Measuring Child Deprivation and Opportunity in Australia

Applying the Nest framework to develop a measure of deprivation and opportunity for children using the Longitudinal Study of Australian Children

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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 author and should not be attributed to DSS, AIFS or the ABS.

This report seeks to provide greater insight into the deprivation and wellbeing of children in Australia using quantitative data. Numbers and statistics can only tell part of the story. Behind these numbers are real children experiencing challenging and difficult circumstances. Any form of deprivation can have a profound impact on their lives. This paper seeks to build an evidence base to develop policy responses that will help improve the wellbeing of children and young people in all its forms.

Acknowledgements

Foreword

The intent of this report is to shine a light on the level of deprivation and wellbeing experienced by Australian children, generally, and to examine the depth and complexity of deprivation faced by children known to be at-risk; children with disability, those living in monetary poverty and those living in jobless families. Specific data on deprivation amongst Indigenous children are not available. If they were, this report would have been able to include a deeper analysis of the circumstances of these children.

Our findings, while startling, are sadly not surprising. While children in Australia are generally faring well, with around one quarter of children having high wellbeing in all Nest dimensions, around 1 in 5 children lack wellbeing in three or more *Nest* dimensions (known as multidimensional deprivation) and up to 1 in 4 are deeply deprived in at least one *Nest* dimension, by having a deprivation in two or more indicators within a Nest dimension.

The research also shows us that deprivation is complex and compounding. For example, kids growing up in jobless families face difficulties which go beyond financial disadvantage. These hardships can include increased levels of bullying, social and educational exclusion, and poorer mental health.

Why is a report such as this important? Because this report coupled with other evidence tells us that when kids grow up in deprivation, they are much more likely to be negatively affected throughout their lives and this brings significant costs to those kids and to their communities.

The *Strong Foundations: Getting it Right in the First 1000 Days Partnership*, led by ARACY, has found that children exposed to adverse environments and experiences early are likely to continue to be exposed to such experiences and that changes or adaptations made during the early years can have lifelong effects.[1] This research has shown that adult conditions, such as coronary heart disease, stroke, diabetes, and cancer, are now being linked to pathways that originated prior to or during the first 1000 days.

The evidence is clear that by investing in helping kids get off to a good start, the costs to the community in areas such as healthcare, homelessness and unemployment can be massively reduced. This fact was recently recognised by the UK Government which announced the establishment of a cross-Government working group to review how to better support families in the period from birth to the age of two.[2] That group's Chair summed up the need for early investment saying: "The money you invest at age zero gives you infinite returns. The money you invest at age 28, when you've already got someone who is self-harming, homeless and unable to hold down a job, is very high cost, much smaller return."[3]

This report is intended by ARACY and our partners to inform national debate on the high number of Australian children that face a complex and life changing array of deprivations; the need to devise policy responses and invest heavily, early and in a targeted way to address this – including lifting the rate of Newstart, given the deprivation faced by kids in jobless homes; and better data to monitor the progress of our children and the effectiveness of investments and policy.

Elaine Henry OAM, ARACY Board Chair

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[1] Moore, T. G., Arefadib, N., Deery, A., & West, S. (2017). The First Thousand Days: An Evidence Paper. Parkville, Victoria. aracy.org.au/documents/item/549

[2] Office of the Leader of the House of Commons. (2018). Leader of the commons to chair ministerial group on family support from conception to the age of two [Press release]. https://www.gov.uk/government/news/leader-of-the-commons-to-chair-ministerial-group-on-family-support-from-conception-to-the-age-of-two

[3] Shipman, T. (2018). Andrea Leadsom: switch off the TV and cuddle your baby and you'll help breed healthy adults. The Times. Retrieved from www.thetimes.co.uk/article/andrea-leadsom-switch-off-the-tv-and-cuddle-your-baby-and-youll-help-breed-healthy-adults-b8qcx9vs9

Glossary of terms

Deep deprivation: Deprived in two or more indicators within a Nest dimension.

Deprivation: Defined as non-fulfilment of child rights in the domains of survival, development, protection and participation. In the index, deprivation can be either within an indicator or a dimension. A child is deprived in an indicator if they fall below the cut-off point. They are deprived within a dimension if they are deprived in at least one indicator in the respective Nest dimension.

Deprivation index: The general term used in this paper for an index that measures deprivation. Synonymous in this paper with a wellbeing index.

Indicator: The exact data item that was used in the study to measure deprivation.

Measure: The construct that indicators are reflecting.

MODA (Multiple Overlapping Deprivation Analysis): MODA is an approach to measuring deprivation experienced by children. It was developed by UNICEF, the United Nations children's agency.

Monetary poverty: A child is said to be living in monetary poverty if they are in a family whose income falls below the relative poverty line, measured at 50% of median income.

Multi-dimensional deprivation: Deprived in three or more Nest dimensions.

The Nest: ARACY's framework for wellbeing that was based off consultations with around 3,700 children and young people. The framework specifies that children need to be loved & safe, have material basics, be healthy, be learning, be participating, and have a positive sense of identity and culture.

Wellbeing: A construct that assesses the quality of an individual's life. In this report, a child is said to have high wellbeing if they are not deprived in all Nest dimensions.
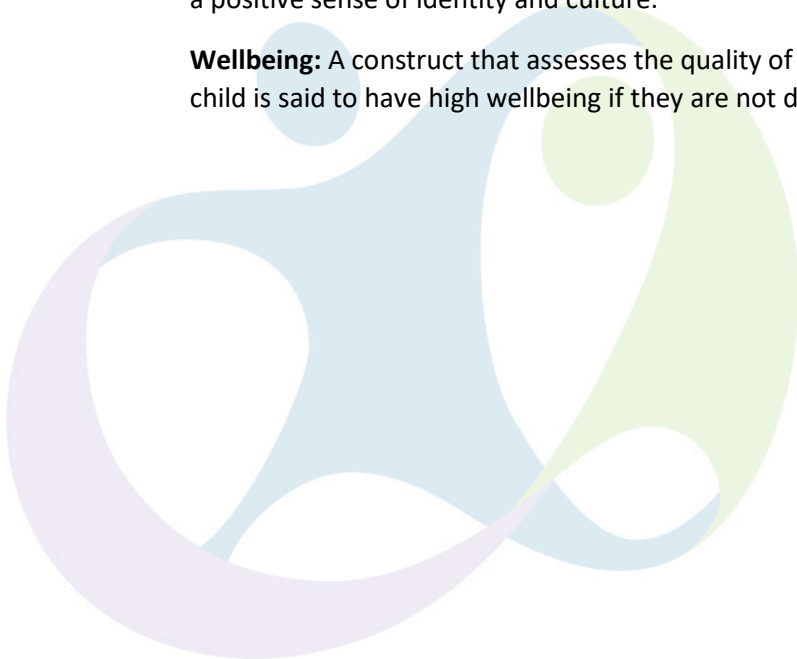
Executive Summary

This report develops a measure of deprivation to assess the wellbeing of children and young people using the Longitudinal Study of Australian Children (LSAC) as a representative sample. The measure utilised the UNICEF MODA methodology, and was based on ARACY's Nest framework which specifies that there are six dimensions of a child's life where they need to be thriving to be said to have high wellbeing; that they are loved and safe, have material basics, are healthy, are learning, are participating in society and have a positive sense of identity and culture. Developing such a tool allows us to uncover the major issues affecting the wellbeing of children in Australia and to assess how children living in difficult circumstances may suffer from greater levels of deprivation in wellbeing areas. This helps to drive policy interventions to improve the lives of children in Australia.

A deprivation index was produced using waves 4, 5 and 6 of the Baby cohort in LSAC, corresponding to children aged 6-7 in 2010, 8-9 in 2012 and 10-11 in 2014. The index is comprised of five dimensions of wellbeing, aligning with the Nest framework. The Nest dimension of Positive Sense of Identity and Culture was not used due to its close relationship with the other Nest dimensions. Indicators were selected based on the Nest consultations conducted in 2012, which asked around 3,700 children and young people what it means to them to live a good life. Cut-off points for 'deprivation' were then empirically derived for each indicator at each wave. A child was considered to be deprived in a dimension if they were deprived in any indicator within that dimension. A measure of multi-dimensional deprivation was developed, defined as being deprived in three or more dimensions, as well as deep deprivation which is defined as being deprived in two or more indicators within a dimension.

The analysis found that while children in Australia are generally faring well, with around one quarter of children having high wellbeing in all Nest dimensions, deprivation still exists in the country, with around one-fifth of children being multi-dimensionally deprived, and up to one-quarter experiencing a deep deprivation in at least one dimension. Children facing more difficult life circumstances are significantly more likely to have deprivations across all areas of their wellbeing, with children in three population groups - children with disability, children living in monetary poverty, and children in jobless families – compared with their peers. The results show that all groups experienced higher levels of deprivation across all wellbeing dimensions. Children in jobless families, in particular, suffered from a greater number of deprivations.

In light of these findings, we present six policy recommendations for which the evidence has shown to improve the issues identified in the report. These are:

1. Increase assistance to low-income families
2. Introduce regulation to reduce the amount of unhealthy food marketing reaching children
3. Introduce evidence-based anti-bullying programs in all Australian schools
4. Prioritise preventative and early intervention mental health programs
5. Establish a more inclusive education system with adequate resourcing
6. Collect better data on children and young people in Australia

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1   Introduction

Measuring the wellbeing of Australian children is integral in gaining a clear understanding of how they are tracking and where policy and programs can help to improve their lives. The purpose of this paper is to build on this evidence base by developing an index to assess the deprivations children in Australia experience, based on ARACY's Nest framework. This index was applied to the most relevant data source available; the Longitudinal Study of Australian Children. Developing a deprivation index allows us to compile wide-ranging indicators on the wellbeing of children and young people into one simple tool. As noted by Vandivere and McPhee (2008), *"The purpose of child well-being indices is to distil large amounts of data on children in ways that can be easily communicated to and used by policy makers and the public" (p251).*

The Nest framework was developed following consultations with around 3,700 children and young people in Australia. It specifies the six key dimensions a child needs to live a good life; namely that they are loved and safe, have material basics, are healthy, are learning, are participating and have a positive sense of identity and culture (ARACY, 2012). Due to research by Renshaw (forthcoming), which found that indicators for Positive Sense of Identity and Culture sit across all other Nest dimensions, this dimension was excluded from the index to avoid double-counting of indicators. The Nest framework was applied in this study using the Multiple Overlapping Deprivation Analysis (MODA) approach.

MODA was developed by UNICEF - the United Nations children's agency – and in this study is used as a methodology to assess the deprivation of children in Australia. MODA has been used as a policy tool in a number of contexts, such as cross-country comparisons of child deprivation in Sub-Saharan Africa (De Milliano & Plavgo, 2014) and the European Union (Chzhen, de Neubourg, Plavgo, & de Milliano, 2016), as well as in national studies in more than 50 countries (Hjelm, Ferrone, Handa, & Chzhen, 2016). It takes a multifaceted, "whole-child approach" that seeks to measure all aspects of a child's life that can contribute to overall deprivation (de Neubourg, Jingqing, de Milliano, Plavgo, & Wei, 2012). MODA requires dimensions of deprivation to be identified, and then indicators to be chosen within each dimension. The five Nest dimensions (excluding Positive Sense of Identity and Culture) were selected as dimensions of deprivation, and key indicators within each dimension were chosen based on data from the Nest consultations. The MODA discourages aggregating indicators into one index, but rather counts the number of dimensions a child is deprived in. It suggests employing the 'union approach' to aggregate indicators into dimensions whereby each indicator captures a different facet within a dimension. If a child is deprived in any indicator within a dimension, they would be flagged as deprived within that dimension (de Neubourg et al., 2012).

The Longitudinal Study of Australian Children (LSAC) is used as the key data source for the deprivation index, using wave 4, 5 and 6 of the B (baby) cohort which captures data on children aged 6-7, 8-9 and 10-11 at each wave respectively. In total, the index is represented through 13 indicators at wave 4, 15 indicators at wave 5 and 16 indicators at wave 6. A maximum of four indicators were selected under each of the five Nest dimensions, with gaps indicating where relevant data are not available. Cut-off points for each indicator at each wave were determined to identify children who were deprived in that indicator. While some indicators capture deprivation of material goods or opportunities, some indicators may reflect choice and preferences that can impact on child outcomes, such as children's enjoyment of physical activity.

Based on this methodology, this paper introduces measures of 'multi-dimensional deprivation' and 'deep deprivation'. Multi-dimensional deprivation is defined as being deprived in three or more of

the five Nest dimensions, while deep deprivation denotes whether a child is deprived in two or more indicators within a single Nest dimension.

The findings illustrate that while approximately one quarter of Australian children at each time point had high wellbeing in all Nest dimensions by having no deprivations in any dimension, pockets of deprivation exist in Australia. At each time point, around one-fifth of children experienced multi-dimensional deprivation and up to one quarter experienced deep deprivation.

The analysis also compares the outcomes of children in three population groups who tend to experience greater levels of disadvantage; children with disability, children living in monetary poverty and children living in jobless families. The results show that children in these groups were more likely to experience deprivation in all Nest dimensions at some point between the ages of 6 and 11. The overlap between children living in monetary poverty and jobless families is also explored, finding that children living in both monetary poverty and a jobless family experienced greater levels of deprivation which is explained by more than just their financial disadvantage.

This analysis raises a number of concerns regarding the wellbeing of Australia's children. In light of the findings, we present six policy recommendations for which the evidence has shown to improve the issues identified in this report. These are:

1. Increase assistance to low-income families
2. Introduce regulation to reduce the amount of unhealthy food marketing reaching children
3. Introduce evidence-based anti-bullying programs in all Australian schools
4. Prioritise preventative and early intervention programs to improve the mental health of Australia's infants and children
5. Establish a more inclusive education system with adequate resourcing
6. Collect better data on children and young people in Australia

2   A review of the literature

2.1 What do we mean by deprivation and wellbeing?

The definitions of child deprivation or wellbeing vary considerably in different cultural contexts and in the literature. This presents challenges in determining suitable approaches to measure it. The Organisation for Economic Co-operation and Development (2009), or OECD, notes that while there is no universally-recognised or agreed definition of child wellbeing, two commonly used approaches to defining and measuring it are (1) for researchers to determine what dimensions are important in a child's life and to select indicators to sit under each of these, and (2) to ask children to assess their own wellbeing.

In the development of the ARACY Nest framework (ARACY, 2012), both of these approaches were used to define and determine key dimensions of wellbeing for children in Australia through consultations with over 3,700 children, young people, and experts in the field. Six dimensions of wellbeing were identified as important to children and young people:

1. Being loved and safe
2. Having material basics
3. Being healthy
4. Learning
5. Participating
6. Having a positive sense of identity and culture.

Indicators were then identified under each of the dimensions based on the outcomes of the consultations. These are reported periodically through the ARACY Report Card on the wellbeing of young Australians (ARACY, 2008, 2013, 2018). In his paper on child wellbeing frameworks in Australia, Walsh (2018) notes that the Nest framework has been *"…one of the most significant efforts to develop a framework for child wellbeing outcomes" (p35).*

Another notable framework in the Australian context is the Australian Child Wellbeing Project which examined how children in their middle years (ages between 8 and 14) define their wellbeing (Redmond et al., 2016). Through in-depth discussions with over 100 young people, six key dimensions of wellbeing were identified which were then ranked based on importance through a national survey of 5,400 students in years 4, 6 and 8. On average, these dimensions in order of importance were (1) family (2) health (3) friends (4) school (5) community and (6) money. These dimensions broadly align with dimensions of the Nest, however no dimension on identity and culture was noted.

Building on the experimental ecology of human development by Bronfenbrenner (1977), Zubrick, Silburn, and Prior (2005) take a child developmental approach in defining wellbeing, highlighting the important interplay between resource domains (time, income, human capital, psychological capital, social capital) and care settings (family, child-care, work, school/neighbourhood). Greater levels of resources available to a child and higher levels of proximal influences through care settings will lead to more positive developmental growth, resulting in better developmental outcomes.

Frameworks to assess the wellbeing of children and young people also exist at a global level. In providing a comparison of child wellbeing across OECD countries, the Organisation for Economic Co-operation and Development (2009) measure child wellbeing through six dimensions: material wellbeing, housing and environment, education, health and safety, risk behaviours, and quality of school life. Several indicators sit under each of the dimensions which were selected based on their ability to be influenced by policy. UNICEF Office of Research (2013) use a similar framework, with

five dimensions selected: material basics, health and safety, education, behaviour and risks, and housing and environment.

Deprivation in this paper uses the definition put forward by Hjelm et al. (2016) that deprivation is as *"non-fulfilment of child rights in the domains of survival, development, protection and participation"*. Given the close relationship between poverty, wellbeing and deprivation, previous research on all these constructs were explored in the literature review.

