wellbeing. The results reveal that residential instability, family composition, housing tenure and costs and the physical condition of the home dwelling have small significant associations that change over the course of childhood and adolescence. Financial stress and parenting explain some of the effects of the housing variables on children's socio-emotional difficulties, but there remains effects that are unexplained. We conclude that housing conditions interact with personal, interpersonal, material and societal factors and fit within the ecology of material factors impacting upon children's socio-emotional development. Future researchers should target their investigations towards the mechanisms that link housing to children's well-being in order to support the design of effective policy interventions.

References

Ahrentzen, S. (2003). Double indemnity or double delight? The health consequences of shared housing and "doubling up". *Journal of Social Issues, 59*(3), 547-568.

Amato, P. R. (2005). The impact of family formation change on the cognitive, social, and emotional well-being of the next generation. *The Future of Children, 15*(2), 75-96.

Australian Bureau of Statistics. (2014). *Consumer Price Index, Australia, June 2014*. Cat. No. 6401.0. Australian Bureau of Statistics, Canberra.

Australian Institute of Family Studies (2015). *Longitudinal Study of Australian Children Data User Guide – November 2015*. Australian Institute of Family Studies, Melbourne.

Bao, P., Jing, J., Jin, Y., Hu, X., Liu, B., & Hu, M. (2016). Trajectories and the influencing factors of behavior problems in preschool children: a longitudinal study in Guangzhou, China. *BMC Psychiatry, 16(*1), 178.

Beck, B., Buttaro Jr, A., & Lennon, M. C. (2016). Home moves and child wellbeing in the first five years of life in the United States. *Longitudinal and Life Course Studies*, *7*(3), 240-264.

Becker, G. S. (1981). *A treatise on the family*, 2nd ed. Cambridge, MA: Harvard University Press.

Berger, L. M., Paxson, C., & Waldfogel, J. (2009). Income and child development. *Children and youth services review*, *31*(9), 978-989.

Blanden, J., Gregg, P., & Macmillan, L. (2007). Accounting for intergenerational income persistence: noncognitive skills, ability and education. *The Economic Journal*, *117*(519).

Bøe, T., Siversten, B., Heiervang, E., Goodman, R., Lundervold, A., & Hysing, M. (2014). Socioeconomic status and child mental health: The role of parental emotional wellbeing and parenting practices. *Journal of Abnormal Child Psychology, 42*(5), 705-615.

Boyle, M. H. (2002) Home ownership and the emotional and behavioral problems of children and youth, *Child Development, 73*, 883–893.

Bramlett, M. D., & Blumberg, S. J. (2007). Family structure and children's physical and mental health. *Health Affairs, 26*(2), 549-558.

Bronfenbrenner, U., & Crouter, A. C. (1982). *Work and family through time and space.* Families that work: children in a changing world. Sheila B. Kamerman and Cheryl D. Hayes (eds.). National Academy Press, Washington, DC.

Bronfenbrenner, U., & Morris, P. A. (2006). *The bioecological model of human development*. Handbook of child psychology. DOI: 10.1002/9780470147658.chpsy0114

Cadman, D., Boyle, M., Szatmari, P., & Offord, D. R. (1987). Chronic illness, disability, and mental and social well-being: findings of the Ontario Child Health Study. *Pediatrics, 79*(5), 805-813.

Cairney, J. (2005) Housing tenure and psychological well-being during adolescence, *Environment and Behavior, 37*, 552–564.

Chen, J. J. L. (2010). Gender differences in externalising problems among preschool children: implications for early childhood educators. *Early Child Development and Care, 180*(4), 463-474.

Clark, W. A. (2016). Life events and moves under duress: disruption in the life course and mobility outcomes. *Longitudinal and Life Course Studies*, *7*(3), 218-239.

Clark, W. A., Deurloo, M. C., & Dieleman, F. M. (2000). Housing consumption and residential crowding in US housing markets. *Journal of Urban Affairs, 22*(1), 49-63.

Coley, R. L., Leventhal, T., Lynch, A. D., & Kull, M. (2013). Relations between housing characteristics and the well-being of low-income children and adolescents. *Developmental Psychology, 49*(9), 1775.

Crowe, L. & Butterworth, P. (2016). The role of financial hardship, mastery and social support in the association between employment status and depression: results from an Australian longitudinal cohort study. *BMJ Open, 6*, e009834. doi:10.1136/bmjopen-2015-009834.

Cutts, D. B., Meyers, A. F., Black, M. M., Casey, P. H., Chilton, M., Cook, J. T., & Rose-Jacobs, R. (2011). US housing insecurity and the health of very young children. *American Journal of Public Health, 101*(8), 1508-1514.