2.2 The purpose of a wellbeing or deprivation index

Measuring the deprivation and wellbeing of individuals is vital in examining how policy and programs can better support those who need assistance. This is of even greater importance for children, who due to their stage of development require tailored supports and protection to survive and thrive, and who are largely dependent on adults and the governments to support their access to such opportunities. Evidence has shown that children's access to such supports and protection during the early years in particular will shape their outcomes as an individual and an adult (Moore, Arefadib, Deery, & West, 2017).

Moreover, Australia has made a commitment to children through ratifying the Convention on the Rights of the Child or Children's Convention. The Children's Convention requires as a general measure of implementation, the collection of reliable and disaggregated data and nationally applicable indicators in order to build a complete picture of progress towards the realisation of children's rights (United Nations Committee on the Rights of the Child, 2003). Additionally, the Sustainable Development Goals, agreed to by all members of the United Nations, including Australia, stipulate that by 2030 countries should *"reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions"* and *"implement nationally appropriate social protection systems and measures for all, including floors, and by 2010 achieve substantial coverage of the poor and vulnerable"* (United Nations, n.d.). Child deprivation or wellbeing indexes are one approach to holistically examine all aspects of wellbeing, or dimensions of poverty. The benefits and drawbacks of an index that aims to incorporate all elements of wellbeing are discussed throughout the rest of this section.

Firstly, a wellbeing or deprivation index provides a holistic way of measuring outcomes. In assessing the outcomes of children, whether it be to provide summary measures, or assess the impact of a program, policy or event, it is important to examine all components of a child's wellbeing. This can be particularly important for impact evaluation, as programs or policies may have negative spill-over effects on certain aspects of wellbeing which may not be realised unless they are measured.

A deprivation or wellbeing index can also enable greater insight into the key issues facing individuals, as well as a more concise way of communicating them. While single indicators of wellbeing provide detail into a particular issue, they are not able to identify the major problems affecting a population. As noted by Vandivere and McPhee (2008), *"The purpose of child well-being indices is to distil large amounts of data on children in ways that can be easily communicated to and used by policy makers and the public" (p251).* This can allow for policy to address the major issues affecting the population for which the index was produced.

Another key feature of wellbeing indices is they can give greater insight into the correlations and inter-relatedness between different dimensions of wellbeing and its absence. While we have a general understanding that different areas of wellbeing are related, by highlighting the key aspects that are important to a child's wellbeing, an index can provide a quantitative measure on the degree of relatedness between dimensions.

Wellbeing or deprivation indices also allow for the depth and extent of deprivation, poverty and opportunity within and across population groups to be examined. Assessing all elements of wellbeing in one data source enables insight into the number of deprivations an individual experiences, which leads to a greater understanding of the demographic groups who tend to be most deprived in the population. Consequently, policy can be tailored to particular population groups, including the targeting of specific social programs depending on the varied needs of different groups.

While developing a wellbeing or deprivation index has number of benefits, there are also limitations. Most notably, the choice of indicators for an index is constrained by data availability. Important aspects of wellbeing for which data does not exist cannot be incorporated into an index, potentially reducing the policy focus on this aspect of wellbeing. This emphasises the importance of recognising data gaps that exist in an index and acknowledging their absence in any analysis.

Further to this, the analysis obtained from wellbeing or deprivation indices is heavily influenced by the choice of indicators, as well as any cut-off points that may need to be determined to define deprivation. This highlights the need to base indicator selection off an evidence-base for what wellbeing or deprivation is to the population of interest. Moreover, any cut-off points should be determined using a consistent and systematic methodology, with the sensitivity of these choices tested.

Finally, there are various approaches of aggregation that can be applied in constructing a wellbeing or deprivation index, which can influence the final results. Thus, the methodology used to develop an index should be justified and suit the purpose of analysis. Aggregation can also result in lack of depth through providing only a summary measure of analysis at a high level. Furthermore, choices such as how dimensions of wellbeing within an index are weighted can be subjective, which has the potential to undermine the validity of the index itself.

In summary, wellbeing or deprivation indices provide a useful tool to capture the various elements of wellbeing at a broad level, and present this information in a way that can be clearly communicated to the public. However, there are a number of drawbacks and limitations that should be taken into consideration when developing an index of wellbeing or deprivation, such as data availability, subjectivity in choice of indicators and cut-off points, and aggregation.

2.3 Methods of measuring multi-dimensional child deprivation, wellbeing and poverty

There are various methods of measuring child deprivation, wellbeing and poverty at the individual level, with the choice being dependent on both the availability of data, and the area of policy that the research is trying to inform. This report considers only methodologies that calculate child wellbeing at the individual level, with measurement tools that capture well-being at the macro-level, such as national indicators of wellbeing, the Human Development Index, and the Child Social Exclusion Index considered to be out-of-scope. Methods of measuring multi-dimensional poverty and material deprivation have been included due to the close relationship between poverty and wellbeing (The World Bank, 2001). Two commonly used approaches to measuring deprivation, poverty and wellbeing are outlined below.

2.3.1 Measures of material deprivation

Measures of material deprivation assess whether individuals obtain the material and social resources that are considered necessary by society to maintain an acceptable standard of living, as

defined by the population at that point in time. The concept of deprivation was first brought about by Townsend (1987), who argued that:

'Individuals, families and groups in the population can be said to be in poverty when they lack the resources to obtain the types of diet, participate in the activities and have the living conditions and amenities which are customary, or at least widely encouraged or approved, in the societies to which they belong. Their resources are so seriously below those commanded by the average individual or family that they are, in effect, excluded from ordinary living patterns and activities.' (Townsend, 1987, p. 31).

The items required to maintain an acceptable standard of living are generally determined through a consensus approach. This approach is applied firstly through a survey asking individuals whether they consider certain items to be essential in life. Any item for which more than 50% of respondents report it to be essential in life is deemed as necessary to avoid material deprivation. This approach has been applied in the Australian context to both adults and children (Saunders, Bedford, Brown, Naidoo, & Adamson, 2018; Saunders & Wilkins, 2016). These studies will be discussed in more detail in Section 2.4.2.

Measures of material deprivation have the distinct benefit of being defined directly by the people for which wellbeing is being measured. However, some elements of wellbeing, not related specifically to social or material deprivation, may be missed through this process, and furthermore, this information is often not collected in surveys. This highlights the need for alternative methods which are able to capture the multi-dimensionality of wellbeing.

2.3.2 Measures of multi-dimensional wellbeing, poverty and deprivation

Measures of multi-dimensional poverty and deprivation seek to consider all factors of a person's life that impact on their wellbeing. While data sources containing such information are less commonly collected than data on income, and may be more subjective and complex to define, they can offer a more comprehensive picture of poverty and wellbeing within a country, and provide greater insights into how to improve the wellbeing of people within a country (Haughton & Shahidur, 2009). Hjelm et al. (2016) outline two approaches to measuring multi-dimensional poverty and deprivation; the Multi-dimensional Poverty Index (MPI), and the Multiple Overlapping Deprivations Analysis (MODA).

The **Multi-dimensional Poverty Index (MPI)** draws on the Capability Approach, brought about by Sen (1999), who was instrumental in the global movement toward defining poverty multi-dimensionally. The Capability Approach contends that the wellbeing of a person is contingent on them having the freedom to achieve what they value in life, as well as the agency to pursue the goals they value (Sen, 1999). Taking a focus on equality of opportunity, Sen (1998) emphasises that to lift people out of poverty we need to maximise their "capability set", defined as the various pathways through life that are available to a person. An unjust society is therefore one in which certain people have a larger capability set, and thus more opportunities, than others. Multi-dimensional measures of poverty and deprivation therefore highlight the aspects of a person's life that causes them to have lesser or greater opportunities.

The methodology to develop indices of multi-dimensional poverty has been discussed widely in the literature, with Alkire and Foster (2011) making a substantial contribution to the field. They outline the key steps to compiling an MPI, which involves: defining key dimensions; identifying indicators to sit under each dimension; determining a cut-off point for each indicator; and determining an overall cut-off point to identify those who are living in multi-dimensional poverty. Alkire and Foster (2011) highlight a number of challenges that exist in the development of multi-dimensional poverty indices,

two of which are discussed here. Firstly, it is heavily contested how dimensions should be determined, with Sen (1997) contending that any multi-dimensional poverty index should be context-specific and thus refusing to produce a list of 'necessary capabilities'. In contrast, Nussbaum (2003) contends that all humans have the same basic rights and these can form the basis of a list to guide people on the capabilities that should be included in a multi-dimensional poverty index.

Alkire and Foster (2011) also emphasise the shortfall in aggregating all information from dimensions into one single number in that it results in a loss of information at dimensional-level. They argue that it nullifies the purpose of having a multi-dimensional index in the first place as it compiles this information into a unidimensional measure. Instead, they propose that a cut-off should be determined at each of the dimension levels, and that the 'poverty line' is determined by selecting a number of dimensions in which an individual needs to be deprived to be considered to be living in poverty (Alkire & Foster, 2011).

The approach set out by Alkire and Foster (2011) has been applied to children in the Australian context (Mishra, Ray, & Risse, 2017; Redmond et al., 2016). These will be discussed further in Section 2.4.3.

The **Multiple Overlapping Deprivation Analysis (MODA)** approach is an alternative method to measuring deprivation, wellbeing or poverty developed by UNICEF - the United Nations children's agency – and is specifically tailored for children. It is based on the child rights framework and has four key characteristics that distinguish it from other measures of deprivation. As outlined by de Neubourg et al. (2012), MODA ensures: the child is seen as the unit of analysis as opposed to the household or parents; it acknowledges that the needs of children change through the life course; it emphasises the importance of analysing the way deprivations overlap; and encourages concentrating analysis on highly deprived groups. The dimensions of deprivation are usually based on the Convention on the Rights of the Child. It also discourages aggregating all indicators into one single index, so that the extent of deprivation is determined instead by counting the number of dimensions in which child is deprived (de Neubourg et al., 2012).

There are two approaches to using MODA, the choice of which is dependent on whether the purpose of the analysis is a cross-country comparison or an analysis of the major issues facing a particular country (de Neubourg et al., 2012). The cross-country comparative application of MODA requires consistent dimensions, and has been employed in a number of analyses including a study by Chzhen et al. (2016) on child poverty in the European Union. In this study they selected nine dimensions: nutrition; clothing; education; child development; leisure; social; health care access; information; and housing. Not all dimensions were applicable to all life stages. In contrast, the National MODA (N-MODA) permits flexibility in dimensions, allowing the choice of dimensions to be guided by the context within a country. MODA has not yet been applied in Australia.

2.4 Previous research on the wellbeing of children and young people in Australia

This section will explore previous research that has examined the wellbeing of children and young people in Australia. This has been done using some of the methods outlined in Section 2.3, but also through monetary poverty, given its relationship to overall wellbeing.

2.4.1 Using measures of income

Income is a commonly used measure to define poverty. Given that children are generally dependent on others within the household, household income is typically used to measure child poverty (Redmond et al., 2016). This household-level income is then calculated on a 'per-capita' basis by

taking into account the number of people living in the household using equivalence scales. Equivalence scales make assumptions about the basic needs of adults and children and assume that there are economies of scale within a household, meaning that the basic needs of a person cost less if there are more people in the house (Coudouel, Hentschel, & Wodon, 2002). Thus, measures of child poverty (based on household income measures) do not assess the circumstances of children directly, but rather make assumptions regarding the distribution of resources within a household. Despite this limitation, it is still worthy to examine the trends of child income poverty over time, given its consistent measurement.

Redmond, Patulny, and Whiteford (2013) conducted an analysis of child poverty in Australia between 1982 to 2008-09. They found that absolute poverty (defined as being below 50% of median income in 1982 and adjusted only for inflation over time) has been on a downward trend, while relative poverty (defined as being below 50% of median income for the given year) rose between 2006 and 2010. They note that the fall in child relative income poverty rates between 1982 and 1995 was driven through large cash transfers to families alongside relatively low real median family income growth. While the cash transfers to families continued beyond 1995, real median family incomes increased by around 50 per cent, causing the relative poverty line to also increase by 50 per cent (Redmond et al., 2013).

Research by Davidson, Saunders, Bradbury, and Wong (2018) found that between 2003 and 2016 there was a three percentage point increase in child relative income poverty, with a poverty rate of 17.2% in 2015-16. This was substantially higher for children in lone parent families, with a poverty rate of 39.4% (Davidson et al., 2018). This result is likely influenced by lower employment levels for single parents.

In an international context, Australia compares relatively favourably in child relative income poverty, ranked 13 out of 41 'rich countries' as outlined in the UNICEF Innocenti Report Card 14 (UNICEF Office of Research, 2017). However, given Australia's strong economic performance over the past 25 years, one might expect a better result. As noted by Organisation for Economic Co-operation and Development (2017) *"strong growth has pulled the incomes of households with wage earners further ahead of households reliant on transfers or pensions, which dominate the lower end of the income distribution" (p5)*.

2.4.2 Using measures of material deprivation

As noted in Section 2.3.1, measuring material deprivation generally involves applying a consensus approach to determine what items are deemed essential by the community. Saunders and Wilkins (2016) utilised this framework to examine material deprivation in Australia. They identified the "essentials of life" using the Household, Income and Labour Dynamics in Australia (HILDA) which asks respondents whether they believe 26 different items are essential in life. These essentials include material basics (a television, a roof and gutters that do not leak), social networks (getting together with friends or relatives for a drink at least once a month) and health (dental treatment when needed). Child-specific items were also used such as "a separate bed for each child", "a hobby or a regular leisure activity for each child" and "new school clothes for school-age children every year". After applying the consensus approach, 22 out of the initial 26 items were deemed essential.

The analysis by Saunders and Wilkins (2016) found that in 2014, 16.1% of parents with children under 18 experienced deprivation in two or more items considered essential, and 9.9% were deprived in three or more items. Lone parents experienced significantly higher levels of deprivation, with 29.4% deprived in two or more items compared to a couple with dependent children for which

10.8% experienced deprivation in two or more items. The research found a strong relationship between relative income poverty and material deprivation, with only 7.8% of people in income poverty not experiencing material deprivation. A strong correlation between subjective wellbeing and material deprivation was also found in the study. Deprivation rates were highest for 'at least $500 in savings for an emergency' (12.2%), 'home contents insurance' (8.3%), 'new school clothes for school-age children every year' (6.8%) and 'dental treatment when needed' (5.2%).

Saunders et al. (2018) used this approach to measure material deprivation and social exclusion amongst high school students in New South Wales (NSW). They firstly conducted focus groups to better understand young people's views on the items and activities that are considered to be essential. They drew on this data to develop a survey which was distributed to around 3,000 students across the state. The survey asked the young people whether 24 individual items were considered essential, whether they had that item, and whether they wanted the item. Based on this, as well as some further statistical testing, a list of 18 'essential items' was compiled which included a computer, fruit or vegetables at least once a day, extra-curricular activities, green spaces and internet at home. A child deprivation index was developed by summing the total number of deprivations experienced, with 'severe deprivation' defined as occurring when a young person is missing out on at least three of the items deemed to be essential.

The research by Saunders et al. (2018) found that around one-fifth of NSW students were severely deprived (lacking three out of the 18 items deemed essential) and over one quarter were deprived in at least two items. The survey collected demographic information, as well as indicators of poverty and subjective wellbeing, finding that the overlap between poverty (reflected through measures of financial disadvantage) and deprivation is low. The findings also suggest that deprivation may have a negative impact on the subjective well-being of young people, where the indicators of well-being used were overall life satisfaction and how much autonomy and control the young person has in their own life. Amongst the high school students, deprivation was highest in 'a holiday away with my family at least once a year' (21.2%), 'go on school trips or excursions at least once a term' (20.4%), 'some money to spend or save each week' (15.2%) and 'a meal out with my family at least once a month' (14.4%).

Redmond et al. (2016) examined the deprivation of children in Australia by developing two scales: a family affluence scale and a child deprivation scale. The Family Affluence Scale asked children seven questions related to the affluence of their family. This included whether the family owned a car, van or truck; whether the child has their own bedroom; how many computers the family owned; how many times the child's family went on holiday during the last year; whether the family owned a dishwasher; how many bathrooms are in the house; and whether or not the child's family can afford to put petrol in the car. These 'essentials' are based off the Health Behaviour in School Aged Children (HBSC) Survey which is conducted on students aged 11, 13 and 15 in 40 countries throughout Europe and North America (Redmond et al., 2016). It found that the most common sources of deprivation were children not having their own bedroom, not having a dishwasher in the family home, and not having a family holiday away at least once a year.

The Child Deprivation Scale developed by Redmond et al. (2016) is based on the work by Main (2014) who compiled a list of 20 items deemed essential to children and young people following focus groups. Redmond et al. (2016) incorporated five of these items into their survey to produce the scale, asking respondents whether they had an iPod or other personal music player; some money that they can save each month; the right kind of clothes to fit in with other people their age; whether their family has enough money for them to go on school camp; and whether they had their own mobile phone. For each item, respondents were able to answer either 'I have this'; 'I don't have

this but would like it'; or 'I don't have this and I don't want or need it'. Responses were then aggregated to give a score between 0 and 5. The most common deprivations experienced were not having a mobile phone, not having money to save each month, and not having an iPod or other personal music player. A large portion of year 4 and 6 students were deprived in 1 or more item, 26% deprived in 2 or more and 8% deprived in 3 or more. Interestingly, the results for year 8 differ considerably from years 4 & 6, with 65.4% of year 8 students having no deprivations (Redmond et al., 2016).

2.4.3 Using measures of multi-dimensional wellbeing and poverty

Previous studies have examined wellbeing and poverty multi-dimensionally in Australia, which provides an initial insight into the major issues affecting children and young people within the country.

Mishra et al. (2017) developed a multi-dimensional poverty index for children in Australia using the K (kindergarten) cohort of the Longitudinal Study of Australian Children. They examined multi-dimensional poverty dynamically by examining the prevalence over time and identified seven dimensions of wellbeing for their index: health; family relationships; community connectedness; material wellbeing; educational wellbeing; emotional wellbeing; and exposure to risky behaviour. They found that health and emotional wellbeing were the areas of most concern. This was driven largely through poor body weight and bullying. This study builds on the work of this research by conducting analysis on the B (baby) cohort, as well as utilising an evidence-based framework to frame the index.

In their study assessing the wellbeing of young people in Australia in their middle years, Redmond et al. (2016) compiled a wellbeing index which comprised five dimensions of wellbeing: life satisfaction; subjective health; family cohesion; school engagement; and relationship with peers. These dimensions were identified by the young people who responded to the survey as being key to their wellbeing. Redmond et al. (2016) emphasise the importance of including subjective as well as objective measures in the index, as the way in which a child sees themselves is integral to their wellbeing. This analysis found that there was a moderate to strong correlation between the domains, emphasising the inter-relatedness of dimensions of wellbeing. There was a strong relationship between outside of school activity indicators and overall wellbeing which included being with friends, doing housework, doing homework, and playing sports (Redmond et al., 2016). This either indicates the influence of participation in family and community on wellbeing, or suggests that children who grow up in environments that allow them to have higher wellbeing are more likely to be doing these activities.

Using cluster analysis, Redmond et al. (2016) also found that 37% of year 4 and 6 participants, and 31% of year 8 participants were considered to have very high wellbeing. In contrast, 7% of year 4 and 6 participants, and 10% of year 8 students had very low wellbeing. Over half of these students were in one or more marginalised groups. The levels of deprivation between marginalised groups were examined in greater detail by Redmond, Huynh, and Maurici (2018). They compared the wellbeing of young people with disability, young carers, materially disadvantaged young people, young people from non-English speaking backgrounds and Indigenous young people. They found that young people with disability, young carers, and young people who were materially disadvantaged had significantly lower well-being compared to young people who were either not marginalised or were from a non-English speaking background. This gap in wellbeing was significantly larger for older age groups (13-14 years) compared to younger age groups (9-12 years).

3   Methodology

The aim of this paper is to develop an index, based on ARACY's Nest framework, to assess individual level outcomes of a representative sample of children in Australia. The methodology to develop the deprivation index, as outlined in the sections below, employs the established Multiple Overlapping Deprivation Analysis (MODA) developed by UNICEF in order to assess the outcomes of children in Australia. The key steps involved in this methodology were to identify dimensions of deprivation (based on ARACY's Nest framework); identify appropriate measures within each dimension; determine the most appropriate and available indicators and the cut-off points in the Longitudinal Study of Australian Children (LSAC) for each measure; and to assess the adequacy of indicators and undertake the analysis.

3.1 The Multiple Overlapping Deprivation Analysis (MODA) Approach

For the purposes of this research, the Multiple Overlapping Deprivation Analysis (MODA) Approach, as outlined in Section 2.3.2, was identified as an appropriate methodology to measure deprivation and wellbeing of children in Australia. This is due to MODA using the child as the unit of analysis (as opposed to the situation of children's parents or families), and the fact that dimension and indicator selection is based on the child rights framework. The National MODA (N-MODA) permits flexibility in selecting wellbeing dimensions that are relevant to the country context, enabling the Nest dimensions to be utilised. 'Deprivation' in this approach is defined as *"non-fulfilment of child rights in the domains of survival, development, protection and participation"* (Hjelm et al., 2016, p. 10) which aligns closely with the Nest framework. de Neubourg et al. (2012) outline the steps that are required to utilise this methodology, which are detailed throughout the rest of this section.

3.2 Identifying dimensions of deprivation – The Nest framework

ARACY's Nest framework is the most relevant tool to measure the wellbeing of children and young people in Australia, and thus provides a purpose-built tool to measure opportunity and deprivation within the country. As noted in Section 2.1, ARACY's Nest framework highlights that the six key dimensions a child or young person needs to have good wellbeing are being loved and safe, having material basics, being healthy, learning, participating and having a positive sense of identity and culture. These dimensions were selected based on evidence, coming from the voices of over 3,700 children, young people and experts in the field.

To operationalise these wellbeing dimensions, sub-domains were identified based on feedback from the children in the consultations, as well as measures to reflect these sub-domains (ARACY, 2012). This is illustrated in Figure 1. Due to research by Renshaw (forthcoming) which found that indicators for Positive Sense of Identity and Culture cut across some of the Nest dimensions, this dimension will not be incorporated into the index. How these measures broadly relate to the Convention for the Rights of the Child are illustrated in Table 1.

Figure 1: Illustration of The Nest wellbeing dimensions operationalised into measures
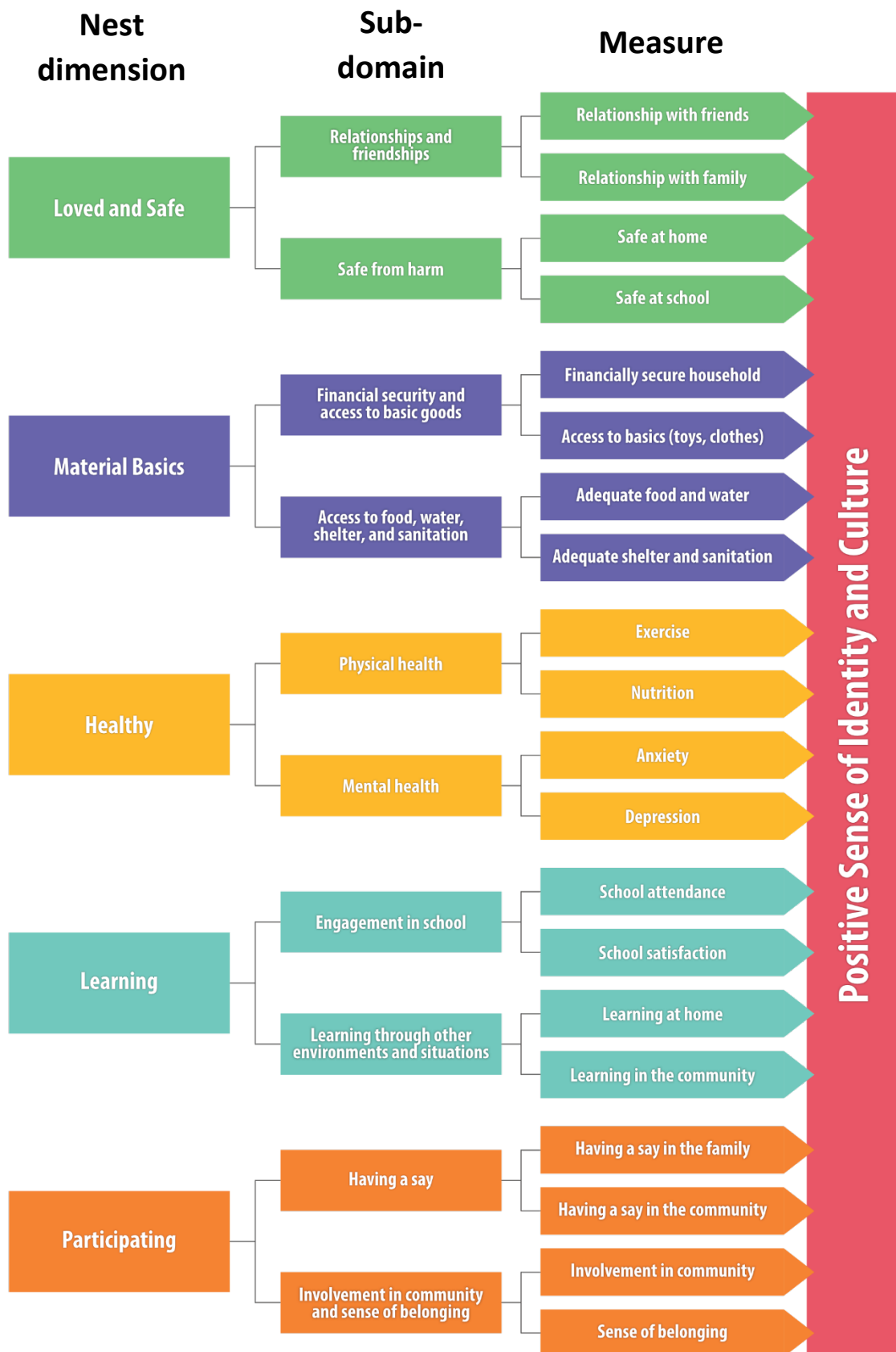
Table 1: Indicative mapping of measures in the index to the Convention for the Rights of the Child (CRC)

Nest dimension	Measures	Indicative CRC articles
Loved & Safe	Relationship with friends	Art 27 (Adequate standard of living - physical, mental, spiritual, moral and social development)
		Art 29 (Preparation of child for responsible life, friendship among peoples)
	Relationship with family	Art 5 (State parties shall respect the responsibilities, rights and duties of parents)
		Art 18 (Appropriate assistance to parents and legal guardians in the performance of their child-rearing responsibilities and ensuring the development of institutions, facilities and services for the care of children and the best interest of the child as the basic concern of parents)
		Art 31 (Participate freely in cultural life and the arts)
	Safe at home	Art 19 (Protection from violence)
	Safe at school	Art 19 (Protection from violence)
Material Basics	Financial security of household	Art 6 (Survival and healthy development)
		Art 26 (Financial assistance for children of families in need)
	Access to basic goods (toys, clothes, computer)	Art 27 (Adequate standard of living - physical, mental, spiritual, moral and social development)
	Access to adequate food and water	Art 24 (Highest attainable standard of health)
		Art 27 (Measures to assist parents with regard to nutrition, clothing and housing)
	Access to adequate shelter and sanitation	Art 24 (Highest attainable standard of health)
		Art 27 (Measures to assist parents with regard to nutrition, clothing and housing)
Healthy	Exercise	Art 27 (Adequate standard of living - physical, mental, spiritual, moral and social development)
	Nutrition	Art 24 (Highest attainable standard of health)
	Anxiety	Art 24 (Highest attainable standard of health)
		Art 27 (Adequate standard of living - physical, mental, spiritual, moral and social development)
	Depression	Art 24 (Highest attainable standard of health)
		Art 27 (Adequate standard of living - physical, mental, spiritual, moral and social development)
Learning	School attendance	Art 28 (Right to education)
	School satisfaction	Art 29 (Education directed to child's personality, talents and abilities)
	Learning at home	Art 18 (Appropriate assistance to parents and legal guardians in the performance of their child-rearing responsibilities)
		Art 28 (Right to education)

	Learning in the community	Art 28 (Right to education)
		Art 31 (Participate freely in cultural life and the arts, and opportunities for cultural, artistic, recreational and leisure activity)
Participating	Having a say with the family	Art 12 (Right to be heard)
	Having a say within the community	Art 12 (Right to be heard)
		Art 13 (Freedom of expression)
	Involvement in community	Art 12 (Right to be heard)
		Art 15 (Freedom of association)
		Art 31 (Participate freely in cultural life and the arts, and opportunities for cultural, artistic, recreational and leisure activity)
	Sense of belonging	Art 14 (Freedom of thought, conscience and religion)
		Art 15 (Freedom of association)
		Art 27 (Adequate standard of living - physical, mental, spiritual, moral and social development)
		Art 30 (Children have the right to enjoy their own culture, practice their religion and use their own language)

3.3 Data – The Longitudinal Study of Australian Children (LSAC)

LSAC surveys two nationally representative cohorts of children every two years of their life. The cohorts were selected in 2004 using a random sample of 5,107 children aged 0-1 (the B cohort), and a random sample of 4,983 children aged 4-5 (the K cohort) (Australian Institute of Family Studies, 2015). The most recent collection for which data is available at the time of writing was wave 6 which was conducted in 2014 when the B cohort was aged 10-11, and the K cohort was aged 14-15. This project will use the B cohort for waves 4-6 which corresponds to an age range of 6-11. The B cohort was chosen so that the level of deprivation of children in their younger years could be explored, as well as the fact that Mishra et al. (2017) produced an index of multi-dimensional poverty using the K cohort. The age of the B cohort at each wave is illustrated in Figure 2 (Australian Institute of Family Studies, 2015).

Figure 2: Age of B cohort at waves 4-6

Wave number	4	5	6
Year of data collection	2010	2012	2014
Age of B cohort	6-7	8-9	10-11

A range of questions related to the wellbeing of the study child are asked in each wave of the child themselves, both parents (if the child has two parents), the child's teacher and a parent living elsewhere (if applicable) (Australian Institute of Family Studies, 2015). The questions asked to the various respondents change at each wave to account for any changes in society and to reflect the importance of different aspects of wellbeing at different life stages. Furthermore, as the children get older the number of questions to which they themselves respond increases.

Given the nature of longitudinal surveys, attrition has occurred over time due to a number of factors such as refusal, non-contact and being away during enumeration (Australian Institute of Family Studies, 2015). The wave 4 sample was 4,241 children with a response rate as a proportion of the starting sample of 86%. The sample size decreased to 4,085 in wave 5 and 3,764 in wave 6. Weights are available within the data to account for initial sample bias and attrition. As the analysis is being conducted cross-sectionally, as opposed to longitudinally, the cross-sectional weights will be utilised at each wave (d-weight, e-weight and f-weight for wave 4, 5 and 6 respectively.

3.4 Indicator selection and determining cut-off points

Using the conceptual framework outlined in Figure 1, the most appropriate data item in wave 4, 5 and 6 of LSAC was selected under each measure. Given the changing nature of wellbeing and deprivation throughout the life-course, consistent indicators were not intentionally sought between the different waves. This means that we cannot compare changes across time for all measures (although some indicators were used consistently).

The process to select indicators firstly gave priority to those which were asked of all children or parents (for example, data items which were answered only by children who have moved schools in the past year could not be used). Secondly, items answered by the study child were selected in preference to items answered by parents. No data items responded to by the teacher were selected due to the low response rate of teachers. As children are progressively asked more questions in LSAC as they get older, this means that some items responded to by parents in earlier waves are later reported on by children. In these cases, we are not able to compare deprivation rates as parents and

children may respond to identical items differently. Some measures did not have relevant indicators which did leave gaps in some measures. The limitations of this are discussed further in Section 3.9.

Table 2, Table 3 and Table 4 list the specific indicators that were used for each wave of the index. Table 5 provides a colour mapping of the consistency in indicators across the three waves, including if the parent or child responded and a determination of the strength of each indicator based on details discussed in the following Section 3.4. It should be noted that some indicators reflect choice or preference, as opposed to deprivation of material goods or opportunities. Such indicators were included as these choices can have an impact on the health and wellbeing of children. For example, enjoyment of exercise was selected as an indicator for physical activity as lack of enjoyment can lead to non-participation in exercise, which can subsequently lead to worse health outcomes.

Cut-off points for each indicator needed to be determined to flag children who are experiencing deprivation in the relevant indicator. In some cases, such as the Strengths and Difficulties Questionnaire, established cut-off points already exist which were applied. In the case that established cut-off points did not exist, cut-off points were determined through one of the following methods, depending on the response format of the data item:

- Literature indicating a sensible cut-off point
- In the case of frequency questions, a regularity of a negative behaviour or construct inferred deprivation
- For indicators which used scales (that did not have an established cut-off point) a mean score was calculated for each child, which took an average of the responses they gave over all items in the scale (for example, 1 – Always, 2 – Sometimes, 3 – Never). The cut-off point for these indicators was the mid-point of the possible responses (for example, in the example above, the cut-off point would be 2). This always resulted in the cut-off for a scale being the point at which children responded, on average, negatively to the items.

Outlined in the following section is a rationale for inclusion of the indicators for each measure and an evaluation of the strength and relevance of the indicators to the measure they are reflecting. Appendix 1, 2 and 3 outline all variables that were used for each indicator and provides details of how the cut-off point for that indicator was calculated.