Darling, N., & Steinberg, L. (1993). Parenting style as context—an integrative model. *Psychological Bulletin, 113*, 487–96.

DeWit D. J., Offord, D., & Braun, K. (1998). *The relationship between geographic relocation and childhood problem behaviour*. Quebec, Canada: Applied Research Branch, Strategic Policy, Human Resources Development Canada, 1–61.

Dockery, A. M., Ong, R., Colquhoun, S., Li, J., & Kendall, G. (2013). *Housing and children's development and wellbeing: evidence from Australian data.* AHURI Final Report no. 201, Australian Housing and Urban Research Institute, Melbourne.

Edwards, J. N., Fuller, T. D., Sermsri, S., & Vorakitphokatorn, S. (1994). Why people feel crowded: An examination of objective and subjective crowding. *Population and Environment, 16*(2), 149-173.

Eisenberg, N., Cumberland, A., Spinrad, T. L., Fabes, R. A., Shepard, S. A., Reiser, M., & Guthrie, I. K. (2001). The relations of regulation and emotionality to children's externalizing and internalizing problem behavior. *Child Development, 72*(4), 1112-1134.

Findlay, L. C., Coplan, R. J., & Bowker, A. (2009). Keeping it all inside: Shyness, internalizing coping strategies and socio-emotional adjustment in middle childhood. *International Journal of Behavioral Development, 33*(1), 47-54.

Finkel, L. B., Kelley, M. L., & Ashby, J. (2003). Geographic mobility, family, and maternal variables as related to the psychosocial adjustment of military children. *Military Medicine, 168*(12), 1019-1024.

Gambaro, L., & Joshi, H. (2016). Moving home in the early years: what happens to children in the UK? *Longitudinal and Life Course Studies, 7*(3), 265-287.

Gifford, R., & Lacombe, C. (2006). Housing quality and children's socioemotional health. *Journal of Housing and the Built Environment, 21*(2), 177-189.

Garaigordobil, M. (2009). A comparative analysis of empathy in childhood and adolescence: Gender differences and associated socio-emotional variables. *International Journal of Psychology and Psychological Therapy, 9*(2), 217-235.

Goodman, A., Lamping, D. L., & Ploubidis, G. B. (2010). When to use broader internalising and externalising subscales instead of the hypothesised five subscales on the Strengths and Difficulties Questionnaire (SDQ): data from British parents, teachers and children. *Journal of Abnormal Child Psychology, 38*(8), 1179-1191.

Grinstein-Weiss, M., Key, C., Yeo, Y. H., Yoo, J., Holub, K., Taylor, A., & Tucker, J. (2012). Homeownership, neighbourhood characteristics and children's positive behaviours among low-and moderate-income households. *Urban Studies, 49*(16), 3545-3563.

Hamilton, L. C. (2012). *Statistics with Stata: version 12*. Cengage Learning, Boston.

Haurin, D., Parcel, T., Haurin, R. (2002) Does homeownership affect child outcomes?, *Real Estate Economics, 30*(4), 635–666.

Heckman, J. J., Stixrud, J., & Urzua, S. (2006). The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. *Journal of Labour Economics, 24*(3), 411-482.

Lauster, N., & Tester, F. (2010). Culture as a problem in linking material inequality to health: on residential crowding in the Arctic. *Health & Place, 16*(3), 523-530.

Leigh, A. (2013). *Battlers and billionaires: The story of inequality in Australia*. Black Inc., Collingwood, Victoria.

Leventhal, T., & Newman, S. (2010). Housing and child development. *Children and Youth Services Review, 32*(9), 1165-1174.

Lind, J. N., Li, R., Perrine, C. G., & Schieve, L. A. (2014). Breastfeeding and later psychosocial development of children at 6 years of age. *Pediatrics, 134*(Supplement 1), S36-S41.

Lynch, J. W., Kaplan, G. A., & Salonen, J. T. (1997). Why do poor people behave poorly? Variation in adult health behaviours and psychosocial characteristics by stages of the socioeconomic lifecourse. *Social Science & Medicine, 44*(6), 809-819.

Jelleyman, T., & Spencer, N. (2008). Residential mobility in childhood and health outcomes: a systematic review. *Journal of Epidemiology & Community Health, 62*(7), 584-592.

Johnson, S., Li, J., Kendall, G., Strazdins, L., & Jacoby, P. (2013). Mothers' and fathers' work hours, child gender, and behavior in middle childhood. *Journal of Marriage and Family, 75*(1), 56-74.

Khanam, R., & Nghiem, S. (2016). Family Income and Child Cognitive and Noncognitive Development in Australia: Does Money Matter? *Demography, 53*(3), 597-621.