Nest dimension	Sub-domain	Measure	Indicator or scale	Respondent	Criteria for deprivation
Loved and Safe	Relationships and friendships	Relationship with friends	Strengths and Difficulties Questionnaire peer problems scale	Parent 1	Summing criteria – score ≥4
		Relationship with family	How often do you have fun with your family at the weekends?	Study child	3 Hardly ever
	Safe from harm	Safe at home	Not available		
		Safe at school	Peers scale	Study child	Child has been picked on or experienced social exclusion
Material Basics	Financial security and access to basic goods	Financial security of family	Hardship scale	Parent 1	1 Yes to any
		Access to basic goods (toys, clothes, computer)	Does study child have access to a computer at home?	Parent 1	0 No
	Access to food, water, shelter and sanitation	Access to adequate food and water	Not available		
		Access to adequate shelter and sanitation	Not available		
Healthy	Physical health	Exercise	How much does study child enjoy physical activity or exercise?	Parent 1	1 Very much dislikes activity OR 2 Somewhat dislikes
		Nutrition	How often did child have fresh fruit, cooked vegetables or raw vegetables/salad in the last 24 hours?	Parent 1	0 Not at all to fresh fruit OR (0 Not at all to cooked vegetables AND raw vegetables/salad)
	Mental health	Anxiety	Social emotional problems scale	Study child	Mean < 2
		Depression			
Learning	Engagement in school	School attendance	During the previous four weeks of school, how many days has study child been absent?	Parent 1	4+
		School satisfaction	School liking and avoidance scale	Study child	Liking – mean > 2 OR Avoidance – mean < 2
	Learning through other environments, situations and interactions	Learning at home	Home activities index	Parent 1	Participating in an activity on less than 7 days in past week
		Learning in the community	Out of home activities index	Parent 1	0 No to all
Participating	Having a say	Having a say within the family	Not available		
		Having a say within the community	Not available		
	Involvement in community and sense of belonging	Involvement in community	Extracurricular activities	Parent 1	0 No to all
		Sense of belonging	Not available		

Table 2: Wave 4 indicators

Nest dimension	Sub-domain	Measure	Indicator or scale	Respondent	Criteria for deprivation
Loved and Safe	Relationships and friendships	Relationship with friends	Strengths and Difficulties Questionnaire peer problems scale	Parent 1	Summing criteria – score ≥ 4
		Relationship with family	Enjoyment of time spent with parents and ability to ask for help	Study child	Mean > 2.5
	Safe from harm	Safe at home	How often do people in your family yell at each other?	Study child	4 Often OR 5 Always
		Safe at school	Bullying and victimisation	Study child	3 About once a week OR 4 Several times a week to any
Material Basics	Financial security and access to basic goods	Financial security of family	Hardship scale	Parent 1	1 Yes to any
		Access to basic goods (toys, clothes, computer)	Not available		
	Access to food, water, shelter and sanitation	Access to adequate food and water	Did child eat breakfast today?	Parent 1	2 No
		Access to adequate shelter and sanitation	Experience of no place to live	Parent 1	1 Yes to any
Healthy	Physical health	Exercise	How much does study child enjoy physical activity or exercise?	Parent 1	1 Very much dislikes activity OR 2 Somewhat dislikes
		Nutrition	How often did the study child have fresh fruit, cooked vegetables or raw vegetables/salad in the last 24 hours?	Parent 1	0 Not at all to fresh fruit OR (0 Not at all to cooked vegetables AND raw vegetables/salad)
	Mental health	Anxiety	Social emotional problems scale	Study child	Mean < 2
		Depression			
Learning	Engagement in school	School attendance	During the previous four weeks of school, how many days has study child been absent?	Parent 1	4+
		School satisfaction	School liking and avoidance scale	Study child	Liking – mean > 2 OR Avoidance – mean < 2
	Learning through other environments, situations and interactions	Learning at home	Home activities index	Parent 1	Participating in an activity on less than 7 days in past week
		Learning in the community	Out of home activities index	Parent 1	0 No to all
Participating	Having a say	Having a say within the family	Not available		
		Having a say within the community	Not available		
	Involvement in community and sense of belonging	Involvement in community	Extracurricular activities	Parent 1	0 No to all
		Sense of belonging	Not available		

Table 3: Wave 5 indicators

Nest dimension	Sub-domain	Measure	Indicator or scale	Respondent	Criteria for deprivation
Loved and Safe	Relationships and friendships	Relationship with friends	Strengths and Difficulties Questionnaire peer problems scale	Study child	Summing criteria score ≥ 4
		Relationship with family	Trust and Communication Scale	Study child	Mean < 2.5
	Safe from harm	Safe at home	How often do people in your family yell at each other?	Study child	4 Often or 5 Always
		Safe at school	Bullying and victimisation	Study child	2 About once a week OR 3 Several times a week to any
Material Basics	Financial security and access to basic goods	Financial security of family	Hardship scale	Parent 1	1 Yes to any
		Access to basic goods (toys, clothes, computer)	Not available		
	Access to food, water, shelter and sanitation	Access to adequate food and water	Did you have breakfast today?	Study child	2 No
		Access to adequate shelter and sanitation	Experience of no place to live	Parent 1	1 Yes to any
Healthy	Physical health	Exercise	How much do you enjoy being physically active (doing things like sports, active games, walking, running or swimming)?	Study Child	3 Not very much OR 4 Not at all
		Nutrition	How often did you have fresh fruit, cooked vegetables or raw vegetables/salad yesterday?	Study child	0 Not at all to fresh fruit OR (0 Not at all to cooked vegetables AND raw vegetables/salad)
	Mental health	Anxiety	Social Difficulties Questionnaire Emotional Problems Scale	Study child	Summing criteria score ≥ 6
		Depression			
Learning	Engagement in school	School attendance	During the previous four weeks of school, how many days has study child been absent?	Parent 1	4+
		School satisfaction	School adjustment scale	Study child	Mean < 2.5
	Learning through other environments, situations and interactions	Learning at home	Number of books in home	Parent 1	0 None OR 1 1-10
		Learning in the community	Out of home activities index	Parent 1	0 No to all
Participating	Having a say	Having a say within the family	How often do you have a say in what the family does, such as what to watch on TV, what to do on the weekends, where to go on family outings or holidays?	Study Child	4 Never
		Having a say within the community	Not available		
	Involvement in community and sense of belonging	Involvement in community	Extracurricular activities	Parent 1	0 No to all
		Sense of belonging	Not available		

Table 4: Wave 6 indicators

Table 5: Respondent and strength of each indicator per wave

Nest dimension	Indicator	Wave 4 (age 6-7)	Wave 5 (age 8-9)	Wave 6 (age 10-11)
Loved and Safe	Relationship with friends	Parent - Moderate indicator	Parent - Moderate indicator	Child - Moderate indicator
	Relationship with family (Fun with family at wave 4)	Child - Moderate indicator	Child - Moderate indicator	Child - Strong indicator
	Frequent yelling at home	N/A	Child - Moderate indicator	Child - Moderate indicator
	Frequent bullying or social exclusion	Child - Strong indicator	Child - Strong indicator	Child - Strong indicator
Material Basics	Financial security of family	Parent - Strong indicator	Parent - Strong indicator	Parent - Strong indicator
	Access to computer	Parent - Weak indicator	N/A	N/A
	Eating breakfast	N/A	Parent - Moderate indicator	Child - Moderate indicator
	Experience of no place to live	N/A	Parent - Moderate indicator	Parent - Moderate indicator
Healthy	Enjoyment of exercise	Parent - Weak indicator	Parent - Weak indicator	Child - Weak indicator
	Adequate fruit and vegetables	Parent - Moderate indicator	Parent - Moderate indicator	Child - Moderate indicator
	Mental health	Child - Strong indicator	Child - Strong indicator	Child - Strong indicator

Learning	School attendance	Parent - Strong indicator	Parent - Strong indicator	Parent - Strong indicator
	School satisfaction	Child - Strong indicator	Child - Strong indicator	Child - Strong indicator
	Parent engagement in learning (wave 4, wave 5) Number of books in home (wave 6)	Parent - Moderate indicator	Parent - Moderate indicator	Parent - Weak indicator
	Participation in cultural activities	Parent - Moderate indicator	Parent - Moderate indicator	Parent - Moderate indicator
Participating	Having a say in family decisions	N/A	N/A	Child - Strong indicator
	Having a say within the community	N/A	N/A	N/A
	Regular participation in extracurricular activities	Parent - Strong indicator	Parent - Strong indicator	Parent - Strong indicator
	Sense of belonging	N/A	N/A	N/A

Green = Indicator consistent with at least one other wave
Orange = Indicator not consistent with any other wave.
Red = Indicator not available for that wave

3.4.1. Relationship with friends

The Strengths and Difficulties Peer Problems Scale was used to reflect this measure for all waves. This was asked of the parents in waves 4 and 5, while the study child was asked this at wave 6. This means that while the scale was identical for all waves, this means that only waves 4 and 5 are comparable.

The indicator does not reflect exactly the measure of 'relationship with friends' due to its focus on peer-problems and being deficit-focussed and is therefore considered to be a moderate indicator. The ideal indicator would measure the strength and depth of relationships the child has with their friends, although it is noted that such an indicator may be difficult to produce for younger children.

Responses are scored according to the Strengths and Difficulties Questionnaire scoring criteria, which has an established cut-off point (Goodman, 1997).

3.4.2 Relationship with family

The indicator used to represent this measure varies for each wave. The 'Trust and Communication Scale' used in wave 6 is considered to be a strong indicator as it taps into the strength of relationship between the child and parent. The wave 5 indicator asks the child about whether they enjoy spending time with their parents and if they would go to them for help, and the wave 4 indicator asks whether they have fun with their family on the weekends, which are considered moderate indicators.

While the strength of the wave 4 and 5 indicators may be lower than that of wave 6, this may simply reflect the varying appropriateness of different questions at different ages. These indicators, and the wave 4 data item in particular, may be influenced by financial and other stresses of parents which could inhibit the amount of time that is available to them to have fun with their child.

No established cut-off point exists for these indicators. For wave 4, children who report 'hardly ever' are identified as deprived and a mean of scores is used for waves 5 and 6 as outlined in Appendix 2 and Appendix 3.

3.4.3 Safe at home

The data item 'How often do people in your family yell at each other?', which is asked of children in waves 5 and 6, was used to reflect the 'safe at home' measure. Previous research has found that there is an association between children living in families with high levels of family conflict and emotional distress (Chung, Flook, & Fuligni, 2009; Mechanic & Hansell, 1989). Furthermore, Shin, Rogers, and Law (2015), using LSAC, found a correlation between this item and their mothers reporting being afraid of their partner. While a data item on whether the parents are afraid of their partner exist in wave 4 of the data, it was not used as only parents that have partners can answer this item. This not only results in high non-response, but is an inappropriate indicator as it is not asked of sole parents. The strength of this indicator is deemed as moderate due to the fact that it does not directly infer whether a child is safe at home.

No established cut-off point exists in the literature. Children were flagged as deprived in this indicator if they report that people in their family yell at each other 'often' or 'always'.

3.4.4 Safe at school

Whether a child experiences bullying and/or victimisation is used to reflect whether or not they are safe at school. This data item is expressed differently at each wave, resulting in this indicator not being directly comparable across the waves. As outlined in Appendix 1, wave 4 asks children three questions on whether they are picked on or experience social exclusion at school. Wave 5 and 6 ask more specific questions around particular forms of bullying and victimisation children may have experienced in the past month. A greater number of bullying types are asked in wave 6 compared to wave 5.

The indicators selected at all waves are considered to be strong, keeping in mind that the wave 4 indicator does not give children prompts of specific forms of bullying (which may be appropriate given the age of the child). In establishing a cut-off point, for wave 5 and 6 a child was flagged as deprived if they had experienced any form of bullying at least once a week. For wave 4, the cut-off was determined by taking the mid-point of scale items as outlined in Appendix 1.

3.4.5 Financial Security of Family

This is measured consistently in all waves through the hardship scale, which asks parents whether they have experienced eight different instances of hardship over the past 12 months (such as not being able to pay bills, going without meals or not being able to heat/cool home) as listed in Appendix 1, 2 and 3. This is considered to be a strong indicator, which closely reflects the financial security of the household.

Children living in families who have experienced any of these forms of hardship are flagged as deprived.

3.4.6 Access to basic goods (toys, clothes, computer)

This measure intends to reflect whether children have the material items they consider necessary to live a good life. It is not adequately reflected through a data item in any wave. Wave 4 contains a data item on whether the study child has access to a computer at home, which was used in the index for this wave, but is considered to be a weak indicator as it doesn't reflect the other items that children deemed as necessary in the Nest consultations (ARACY, 2012). In this wave, children who do not have access to a computer at home are identified as deprived.

3.4.7 Access to adequate food and water

This indicator is reflected in waves 5 and 6 which asks respondents whether the child had breakfast today. This is responded by the parent in wave 5 and the child in wave 6. It is considered to be a moderate indicator as it may not necessarily indicate access, but choice of whether to eat breakfast. Children who did not eat breakfast on the day of the survey are identified as deprived.

3.4.8 Access to adequate shelter and sanitation

This measure is reflected in wave 5 and 6 and asks parents whether they have experienced any instances of homelessness in the last two years. No indicator is available for wave 4.

This indicator partially reflects the measure, representing whether the child has permanent housing. However, it does not indicate whether the permanent housing a child may be in is adequate and whether they have access to adequate sanitation. It is therefore considered to be a moderate indicator as it strongly illustrates the level of impermanent housing a child is experiencing, but does not capture all elements of housing quality.

A child is considered deprived if their parents report any experience of homelessness in the last two years.

3.4.9 Exercise

This measure intends to assess the degree to which children participate in physical activity. In waves 4-6, the relevant data items in LSAC were teacher reports on the degree to which children engage in physical activity, parent and child reports on enjoyment of physical activity, and parent reports on whether children choose to engage in physical activity in their spare time.

Due to enjoyment of physical activity having been found to be a significant predictor of participation in exercise for children (DiLorenzo, Stucky-Ropp, Vander Wal, & Gotham, 1998; Stuckyropp & Dilorenzo, 1993), it was deemed the most appropriate indicator for this measure. This data item was asked of parents in waves 4 and 5, and responded to by children in wave 6. Therefore, the deprivation rate observed at wave 6 is not comparable to the previous waves. The strength of this indicator is deemed as weak as it does not give a frequency of how often the child actually engages in physical activity.

Children were flagged as deprived if parents report their child 'somewhat' or 'very much' dislikes activity in waves 4 and 5. Children in wave 6 are flagged as deprived if they enjoy being physically active 'not very much' or 'not at all'.

3.4.10 Nutrition

The indicator for all waves is whether children ate fruit or vegetables in the previous day. While children and parents are asked in LSAC about a range of foods they ate the previous day, only fruit and vegetables were used to reflect nutrition due to the National Health and Medical Research Council (2013) indicating that children need a particular number of servings of fruit and vegetables every day. While other food groups are also considered necessary, the absence of these from a

child's diet may be due to allergies or food choices (e.g. vegetarianism). This was asked of the parents in waves 4 and 5, while the children responded to this data item in wave 6.

This indicator is considered to be moderate as we are unable to ascertain whether the child is getting precisely all the nutrients they require. Furthermore, we are unable to determine the number of servings of vegetables and fruit they intake so cannot directly compare it with dietary guidelines. We are also given information only for a single day, so are making an inference that the amount of fruit and vegetables they ate on the previous day are reflective of their regular dietary habits.

Children were flagged as deprived if they didn't eat fruit or vegetables at all in the previous day, so children who ate some fruit or vegetables, but not enough according to the dietary guidelines, would not be identified as deprived in this indicator.

3.4.11 Mental Health

While this construct is split into two measures in the conceptual framework (anxiety and depression), these different conditions are not separated into different data items in LSAC and they have therefore been measured together to represent all elements of mental health. For waves 4 and 5 this measure uses the social-emotional problems scale which asks children a range of questions related to their social and emotional wellbeing, as outlined in Appendix 1 and 2. Wave 6 utilises the Strengths and Difficulties Questionnaire Emotional Problems Scale which includes more specific items.

These indicators are considered to be strong as they are valid and reliable scales that assess the mental, social and emotional wellbeing of children. For waves 4 and 5, a cut-off is determined by using a scoring approach as outlined in Appendix 1 and 2. For wave 6, the Strengths and Difficulties Questionnaire has an established scoring and cut-off approach which is utilised.

3.4.12 School satisfaction

The measure is reflected through a data item asking parents how many days children have missed school in the previous month. This is asked at all waves and is considered a strong indicator as it taps directly into the construct.

There is no established cut-off point for school attendance, and furthermore, Hancock, Shepherd, Lawrence, and Zubrick (2013) emphasise that a cut-off point cannot be determined as every additional day missed of school impacts on a child's educational outcomes. A cut-off point of 4+ days in the previous 4 weeks, averaging once per week, was used as this may suggest regular absences from school. This equates to an attendance rate of 80%, which aligns with the categorisation of educational risk in attendance by Hancock et al. (2013) of 'moderate risk' being an attendance rate of 60-79% and 'severe risk' being less than 60%.

3.4.13 School engagement

School engagement is measured through the school liking and avoidance scales in waves 4 and 5 and the school adjustment scale in wave 6. These scales change to varying degrees at each wave and therefore are not directly comparable over time. Details on the items within the scales at each wave can be found in Appendix 1, 2 and 3.

Both scales are considered to be strong as they tap into the degree to which a child enjoys being at school. For each wave, a scoring approach has been used with the cut-off determined by a mean as outlined in Appendix 1, 2 and 3.

3.4.14 Learning at home

'Learning at home' for waves 4 and 5 are reflected through the home activities index which gives an indication of how often parents engage in activities at home with their child. This data item was not available in wave 6, with 'number of books in home' deemed as the most appropriate indicator for this wave.

Research into parent and family engagement has established that the quality of the home learning environment is more important for intellectual and social development of all children than parental occupation, education or income (Sylva, Sammons, & Siraj-Blatchford, 1999). Therefore, the 'learning at home' data provides a valuable opportunity to determine how Australian children are faring in this area.

The home activities index is considered to be a moderate indicator as it directly illustrates the extent to which parents engage in learning with their child, across a range of activities. However, it does not capture the learning opportunities children may engage with through self-play. Number of books in home, as used in wave 6, is considered to be a weak indicator as it does not illustrate the extent to which children actually utilise the books for learning.

A scoring approach using the home activities index is utilised to determine deprivation, with children being flagged as deprived if parents engage them in an activity less than once per day in the last week on average. For wave 6, children were flagged as deprived if they have fewer than 11 books in the home. This is outlined further in Appendix 1, 2 and 3.

3.4.15 Learning in the community

This measure is reflected through the 'out-of-home activities index' which is asked of parents at all waves. It asks parents whether the study child has been accompanied by them, or another family member, to a number of activities as outlined in Appendix 1, 2 and 3. This indicator is considered to be moderate, as it captures the opportunities children have to learn out in the community, but there is not necessarily a need for their parents or a family member to accompany them on these outings to be able to learn. Furthermore, it would be ideal if this indicator was responded to by the child themselves.

Children were flagged as deprived in this indicator if they haven't participated in any of the listed activities in the past month.

3.4.16 Having a say within the family

An adequate indicator for this measure was available only for wave 6, which asked children directly how often they have a say in family decisions. It should be noted that children can have a say in the families in varying ways as they grow and similar questions could be asked of children at younger ages.

This indicator is considered to be strong as it directly reflects the construct. Children were flagged as deprived if they report that they 'never' have a say.

3.4.17 Having a say within the community

An appropriate indicator was not found for any wave. Further research should ascertain how this question could be asked of children.

3.4.18 Involvement in community

The indicator representing this measure is collected consistently at each wave and asks parents whether the study child has participated in a number of activities in the community regularly in the

past 12 months, as listed in Appendix 1, 2 and 3. This is considered to be a strong indicator as it directly reflects the construct, however it should be noted that this question is not asked of children themselves.

Children were flagged as deprived if they have not regularly participated in any activity in the past 12 months.

3.4.19 Sense of belonging

Sense of belonging, whether it be within the community, school or family, is not measured in any of the waves. Further research should ascertain appropriate questions that could be asked of children in future waves of the study.

3.5 Dealing with missing data

For almost any data item in the Longitudinal Study of Australian Children, the parents or children responding have the option to opt out of any question. This means that for any indicator there may be a proportion who have not responded. We therefore cannot assess whether they are deprived in that indicator. For that reason, any child who has an indicator missing is automatically flagged as not deprived, given that we do not have any information about them to infer deprivation. Imputation was not used to avoid over-inflating the deprivation rates. Consequently, the rate of deprivation for any given indicator is potentially under-reported.

The non-response rate for each indicator at each wave is illustrated in Table 23 in Appendix 4. While this level of non-response is relatively low, it was deemed that this still may introduce some bias into the results. For that reason, children in the sample who had greater than one third of indicators missing were excluded from the analysis. This removed 0.5%, 2.4% and 5.2% of observations for waves 4, 5 and 6, respectively. It was assessed whether children of a certain sex, disability status, monetary poverty status or living in a jobless family were more likely to be excluded from the analysis. As shown in Table 24, Table 25 and Table 26 in Appendix 4, children with disability and children in jobless families had a higher likelihood of being removed from the analysis in waves 5 and 6, when controlling for all other groups. The level of non-response by each indicator, after removing children who had more than one-third of all indicators missing, is substantially decreased after removing these observations as demonstrated in Table 27 in Appendix 4.

3.6 Correlation check

As outlined by de Neubourg et al. (2012), the correlations between all variables used in the MODA should be assessed. If a correlation between two indicators is very high, it indicates that they could be measuring the same deprivation and therefore one indicator should be removed from the index. For the purposes of this analysis, a correlation of greater than 0.3 is considered to be high.

The correlations between all indicators at each wave are presented in Appendix 5. They illustrate that there are no major concerns in terms of high correlations between indicators. The 'relationship with friends' and 'frequent bullying and social exclusion' indicators are highly correlated, with the correlation increasing between time points, reaching 0.3310 at wave 6. As this correlation is on the borderline point of being considered 'high', neither indicator was removed.

3.7 Analysis approach

The index was applied to assess the deprivation of all children in Australia, as well as taking a focus on three population groups. The steps taken to estimate the incidence of deprivation are outlined below.

3.7.1 Assessing deprivation in individual indicators

The percentage of children deprived in each individual indicator will be calculated. This allows for a deeper understanding of how children in Australia fare on each indicator. Where the indicators are consistent over time, illustrated by those colour-coded green in Table 5, we are able to compare the deprivation rates over time. However, in doing so, it is important to take into account that differences over time may be due to age progression. Furthermore, we cannot assess whether a change over time is caused by differences occurring between the different age groups, or general improvement/worsening for all children over time.

3.7.2 Assessing deprivation in Nest dimensions

As discussed in Section 3.1, the MODA methodology encourages using the union approach, whereby a child is automatically flagged as deprived within a dimension if they are considered deprived in ANY indicator within that dimension. An analysis of the percentage deprived in each Nest dimension, as well as the total number of dimensional deprivations experienced, will be conducted at each wave. The analysis will also present a mean of the number of indicators children are deprived in within each dimension to give an indication of severity.

3.7.3 Determining multi-dimensional deprivation

A measure of 'multi-dimensional deprivation' will be determined, defined as being deprived in three or more Nest dimensions. A child is, therefore, living in multi-dimensional deprivation if they are deprived in one or more indicators in at least three dimensions.

3.7.4 Determining deep deprivation in each Nest dimension

An illustration of the depth of deprivation within each Nest dimension will be presented by developing a measure of 'deep deprivation'. This is defined as being deprived in 2 or more indicators within each dimension.

3.7.5 Nest outcomes for population groups

The deprivation index is most useful for comparing outcomes of different population groups. To illustrate this, the index was applied to three population groups who tend to experience more difficult life circumstances, as well as being well-defined groups for which policy can assist in improving their outcomes. These are children living in monetary poverty, children with disability and children living in jobless families. The Aboriginal and Torres Strait Islander population was not assessed due to LSAC not being representative of this population. Figure 3 shows the overlap between each population group, illustrating that a majority of children in jobless families are also in monetary poverty. Examining both groups allows for deeper insight into the impact on wellbeing outcomes of having unemployed parents while controlling for income. The difference in outcomes between groups was tested using a chi-square test, with odds ratios calculated using logistic regression.

The definitions used for these groups are described below. Table 7 and Table 7 illustrate the sample size in each population group, as well as the weighted percentage of the sample before and after removing records with missing data.

Table 6: Number of children in sample, and weighted percentage of sample at each wave before removing records with missing data

	Wave 4 (age 6-7)		Wave 5 (age 8-9)		Wave 6 (age 10-11)	
	n	Weighted %	n	Weighted %	n	Weighted %
Children with disability	212	5.42%	162	4.09%	173	4.60%
Children in monetary poverty	501	15.71%	486	14.43%	407	13.34%
Children in jobless families	308	11.00%	284	9.45%	250	9.05%

Table 7: Number of children in sample; weighted percentage of sample at each wave after removing records with missing data

	Wave 4 (age 6-7)		Wave 5 (age 8-9)		Wave 6 (age 10-11)	
	n	Weighted %	n	Weighted %	n	Weighted %
Children with disability	211	5.40%	154	4.04%	149	4.41%
Children in monetary poverty	499	15.73%	473	14.43%	377	13.02%
Children in jobless families	306	11.00%	271	9.15%	220	8.26%

Figure 3: Overlap between the three population groups at each wave after removing records with missing data
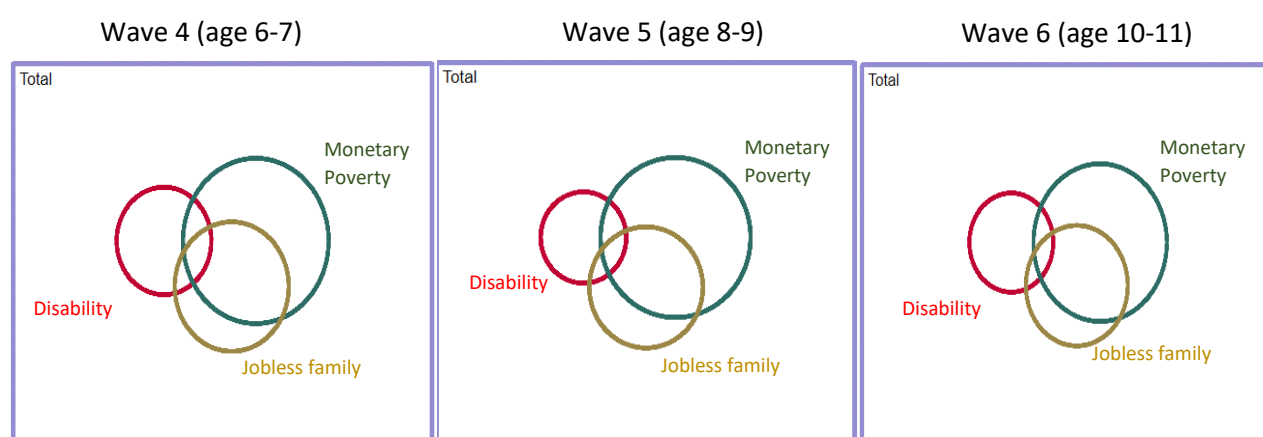
Children with disability

The most relevant question related to disability in LSAC is whether the child has a medical condition or disability that has lasted for 6 months or more. It should be noted that this differs from other definitions of disability and would include children who have conditions such as asthma or eczema. It should also be noted that it does not include mental illness. This is so the impact between disability and poor mental health could be assessed.

Children living in monetary poverty

For this research, child monetary poverty is defined as children living in families below the relative poverty line, measured at 50% of median income. The poverty line for families of children in the survey was calculated using the relative poverty line for a single adult, as reported by Australian Council of Social Service (2016), Australian Council of Social Service (2014) and Australian Council of Social Service (2012), for wave 6, 5 and 4 respectively, using the Australian Bureau of Statistics Survey of Income and Housing. It should be noted that these poverty lines use after-tax income, as opposed to before-tax income which is reported in the LSAC data. This means that there will be exclusion error in defining monetary poverty, with some children who are living below the poverty line being classed as 'not in poverty'. This exclusion error will be relatively small, given that parents living under the poverty line would, on average, be paying low rates of tax.z

Equivalence scales were then applied, which helps to calculate monetary poverty on a per capita basis by taking into account the number of people living in the household. Equivalence scales make assumptions about the basic needs of adults and children, and also assume that there are economies of scale within a household, meaning that the basic needs of a person cost less if there are more people in the house (Coudouel et al., 2002). Australia uses the 'modified OECD' equivalence scale which assigns a value of 1.0 to the first adult, 0.5 to each subsequent adult and 0.3 to each dependent child (Australian Bureau of Statistics, 2006). This scale was applied to the poverty line for a single adult using data from the Australian Bureau of Statistics Survey of Income and Housing in 2010, 2012 and 2014 to correspond to waves 4, 5 and 6, respectively. The poverty line for a couple with two children was $752 per week in 2010 (Australian Council of Social Service, 2012), $840.60 per week in 2012 (Australian Council of Social Service, 2014) and $895.22 per week in 2014 (Australian Council of Social Service, 2016).

Children in jobless families

Children living in jobless families was defined as children who had no parents employed in the labour force. This includes parents who were either 'unemployed' or 'not in the labour force'. This definition was also applied in the study by Baxter, Gray, Hand, and Hayes (2012) who examined the impact of parental joblessness on children's wellbeing. The employment status of parents living elsewhere was not considered in the classification of jobless families, as it was deemed more important to assess the employment characteristics of the adults living in the child's primary home environment.

3.8 Robustness check

A robustness check was conducted by assessing the sensitivity of the results to more conservative cut-off points in the indicators. This means that the conservative cut-off points would result in smaller deprivation rates (some cut-off points could not be made more conservative, and thus the cut-off points for these indicators were unchanged in the robustness check). The alternative cut-off points used, as well as the output using these different cut-off points, are shown in Appendix 6.

By design, the deprivation rates decreased for each indicator where a more conservative cut-off point could be tested. However, the deprivation rates for certain indicators decreased more substantially than others. In particular, the deprivation rates in mental health for waves 4 and 5, where the emotional problems scale was used, and the deprivation rates for frequent yelling in the home decreased substantially.

When assessing the sensitivity of the alternative cut-off points to statistical inference in comparing population groups, the difference in population groups either remained at the same significance

level or changed to a different significance level. Some indicators at certain waves did become significant, or become non-significant when using a more conservative cut-off point, which are shown in Table 8. The majority of these changed between a 10% significance level and non-significance, which illustrates only a minor change. Some indicators did change substantially in their significance level, however these varied by wave and population group. This suggests that this is not a factor of the cut-offs being inappropriate, but rather that there are particular characteristics of each population group which makes the classification of deprivation sensitive for a small number of indicators.

Table 8: Summary of indicators that changed significance in robustness checks

	Wave 4 (age 6-7)	Wave 5 (age 8-9)	Wave 6 (age 10-11)
Children with disability	• Living in deep deprivation (became significant at 5% level from non-significant) • Parent engagement in learning (became non-significant from being significant at 1% level)	• School attendance (became non-significant from being significant at 10% level)	• Relationship with parents (became non-significant from being significant at 10% level)
Children in monetary poverty	• Enjoyment in exercise (became significant at 10% level from non-significant) • School attendance (became non-significant from being significant at 1% level	• Yelling in the home (became significant at 5% level from non-significant) • Mental health (became non-significant from being significant at 1% level) • School attendance (became non-significant from being significant at 1% level	• Relationship with friends (became non-significant from being significant at 10% level)
Children in jobless families		• Parent engagement in learning (became significant at 10% level from being non-significant)	• Yelling at home (became non-significant from being significant at 10% level) • School satisfaction (became non-significant from being significant at 10% level) • Number of books in home (became non-significant from being significant at 1% level)

Some of the differences can also be explained by the fact that the deprivation rate at a national level was incredibly low when using a more conservative cut-off point, meaning that because almost all children were not considered deprived, no significant differences were observed between population groups.

In summary, while the robustness check did note some differences in statistical inference for certain waves when using more conservative cut-off points, the majority of inferences remained the same. This suggests that the deprivation rates for most indicators at most waves are not sensitive to the established cut-off point.

3.9 Limitations of the study

Before moving on to the analysis, there are a number of limitations which should be noted. Firstly, the framework presented in Figure 1 is a simplification of the key wellbeing dimensions that were highlighted through the Nest consultations. For example, access to health insurance was identified

as an important aspect of Material Basics and, in this measure, it is represented through 'Financial security'. Similarly, physical health would be more accurately measured through a greater range of measures than simply nutrition and exercise. However, it was important to restrict the number of measures under each dimension, with the final measures being based on the Nest consultations.

Secondly, there are some gaps in the deprivation index for which no indicators were available in the dataset, as shown in Table 5. This results in children being 'more likely to be deprived' in dimensions where complete data were available, compared to dimensions where not all measures were available. This is particularly notable for the Participation dimension, where only one measure was represented in waves 4 and 5, with two in wave 6. Therefore, when interpreting deprivation by dimension, the true rate of deprivation may be higher than the rate of deprivation presented in the analysis, if all measures were available. This is because children are deprived in a dimension if they have a deprivation in at least one indicator. Where more indicators are available, there is a higher likelihood of being deprived in that dimension.