Koebel, C. T., & Murray, M. S. (1999). Extended families and their housing in the US. *Housing Studies, 14*(2), 125-143.

Korneluk, Y. G., & Lee, C. M. (1998). Children's adjustment to parental physical illness. *Clinical Child and Family Psychology Review, 1*(3), 179-193.

Myers, D., & Lee, S. W. (1996). Immigration cohorts and residential overcrowding in Southern California. *Demography, 33*(1), 51-65.

Myers, D., Baer, W. C., & Choi, S. Y. (1996). The changing problem of overcrowded housing. *Journal of the American Planning Association, 62*(1), 66-84.

Nicholson, J. M., Strazdins, L., Brown, J. E., & Bittman, M. (2012). How parents' income, time and job quality affect children's health and development. *Australian Journal of Social Issues, 47*(4), 505.

O'Connor, E. E., Scott, M. A., McCormick, M. P., & Weinberg, S. L. (2014). Early mother–child attachment and behavior problems in middle childhood: The role of the subsequent caregiving environment. *Attachment & Human Development, 16*(6), 590-612.

Parke, R. D. (2004). Development in the family. *Annual Review of Psychology, 55*, 365-399.

Paterson, G., & Sanson, A. (1999). The association between behavioural adjustment to temperament, parenting and family characteristics among 5 year-old children. *Social Development, 8*, 293–309.

Pilkauskas, N. V., & Martinson, M. L. (2014). Three-generation family households in early childhood: Comparisons between the United States, the United Kingdom, and Australia. *Demographic Research, 30*, 1639.

Pribesh, S., & Downey, D. B. (1999). Why are residential and school moves associated with poor school performance? *Demography, 36*(4), 521-534.

Rabe-Hesketh, S., & Skrondal, A. (2008). *Multilevel and longitudinal modeling using Stata*. STATA press.

Repetti, R. L., Taylor, S. E., & Seeman, T. E. (2002). Risky families: family social environments and the mental and physical health of offspring. *Psychological Bulletin, 128*(2), 330.

Rochat, T. J., Houle, B., Stein, A., Coovadia, H., Coutsoudis, A., Desmond, C., & Bland, R. M. (2016). Exclusive breastfeeding and cognition, executive function and behavioural disorders in primary school-aged children in rural South Africa: a cohort analysis. *PLoS Medicine, 13*(6), 1-30.

Sanson, A., Smart, D., & Misson, S. (2011). Children's socio-emotional, physical, and cognitive outcomes: Do they share the same drivers? *Australian Journal of Psychology, 63*(1), 56-74.

Saunders, P. (2006). *Social class and stratification*. Routledge, London.

Skobba, K., & Goetz, E. G. (2015). Doubling up and the erosion of social capital among very low income households. *International Journal of Housing Policy, 15*(2), 127-147.

Simpson, G. A., & Fowler, M. G. (1994). Geographic mobility and children's emotional/behavioral adjustment and school functioning. *Pediatrics, 93*(2), 303-309.

Singer, J. D., & Willett, J. B. (2003). *Applied longitudinal data analysis: Modeling change and event occurrence*. Oxford University Press, New York.

Solari, C. D., & Mare, R. D. (2012). Housing crowding effects on children's wellbeing. *Social Science Research, 41*(2), 464-476.

StataCorp. 2015. *Stata Statistical Software: Release 14*. College Station, TX: StataCorp LP.

Statistics Canada. (2000). National Longitudinal Survey of Children and Youth (NLSCY) Cycle 3 survey instruments: parent questionnaire. Ottowa, Canada: Author.

Vacha, E. F., & Marin, M. V. (1993). Doubling up: Low income households sheltering the hidden homeless. *Journal of Sociology & Social Welfare, 20*, 25.

Wood, D., Halfon, N., Scarlata, D., Newacheck, P., & Nessim, S. (1993). Impact of family relocation on children's growth, development, school function, and behavior. *JAMA, 270*(11), 1334-1338.

Yamauchi, C. (2010). Parental investment in children: Deferential pathways of parental education and mental health. *Economic Record, 86*(273), 210–226.

Yeung, W. J., Linver, M. R., & Brooks-Gunn, J. (2002). How money matters for young children's development: Parental investment and family processes. *Child Development, 73*(6), 1861–1879.

Ziol-Guest, K. M., & McKenna, C. C. (2014). Early childhood housing instability and school readiness. *Child development, 85*(1), 103-113.

Zubrick, S.R., Lucas, N., Westrupp, E. M., & Nicholson, J. M. (2014). *Parenting measures in the Longitudinal Study of Australian Children: Construct validity and measurement quality, Waves 1 to 4*. Canberra: Department of Social Services.