Thirdly, as discussed above, non-response in data items means that some children were excluded from the analysis. This results in the deprivation rates being downward biased and will result in bias when looking at population groups if some population groups are more likely to have missing data than others. For example, children with disability and children in jobless families were more likely to have missing data items in wave 5 and 6, and, therefore, removing them from the analysis does result in sample bias.

Another limit, as noted in Section 3.4, is that the strength of the closest available indicator varies by measure. This means that some indicators accurately reflect the construct it is intending to represent, while some only partially reflect the construct. For example, access to basic goods is reflected through whether or not children have a computer in wave 4 which only partially captures the measure and is, thus, considered to be a weak indicator. In contrast, the financial hardship scale comprehensively reflects the measure of financial security of family and is therefore considered to be a strong indicator.

Finally, due to lack of information, some cut-off points didn't reflect the literature exactly. For example, dietary guidelines could not be used to determine deprivation in nutrition due to serving sizes not being reported in the data. This has meant that the cut-off for nutrition was determined as 'no fruit or vegetables' which may under-report the level of deprivation experienced in this indicator.

4   Findings

The following sections provide insight into the incidence of deprivation experienced by children in Australia using LSAC. Firstly, the rates of deprivation at the national level are explored, before assessing the incidence of multi-dimensional and deep deprivation. Finally, the index is applied to compare the wellbeing of population groups who tend to experience greater levels of disadvantage: children with disability; children in monetary poverty; and children living in jobless families.

The findings illustrate that while children in Australia are generally faring well, there are pockets of deprivation that exist. At each time point, around one quarter of children had high wellbeing in all Nest dimensions, sitting at 25% at age 6-7, 23% at age 8-9 and 27% at age 10-11.

However, some indicators showed particularly high deprivation rates. These are particularly alarming when considering the overall performance of the Australian economy and the relative prosperity enjoyed by many parts of the Australian community. At each available time point, around one-fifth of children are experiencing frequent yelling in their family, and around one-quarter are experiencing regular bullying or social exclusion. Around 20% of children are in families living in financial insecurity and the rates of poor mental health appear to be rising as children get older. While a high proportion of children are regularly participating in extracurricular activities at age 10-11 (91%), 17% are missing out at age 6-7.

The rate of children living in multi-dimensional deprivation, defined as being deprived in at least three Nest dimensions, is around 20% at all time points, however, the severity of deprivation for these children tends to be relatively low. At each time point, between 14% and 24% of children experienced a deep deprivation in at least one dimension, defined as being deprived in two or more indicators within a dimension.

When examining the Nest outcomes of three population groups: children living in monetary poverty; children with disability; and children living in jobless families, all are significantly more likely to be experiencing deprivations in indicators across all Nest dimensions. In particular, children in jobless families tend to experience a greater number of deprivations compared to children in monetary poverty and children with disability.

4.1 Rates of deprivation at the national level

Key findings

- 'Frequent bullying or social exclusion', 'financial security of family' and 'adequate fruit and vegetables' have the highest deprivation rates.
- The deprivation rate for 'relationship with friends', 'enjoyment of exercise', 'parent engagement in learning' and 'participation in cultural activities' tended to worsen as children got older.
- The deprivation rate for 'frequent yelling at home', 'financial security of family', 'adequate fruit and vegetables', 'school attendance' and 'regular participation in extracurricular activities' tended to improve as children got older.

This section gives an overview of the deprivation rates for individual indicators and dimensions at a national level. Firstly, Figure 4 shows the deprivation rate for each dimension and wave. It illustrates

that there is some variation in deprivation rates between Nest dimensions, and within the same Nest dimension, over time. Table 10 lists the deprivation rate for each indicator, which will be discussed in greater detail in the sections below.

As illustrated in Figure 4, Loved and Safe tends to have one of the higher deprivation rates at all waves, particularly for wave 5 when children were aged 8-9. This is predominantly driven by deprivation in frequent bullying or social exclusion at school, which is as high as 28% at age 8-9. The increase in deprivation in Loved and Safe between ages 6-7 (wave 4) and 8-9 (wave 5) is largely caused by the large increase in bullying or social exclusion at school at these two time points.

The deprivation rate for Material Basics is fairly consistent over time and is heavily influenced by the one-fifth of children who are living in financially insecure homes.

Deprivation in children's health within Australia is relatively high and tends to get worse over time with almost 40% of children deprived in this dimension at age 10-11. Poor health is largely driven by poor nutrition, with over one-quarter of children aged 10-11 not eating any fruit or vegetables in a day. Mental health concerns are starting early in a young person's life, with almost 1 in 10 children aged 6-7 having a low score on the social emotional problems scale.

The opportunities children have through the Learning dimension improve over time, with the deprivation rate falling from 37% at age 6-7 to 27% at age 10-11. This improvement is influenced by increased levels of school satisfaction (although this indicator is measured inconsistently at each wave, so we cannot be certain that school satisfaction is truly improving).

Finally, the deprivation rate for Participating is the lowest of all Nest dimensions, however this is largely a factor of fewer available indicators for this Nest dimension, compared to the others. The percentage of children engaged in regular participation in extracurricular activities was used consistently at all waves and improves over time, with the deprivation rate sitting at 17% at age 6-7 and declining to 9% at age 10-11.

Figure 4: Deprivation rate by dimension and wave (%)
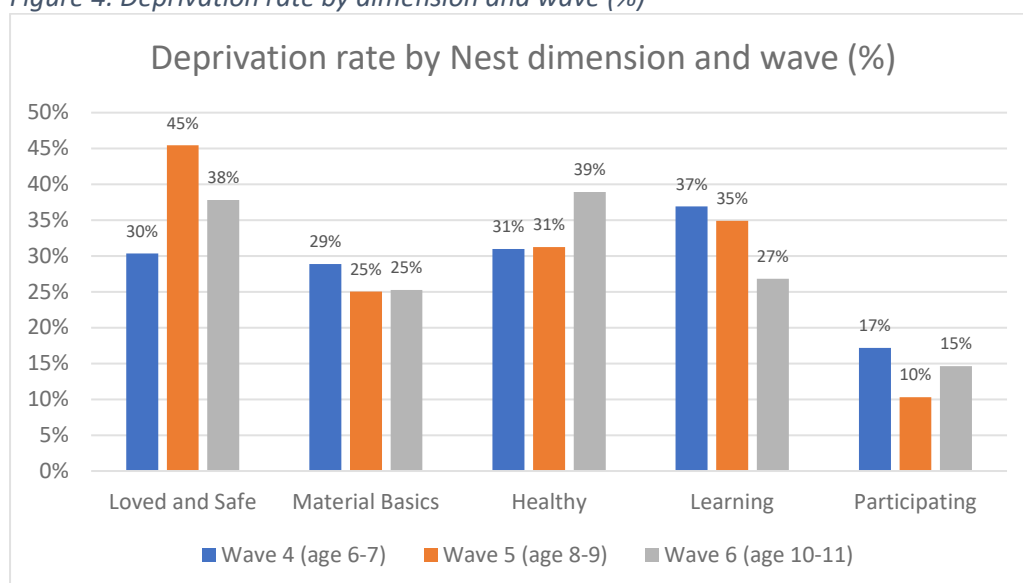
Note: The height of bars reflecting identical percentages may differ due to rounding

Figure 5 presents the distribution of the total number of dimensions in which children are deprived in. It shows that at each time point, around one-quarter of children had high wellbeing in all Nest

dimensions, sitting at 25% at age 6-7, 23% at age 8-9 and 27% at age 10-11. This is lower than the finding by Redmond et al. (2016) that 37% of year 4 and 6 students had very high wellbeing. This discrepancy can be explained by the fact that the two studies applied different frameworks and methodologies.

Figure 5: Distribution of number of deprived dimensions children experience at each wave (%)
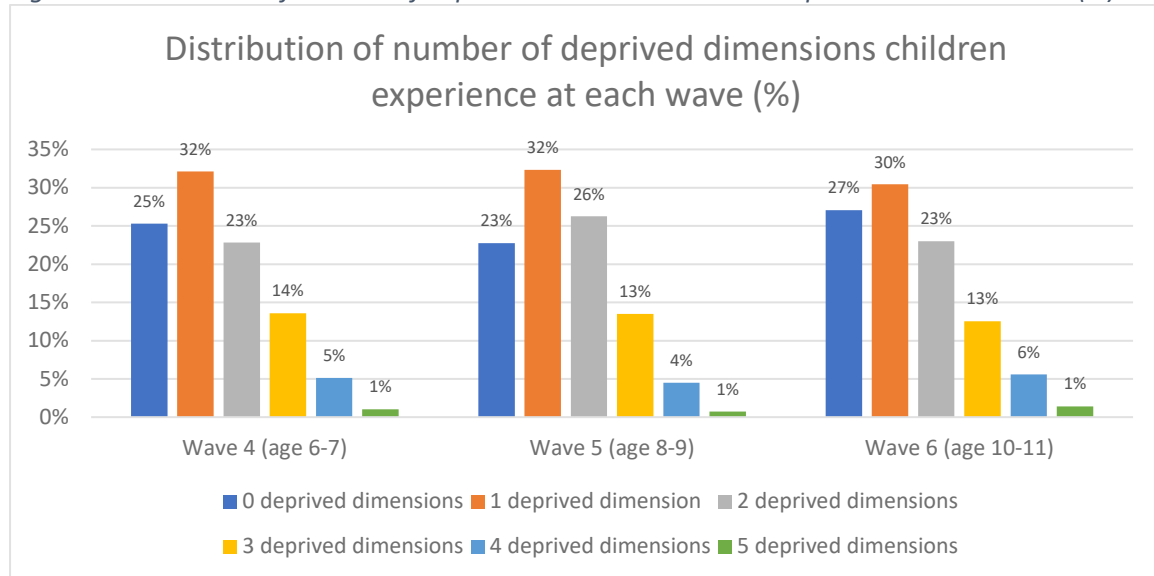
Note: The height of bars reflecting identical percentages may differ due to rounding

Taking a look within each dimension, Table 9 illustrates the mean number of deprived indicators children experience within each dimension, which gives an indication as to the severity of deprivation in each Nest dimension. This shows that the severity of deprivation in all dimensions is relatively low, with it being highest for Loved and Safe, as well as Healthy.

Table 9: Mean number of deprived indicators children experience per dimension

Dimension	Wave 4	Wave 5	Wave 6
Loved and Safe	0.36 (out of 3)	0.62 (out of 4)	0.57 (out of 4)
Material Basics	0.32 (out of 2)	0.28 (out of 3)	0.29 (out of 3)
Healthy	0.35 (out of 3)	0.36 (out of 3)	0.48 (out of 3)
Learning	0.44 (out of 4)	0.42 (out of 4)	0.32 (out of 4)
Participating	0.17 (out of 1)	0.10 (out of 1)	0.16 (out of 2)

Finally, Table 10 drills down further, listing the deprivation rate for each indicator. These results are discussed further in the sections below.

Table 10: Deprivation rate for each indicator (%)

Nest dimension	Indicator	Wave 4 (age 6-7)	Wave 5 (age 8-9)	Wave 6 (age 10-11)
Loved and Safe	Relationship with friends *^Indicator consistent at wave 4 and 5*	11.38%	12.43%	16.68%
	Relationship with parents (Fun with family at wave 4) *^Indicator inconsistent at all waves*	3.50%	1.07%	5.34%
	Frequent yelling at home *^Indicator consistent at wave 5 and 6*	N/A	20.01%	14.72%
	Frequent bullying or social exclusion *^Indicator inconsistent at all waves*	21.16%	28.34%	19.87%
Material Basics	Financial security of family *^Indicator consistent at all waves*	21.58%	20.22%	19.51%
	Access to computer	10.47%	N/A	N/A
	Eating breakfast *^Indicator inconsistent at all waves*	N/A	5.08%	6.93%
	Experience of no place to live *^Indicator consistent at wave 5 and 6*	N/A	2.61%	2.17%
Healthy	Enjoyment of exercise *^Indicator consistent at wave 4 and 5*	5.06%	7.79%	7.66%
	Adequate fruit and vegetables *^Indicator consistent at wave 4 and 5*	20.21%	18.34%	26.24%
	Mental health *^Indicator consistent at wave 4 and 5*	9.42%	10.05%	14.19%
Learning	School attendance *^Indicator consistent at all waves*	11.64%	10.84%	9.56%
	School satisfaction *^Indicator inconsistent at all waves*	22.90%	14.64%	10.26%
	Parent engagement in learning (wave 4, wave 5) Number of books in home (wave 6) *^Indicator consistent at wave 4 and 5*	5.80%	12.66%	7.17%
	Participation in cultural activities *^Indicator consistent at all waves*	3.21%	3.86%	4.61%
Participating	Having a say in family decisions	N/A	N/A	6.44%
	Having a say within the community	N/A	N/A	N/A
	Regular participation in extracurricular activities *^Indicator consistent at all waves*	17.17%	10.28%	9.17%
	Sense of belonging	N/A	N/A	N/A

Green = Deprivation rate 0-4.99%
Orange = Deprivation rate 5-14.99%
Red = Deprivation rate 15%+

4.1.1 Loved and Safe

The deprivation rate for Loved and Safe was 30% at age 6-7, 45% at age 8-9 and 38% at age 10-11. As illustrated through Table 9, the severity of deprivation within Loved and Safe is a little deeper in waves 5 and 6. However, this may just be a factor of waves 5 and 6 having an indicator for 'safe at home' which is absent in wave 4.

Deprivation in Loved and Safe is predominantly driven by frequent bullying or social exclusion, with 21%, 28% and 20% of children deprived for waves 4, 5 and 6, respectively. While the question varies between the waves, the data item is similar between waves 5 and 6 (with additional examples of bullying and social exclusion being asked at wave 6). This finding aligns with previous research on bullying prevalence, with Cross et al. (2009) finding that frequent bullying (defined by Cross et al. (2009) as being bullied every few weeks or more often, as opposed to at least once a week as used in the current research) was highest among Year 5 students, sitting at 32%.

Deprivation in bullying and social exclusion may be related to deprivation in 'relationship with friends' which sits at 11% at wave 4, 12% at wave 5 and 17% at wave 6. This indicator utilises the peer problems scale and was consistent at each wave, except that the child was the respondent in wave 6 while the parent responded in waves 4 and 5. The increase of 4.25 percentage points between age 8-9 and 10-11 could either be caused by the true deprivation rate being higher at age 10-11, or the fact that children are more likely to provide negative responses compared to parents responding on their behalf. This finding illustrates that children may benefit from greater levels of support in developing positive relationships with their peers.

On a more positive note, the results indicate that the vast majority of children have positive relationships with their parents and family with the rate of deprivation sitting between 1% and 6% at each time point. Given that the indicator used for this measure is not consistent at each wave, we cannot determine whether there are any changes over time.

Finally, the deprivation rate for the 'frequent yelling at home' indicator decreased from 20% at age 8-9 to 15% at age 10-11. This may be a factor of levels of family conflict reducing over time, or children at age 8-9 being more likely to experience frequent yelling at the home compared to when they are older at age 10-11.

4.1.2 Material Basics

The deprivation rate for Material Basics stayed fairly consistent over time, sitting at 29% at age 6-7, 25% at age 8-9 and 25% at age 10-11. As shown in Table 9, the depth of deprivation within Material Basics is relatively low at each wave, with children being deprived, on average, in about 0.3 indicators.

A high proportion (around one-fifth) of children at all time points were living in financially insecure families, illustrating that many children are living in families who do not have the financial support needed to meet their basic needs such as not being able to pay for bills, housing or attend school excursions. While not directly comparable, this figure aligns with the child monetary poverty rate, which was 17% in 2016 (Davidson et al., 2018).

While the impact of children experiencing homelessness cannot be over-stated, the prevalence of children experiencing not having a place to live is relatively low in Australia in comparison to the other indicators and stays at the same rate over time sitting at 3% for children aged 8-9, and 2% when they reach age 10-11. This rate is higher than homelessness figures for children aged 0-11,

which was 0.5% in the 2016 Census (Australian Bureau of Statistics, 2018a)[4], likely due to the fact that LSAC asks parents their experience of homelessness in the last two years, while the Census asks individuals their housing situation on a specific night.

The majority of children in Australia have good opportunities through having a meal in the morning, although the deprivation rate increased between ages 8-9 and 10-11 (from 5% to 7%). As this was asked by the primary parent in wave 5 and the child in wave 6, we cannot be certain that this is a true increase over time, or whether it's a factor of the child answering differently to how the parent responds. Redmond et al. (2016) report similar results in the Australian Child Wellbeing Project, finding that 5% of Year 4 students and 2.5% of Year 6 students are going to school or bed hungry, either always or often, because there is not enough food at home.

Finally, access to a computer could be measured only at age 6-7, with 10% of children aged 6-7 being deprived on this indicator.

4.1.3 Healthy

The deprivation rate for Healthy peaked at the latest time point, being 31% at age 6-9 and 39% at age 10-11. The depth of deprivation is relatively high at age 10-11, with children being deprived in 0.48 indicators, on average. At age 6-7 and 8-9, it is substantially lower as illustrated in Table 9.

The results found that there are good opportunities for children to engage in physical activity, with the deprivation rate for enjoyment in exercise sitting at lower than 8% at each time point. It should be noted that this result differs substantially from research that examines the percentage of children meeting physical activity guidelines (defined as accumulating at least 60 minutes of moderate to vigorous activity daily). For example, Active Healthy Kids Australia (2016) found that only around 40% of children aged 5-8 years and 20% of children aged 9-11 years were meeting physical activity guidelines. Further research could examine why participation in physical activity is so low, while enjoyment is high.

The analysis implies that children may not be getting adequate fruit and vegetables, with between 18% and 26% of children being deprived on this indicator over each of the three time points. The large jump in the deprivation rate from 18% at age 8-9 to 26% at age 10-11 may either be caused by children having worse nutrition at age 10-11, or them being more likely to respond that they haven't eaten fruit or vegetables compared to when their parents are asked. As the indicator used for this result doesn't take into account number of servings of fruit and vegetables, this result differs substantially from research using the NHMRC fruit and vegetable consumption guidelines (National Health and Medical Research Council, 2013), with only 3.8% of children aged 4-8, and 5.1% of children aged 9-11 meeting recommended guidelines in 2017-18 (Australian Bureau of Statistics, 2018c). This result is largely influenced by inadequate vegetable intake. These figures illustrate that nutrition is a significant concern for Australia's children.

Finally, mental health in children is a significant concern with the rate of deprivation varying between 9% and 15% over the three time points. The indicator is consistent between age 6-7 and 8-9 with the rate sitting at 9% at age 6-7 and 10% at age 8-9. There was a large jump to 14% at age 10-11. However, this may be influenced by the use of a different scale. These figures align with research from Lawrence et al. (2015) which found that 13.6% of children aged 4-11 in 2013-14 had a mental disorder.

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[4] Denominator calculated using 2016 Census data (Australian Bureau of Statistics, 2016)

4.1.4 Learning

The deprivation rate for Learning was 37% at age 6-7, 35% at age 8-9 and 27% at age 10-11. The depth of deprivation is relatively high at age 6-7 and 8-9 and slightly decreases by age 10-11 as shown in Table 9.

The majority of children have good opportunities to learn in the home at age 6-7, with only 6% being deprived on this indicator. This worsens by age 8-9, with the deprivation rate sitting at 13%. This may be a factor of parents having less time to engage with their children in activities, or could be that parents are engaging with their children in ways not measured through the scale, such as in activities outside the home. By age 10-11, 7% of children are deprived on this measure, which is reflected through the number of books the child has in their home. Previous studies have measured this construct through total time spent with children (which can include things like helping children with personal care and taking them to child care, school and other activities). For example, Baxter, Gray, and Hayes (2007) found that, on average, parents of children aged 5-14 spent around 25 hours with their child per week, equating to about 3.5 hours per day. However, given the different approach by which this is measured, their results are not comparable to those found in this report.

The rate of children not attending school regularly gradually improves over time, with the deprivation rate sitting at 12% at age 6-7, 11% at age 8-9 and 10% at age 10-11. This roughly aligns with findings by Hancock et al. (2013) in their study of school attendance in Western Australia, which found that 8-9% of primary school students had an attendance rate lower than 80%.

Low levels of school satisfaction among children aged 6-7 is of concern, with 23% of children being deprived on this indicator. At age 8-9, 15% were considered deprived in this dimension and 10% at age 10-11. This may reflect developmental change as children get older, however we cannot be certain of this, due to the inconsistency in the indicator (as the scale is adapted at each wave to be age appropriate). The low rates of school satisfaction are associated with bullying and social exclusion and relationship with friends, particularly at age 10-11 with a correlation coefficient of 0.1420 with bullying and 0.1531 with relationship with friends

Finally, children in Australia have good opportunities to learn through participating in cultural activities, with only 3%-5% deprived on this indicator through ages 6-11.

4.1.5 Participating

With only one indicator at age 6-7 and 8-9, and two at age 10-11, the deprivation rate for Participating is lower at all waves compared to the deprivation rates for the other dimensions. At age 6-7 and age 8-9, the deprivation rate was 17% and 10%, respectively (measured through regular participation in extracurricular activities). At age 10-11, this rose to 15% where the dimension was measured through regular participation in extracurricular activities (a deprivation rate of 9%) and having a say in family decisions (a deprivation rate of 6%). Further research could help examine what policy tools could get children more engaged in their community at an earlier age.

4.2 Rates of multi-dimensional deprivation at the national level

> **Key findings**
>
> - At each time point, almost one-fifth of children were considered to be in multi-dimensional deprivation (defined as being deprived in three or more dimensions).
> - At each time point, of children who were multi-dimensionally deprived, between 4% and 7% were deprived in all dimensions.
> - The level of severity of deprivation within each Nest dimension for multi-dimensionally deprived children is relatively low. This illustrates that children who do have deprivation in multiple dimensions are not deprived in all indicators within those dimensions.

The rate of multi-dimensional deprivation, defined as being deprived in three or more dimensions, is relatively high sitting at 20% at age 6-7, 18% at age 8-9 and 20% at age 10-11, as illustrated through Figure 5. Appendix 8 shows the breakdown of all possible combinations of deprivations for children who are multi-dimensionally deprived. The most common deprivation 'groupings' were generally those for which Loved and Safe was present and Participating wasn't. For those who were multi-dimensionally deprived, 5% were deprived in all dimensions at age 6-7, 4% were at age 8-9 and 7% were at age 10-11 as shown in Appendix 8.

To determine the severity of deprivation within each Nest dimension for children who are multi-dimensionally deprived, the mean number of indicators where children experienced deprivation was calculated within each dimension at each wave, as shown in Table 11. Broadly, the severity of deprivation is relatively low within each dimension with the mean number of indicators children experiencing deprivation generally being below 1. However, they are substantially higher than the mean number of deprivations for the overall population, as shown in Table 9. We can see that for children who are multi-dimensionally deprived, the severity of deprivation tended to be greatest for Loved and Safe, with these children experiencing deprivation, on average, in 1.3 indicators at age 8-9 and 10-11. The severity of deprivation in Healthy for children who are multi-dimensionally deprived was also high at age 10-11, with these children experiencing deprivation, on average, in 1.10 indicators.

Table 11: Mean number of deprived indicators children experience per dimension for children who are multi-dimensionally deprived

Dimension	Wave 4 (age 6-7)	Wave 5 (age 8-9)	Wave 6 (age 10-11)
Loved and Safe	0.87 (out of 3)	1.31 (out of 4)	1.34 (out of 4)
Material Basics	0.78 (out of 2)	0.72 (out of 3)	0.74 (out of 3)
Healthy	0.82 (out of 3)	0.92 (out of 3)	1.10 (out of 3)
Learning	1.00 (out of 4)	0.93 (out of 4)	0.83 (out of 4)
Participating	0.50 (out of 1)	0.32 (out of 1)	0.52 (out of 2)

Figure 6 shows the total number of indicators that children who experience multi-dimensional deprivation are deprived in at each wave. Given that this population group is defined as being deprived in three or more dimensions, the minimum number of indicators a child could be deprived in is three. We can see that at age 6-7, the majority tend to have this minimum number of

deprivations, indicating that while these children have various deprivations across dimensions, the severity of deprivation within any given dimension is relatively low. In later waves, children who are multi-dimensionally deprived tend to experience a greater number of deprivations in indicators (with the majority being deprived in 4 indicators in total). However, this is largely a factor of a greater number of indicators being integrated into the index at later waves. As shown in Table 11, the number of deprivations multi-dimensionally deprived children experienced in the Healthy dimension increased between age 8-9 and age 10-11, while it decreased in the Learning dimension.

These findings illustrate that while children who are multi-dimensionally deprived are experiencing deprivation on multiple fronts, they have alternative resources available to them within each Nest dimension that they can rely upon to help them overcome deprivation in some aspects of their wellbeing.

Figure 6: Distribution of number of indicators multi-dimensionally deprived children are deprived in, by wave (%)

Distribution of number of indicators multi-dimensionally deprived children are deprived in, by wave (%)
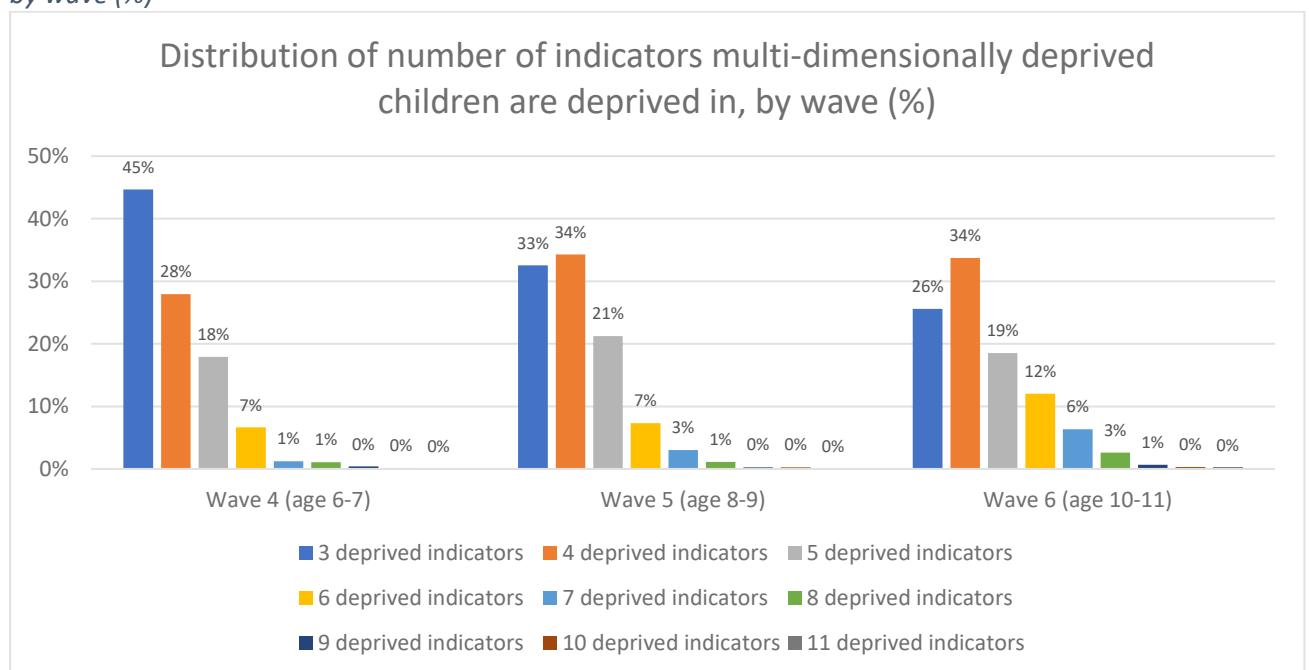
Note: The height of bars reflecting identical percentages may differ due to rounding

4.3 Rates of deep deprivation at the national level

Key findings

- At each time point, between 14% and 25% of children were considered to be in deep deprivation (defined as being deprived in two or more indicators) in at least one Nest dimension.
- The rate of deep deprivation was higher in Loved and Safe at age 8-9 and age 10-11 than all other dimensions. This was driven by the inclusion of the 'frequent yelling at home' indicator at age 8-9, which has high co-occurrence with deprivation in relationship with parents and frequent bullying and social inclusion.

As highlighted in Section 3.7, deep deprivation is defined as being deprived in half or more of measures under each Nest dimension. Given that each dimension is comprised of four measures,

this is therefore defined as being deprived in two or more indicators. Such analysis provides greater insight into the prevalence of more severe deprivation in Nest dimensions.

Overall, 14% of children at age 6-7, 24% of children at age 8-9 and 25% of children at age 10-11 were experiencing deep deprivation in at least one Nest dimension. Figure 7 illustrates the percentage of children who were deeply deprived by each dimension, which shows that the large increase in deep deprivation between age 6-7 and 8-9 is predominantly caused by the large proportion of children who are deeply deprived in Loved and Safe.

Figure 7: Rate of deep deprivation by dimension and wave (%)

Deep deprivation rate by dimension and wave (%)
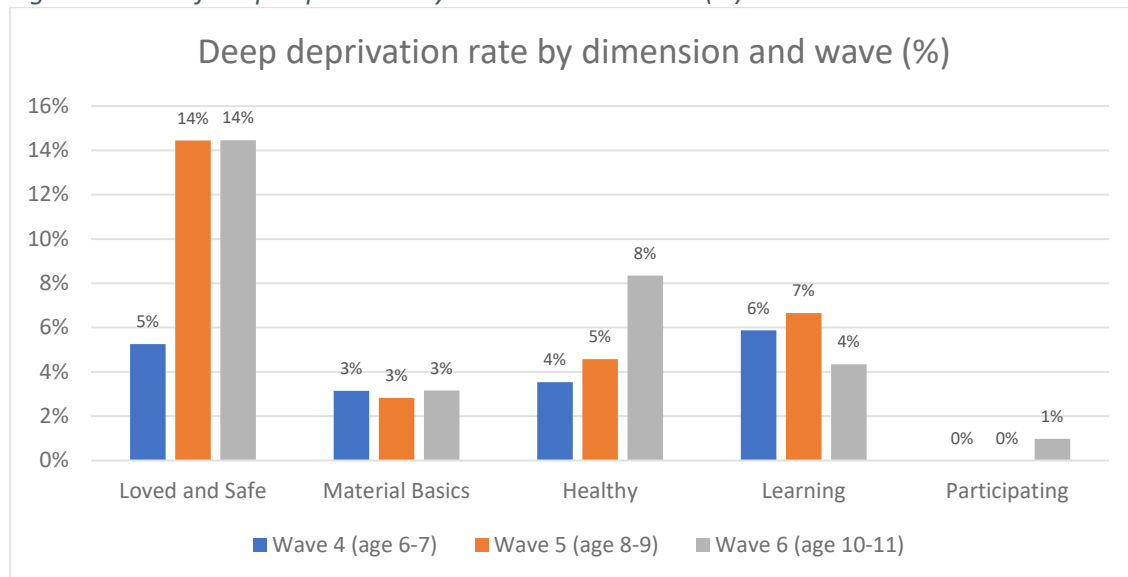
Notes: - Rate for Participating is 0% for wave 4 and 5 as only 1 indicator exists at these waves, making deep deprivation not Possible
  - The height of bars reflecting identical percentages may vary due to rounding

Of children who had a deprivation in Loved and Safe, 17% of children at age 6-7, 31% at age 8-9 and 37% at age 10-11 were considered to be deeply deprived in this dimension, illustrating that the rate of deep deprivation is high in Loved and Safe. Table 12 presents the breakdown of the various pairs of deprivations in Loved and Safe for those who had a deep deprivation in this dimension. At each time point, for children who are deeply deprived in Loved and Safe, a large proportion are deprived in both 'relationship with friends' and 'safe at school'. This illustrates that children who are experiencing bullying also tend to not have positive relationships with their peers. Among children aged 8-9, another common deprivation pair is 'safe at school' and 'safe at home', indicating that children who are experiencing bullying at school are also more likely to be having negative experiences at home.

Table 12: Breakdown of combinations of deprivations for children who are deeply deprived in Loved and Safe (%)

Combination of deprivations	Wave 4 (age 6-7)	Wave 5 (age 8-9)	Wave 6 (age 10-11)
Relationship with parents/family and Relationship with friends	14.09%	1.53%	12.03%
Relationship with friends and Frequent yelling at home	n/a	20.09%	29.48%
Relationship with friends and Frequent bullying or social exclusion	78.59%	40.66%	57.34%
Relationship with parents/family and Frequent yelling at home	n/a	2.85%	16.19%
Relationship with parents/family and Frequent bullying or social exclusion	23.36%	4.70%	14.40%
Frequent yelling at home and Frequent bullying or social exclusion	n/a	58.27%	35.60%

Note: Numbers don't add up to 100% due to children who were deprived in more than two indicators

There are also some common deprivation pairings within Material Basics, with 'financial security of family' and 'eating breakfast' being the most common, as shown in Table 13. This is followed by 'financial security of family' and 'experience of no place to live'. This indicates that children who are living in financially insecure homes are also suffering in terms of their food security and having adequate housing.

Table 13: Breakdown of combinations of deprivations for children who are deeply deprived in Material Basics (%)

Combination of deprivations	Wave 4 (age 6-7)	Wave 5 (age 8-9)	Wave 6 (age 10-11)
Financial security of family and Eating breakfast	n/a	56.31%	70.21%
Financial security of family and Experience of no place to live	n/a	43.66%	35.72%
Eating breakfast and Experience of no place to live	n/a	4.12%	7.28%

Notes: - Numbers don't add up to 100% due to children who were deprived in more than two indicators
- No data in wave 4 due to only Financial Security of Family and Access to Basic Goods being available

Table 14 examines the severity of deprivation in each dimension for those who are deeply deprived in the respective dimension. It illustrates that the majority of children who are deeply deprived are deprived in two indicators only, with Loved and Safe at age 10-11 having substantially higher severity than all other dimensions.

Table 14: Mean number of deprived indicators children experience per dimension for children who are in deep deprivation within that dimension

Dimension	Wave 4 (age 6-7)	Wave 5 (age 8-9)	Wave 6 (age 10-11)
Loved and Safe	2.08 (out of 3)	2.14 (out of 4)	2.30 (out of 4)
Material Basics	2.00 (out of 2)	2.02 (out of 3)	2.07 (out of 3)
Healthy	2.05 (out of 3)	2.08 (out of 3)	2.09 (out of 3)
Learning	2.13 (out of 4)	2.07 (out of 4)	2.09 (out of 4)
Participating	n/a	n/a	2.00 (out of 2)

While the percentage of children experiencing deep deprivation in more than one dimension of the Nest is relatively low, as shown in

Figure 8, it is rising over time, sitting at 2% at age 6-7, 3% at age 8-9 and 5% at age 10-11.

Figure 8: Distribution of number of deep deprivations, by wave (%)
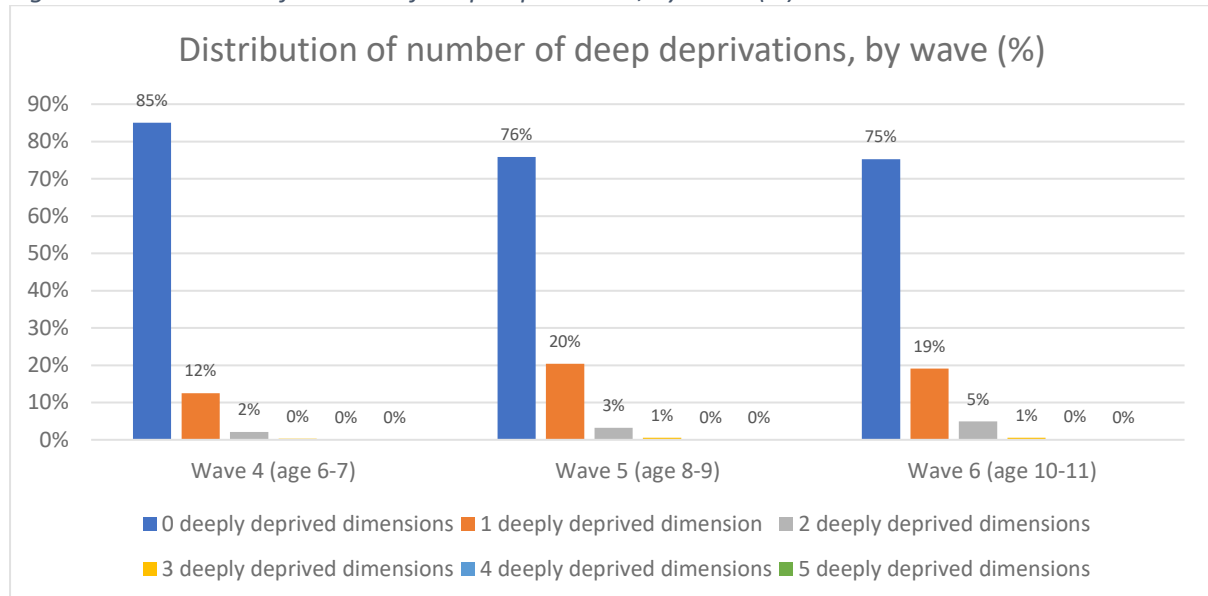
Note: The height of bars reflecting identical percentages may differ due to rounding

4.4 Deprivation of children in population groups that tend to experience greater levels of disadvantage

The deprivation index can be used to compare the Nest outcomes of population groups. The following sections will assess how children with disability, children living in monetary poverty, and children living in jobless families fare in their Nest outcomes compared to their peers. These groups were chosen due to the greater levels of disadvantage they tend to face, as well as policy having a clear role to play in improving their outcomes (Baxter et al., 2012; Redmond et al., 2018). The results found that all three population groups were more likely to experience deprivations in almost all Nest dimensions at some point between age 6 and 11. In particular, children in jobless families were significantly more likely to experience deprivations in more indicators than any other group. At all time points, all groups were significantly more likely to experience multi-dimensional and deep deprivation (with the exception of children with disability at age 6-7).

The deprivation experienced by children who are in a jobless family, as well as in monetary poverty, was assessed, due to the fact that a large majority of children living in a jobless family are also living in monetary poverty. The results indicated that even when controlling for monetary poverty, children in jobless families are more likely to experience deprivation in some indicators, which shows that the poorer outcomes these children experience are not solely caused by monetary factors. Odds ratios and p-values were calculated and can be found in Appendix 7.

4.4.1 Children with disability

> **Key findings**
>
> - At all time points, children with disability were significantly more likely to be living in multi-dimensional deprivation. They were also significantly more likely to be living in deep deprivation at age 8-9 and age 10-11.
> - Children with disability had significantly higher rates of deprivation in their relationships with friends, bullying and social exclusion, financial security, mental health and school attendance.
> - There were no significant differences in their learning environment at home and regular participation in extracurricular activities from age 8.

As noted in Section 3.7.5, children with disability is defined in LSAC as those who have had a medical condition or disability that has lasted six or more months. According to the data, children with disability constituted 5.40% of the population at age 6-7, 4.04% at age 8-9 and 4.41% at age 10-11. Table 15 illustrates that children with disability were significantly more likely to be living in multi-dimensional deprivation at the 1% significance level. Children with disability were more likely to be living in deep deprivation at all time points except at age 6-7.

Table 15: Percentage of children living in multi-dimensional and deep deprivation by disability status and wave

	Wave 4 (age 6-7)		Wave 5 (age 8-9)		Wave 6 (age 10-11)	
	With disability	Without disability	With disability	Without disability	With disability	Without disability
Living in multi-dimensional deprivation	28.87% (***)	19.26%	34.79% (***)	18.04%	38.43% (***)	18.68%
Living in deep deprivation	18.97% (-)	14.73%	36.53% (***)	23.67%	39.61% (***)	24.08%

*** *Significant at 1% significance level using chi-square test*
** *Significant at 5% significance level using chi-square test*
* *Significant at 10% significance level using chi-square test*
- *No significant difference between groups using chi-square test*

Table 16 shows the deprivation rate at the indicator level for children with and without disability at each wave. The findings illustrate that while children are generally engaged and included in the family and home context, they are experiencing significant social exclusion at school and in the community. In at least two time points, children with disability were significantly more likely to be deprived in their relationship with friends, experience bullying and social exclusion at school, experience poorer mental health, not attend school regularly, and have lower school satisfaction. Families of children with disability were significantly more likely to be experiencing financial insecurity at every time point. However, the results also do paint a positive picture, with no significant difference observed in their learning environment at home and in the community from age 8, as well as regular participation in extracurricular activities. Furthermore, children with disability had significantly higher school satisfaction at age 6-7 at the 10% significance level.

Table 16: Deprivation rate by indicator, wave, and disability status (%)

Nest dimension	Indicator	Wave 4 (age 6-7)		Wave 5 (age 8-9)		Wave 6 (age 10-11)	
		With disability	Without disability	With disability	Without disability	With disability	Without disability
Loved and Safe	Relationship with friends	15.00% (-)	11.17%	28.94% (***)	11.74%	24.09% (**)	16.34%
	Relationship with parents (Fun with family at wave 4)	4.10% (-)	3.46%	1.58% (-)	1.05%	8.83% (*)	5.18%
	Frequent yelling at home	N/A	N/A	15.62% (-)	20.20%	17.48% (-)	14.59%
	Frequent bullying or social exclusion	22.04% (-)	21.11%	36.80% (**)	27.98%	30.10% (***)	19.40%
Material Basics	Financial security of family	39.03% (***)	20.59%	38.15% (***)	19.47%	32.22% (***)	18.92%
	Access to computer	14.75% (*)	10.23%	N/A	N/A	N/A	N/A
	Eating breakfast	N/A	N/A	7.96% (-)	4.96%	9.17% (-)	6.82%
	Experience of no place to live	N/A	N/A	4.65% (-)	2.53%	4.10% (-)	2.08%
Healthy	Enjoyment of exercise	4.08% (-)	5.12%	10.80% (-)	7.67%	15.28% (***)	7.31%
	Adequate fruit and vegetables	25.38% (-)	19.92%	20.46% (-)	18.25%	32.19% (-)	25.96%
	Mental health	9.32% (-)	9.42%	19.23% (***)	9.67%	25.03% (***)	13.69%
Learning	School attendance	18.22% (**)	11.26%	16.13% (*)	10.62%	20.24% (***)	9.06%
	School satisfaction	17.50% (*)	23.21%	20.15% (*)	14.40%	18.13% (***)	9.90%
	Parent engagement in learning (wave 4, wave 5) Number of books in home (wave 6)	11.59% (***)	5.47%	8.65% (-)	12.83%	7.09% (-)	7.18%
	Participation in cultural activities	6.77% (**)	3.01%	2.99% (-)	3.90%	3.26% (-)	4.67%

							10.64% (*)	6.24%
Participating	Having a say in family decisions	N/A	N/A	N/A	N/A	10.64% (*)	6.24%
	Having a say within the community	N/A	N/A	N/A	N/A	N/A	N/A
	Regular participation in extracurricular activities	26.18% (***)	16.66%	9.23% (-)	10.33%	9.68% (-)	9.15%
	Sense of belonging	N/A	N/A	N/A	N/A	N/A	N/A

*** *Significant at 1% significance level using chi-square test*
** *Significant at 5% significance level using chi-square test*
* *Significant at 10% significance level using chi-square test*
- *No significant difference between groups using chi-square test*

4.4.2 Children living in monetary poverty

Key findings

- At each time point, children living in monetary poverty were significantly more likely to be living in multi-dimensional deprivation and deep deprivation.
- At each time point, children living in monetary poverty had significantly higher rates of deprivation in all indicators in Material Basics.
- Children living in monetary poverty were more likely to experience deprivation in a number of other indicators including relationship with friends, yelling in the home, enjoyment in exercise, adequate fruit and vegetables, mental health, school attendance, learning at home, and involvement in extracurricular activities.
- This illustrates that the impact of monetary poverty spreads far wider than just material basics, affecting all areas of wellbeing.

As noted in Section 3.7.5, children living in monetary poverty is defined as children living in families with less than 50% of median income. In this analysis, this accounts for 15.73% of children at age 6-7, 14.43% of children at age 8-9 and 13.02% of children at age 10-11. At each time point, children living in monetary poverty were significantly more likely to be living in both multi-dimensional deprivation and deep deprivation, as shown in Table 17.

Table 17: Percentage of children living in multi-dimensional and deep deprivation by monetary poverty status and wave

	Wave 4 (age 6-7)		Wave 5 (age 8-9)		Wave 6 (age 10-11)	
	In poverty	Not in poverty	In poverty	Not in poverty	In poverty	Not in poverty
Living in multi-dimensional deprivation	35.49% (***)	16.84%	36.96% (***)	15.64%	36.46% (***)	17.02%
Living in deep deprivation	29.62% (***)	12.23%	33.84% (***)	22.56%	38.25% (***)	22.74%

*** *Significant at 1% significance level using chi-square test*
** *Significant at 5% significance level using chi-square test*
* *Significant at 10% significance level using chi-square test*
- *No significant difference between groups using chi-square test*

Table 18 presents the percentage deprived in each indicator by monetary poverty status at each wave, indicating the significance level of the difference between those living in monetary poverty compared to those who are not. Given that monetary poverty is closely related to Material Basics, it is unsurprising that children living in monetary poverty were significantly more likely to experience deprivation in all indicators in this dimension compared to children not in monetary poverty. However, as shown in Table 18, children living in monetary poverty are significantly more likely to have deprivations in a number of other indicators, including relationship with friends, frequent yelling in the home (at age 10-11 only), enjoyment in exercise (at age 6-7 and 10-11), eating fruit and vegetables every day, mental health (at age 8-11 only), school attendance, learning at home, participation in cultural activities, and involvement in extracurricular activities

While lack of funds may help explain some of these findings, such as deprivations in adequate fruit and vegetables and regular participation in extracurricular activities, family stresses due to lack of adequate income may be influencing more yelling in the household and parents not having the time to engage their children in learning at home. Furthermore, as children living in monetary poverty are more likely to experience homelessness, this may be resulting in lower school attendance and fewer opportunities for children to regularly engage in extracurricular activities. Research by Skattebol and Redmond (2018) contends that locational disadvantage results in children in poverty having fewer opportunities through out-of-school-activities.

This finding also aligns with research by Warren (2017) who found that monetary poverty in the early years of a child's life has a strong relationship with poor cognitive and social-emotional outcomes later in life. Furthermore, children who had lived in monetary poverty were more likely to experience obesity, have an unhealthy diet, and not exercise regularly. Warren (2017) emphasises that it may not necessarily be low income itself that leads to poorer developmental outcomes, but rather the circumstances that those who live in low-income families find themselves in.

These findings illustrate that the impacts felt by children from their families living below the poverty line spread far wider than just their material basics, affecting all areas of their wellbeing.

Table 18: Deprivation rate by indicator, wave, and monetary poverty status (%)

Nest dimension	Indicator	Wave 4 (age 6-7)		Wave 5 (age 8-9)		Wave 6 (age 10-11)	
		In poverty	Not in poverty	In poverty	Not in poverty	In poverty	Not in poverty
Loved and Safe	Relationship with friends	17.64% (***)	10.21%	19.00% (***)	11.32%	20.56% (*)	16.10%
	Relationship with parents (Fun with family at wave 4)	4.07% (-)	3.39%	1.61% (-)	0.98%	6.08% (-)	5.23%
	Frequent yelling at home	N/A	N/A	20.72% (-)	19.89%	19.73% (***)	13.97%
	Frequent bullying or social exclusion	23.20% (-)	20.78%	28.80% (-)	28.26%	22.75% (-)	19.44%

Category	Indicator						
Material Basics	Financial security of family	40.79% (***)	18.00%	42.44% (***)	16.48%	40.87% (***)	16.31%
	Access to computer	21.27% (***)	8.46%	N/A	N/A	N/A	N/A
	Eating breakfast	N/A	N/A	7.64% (**)	4.65%	10.70% (***)	6.36%
	Experience of no place to live	N/A	N/A	5.12% (***)	2.19%	4.37% (***)	1.84%
Healthy	Enjoyment of exercise	7.03% (*)	4.69%	8.40% (-)	7.69%	10.20% (*)	7.28%
	Adequate fruit and vegetables	25.77% (***)	19.18%	21.49% (*)	17.80%	32.67% (***)	25.27%
	Mental health	11.61% (-)	9.01%	14.27% (***)	9.34%	19.71% (***)	13.37%
Learning	School attendance	15.62% (***)	10.89%	15.71% (***)	10.02%	15.52% (***)	8.66%
	School satisfaction	25.07% (-)	22.50%	13.72% (-)	14.79%	12.75% (-)	9.89%
	Parent engagement in learning (wave 4, wave 5) Number of books in home (wave 6)	10.92% (***)	4.85%	15.94% (**)	12.11%	15.85% (***)	5.87%
	Participation in cultural activities	5.12% (**)	2.86%	5.97% (**)	3.50%	9.79% (***)	3.83%
Participating	Having a say in family decisions	N/A	N/A	N/A	N/A	7.43% (-)	6.29%
	Having a say within the community	N/A	N/A	N/A	N/A	N/A	N/A
	Regular participation in extracurricular activities	33.85% (***)	14.06%	24.33% (***)	7.91%	19.35% (***)	7.65%
	Sense of belonging	N/A	N/A	N/A	N/A	N/A	N/A

*** *Significant at 1% significance level using chi-square test*
** *Significant at 5% significance level using chi-square test*
* *Significant at 10% significance level using chi-square test*
- *No significant difference between groups using chi-square test*

4.4.3 Children in jobless families

Key findings

- At each time point, children in jobless families were significantly more likely to be living in multi-dimensional deprivation and deep deprivation.
- Children in jobless families had significantly higher rates of deprivation across almost all indicators.

As discussed in Section 3.7.5, children living in jobless families are defined as having both parents (or only parent, in the case of single parents) either unemployed or not in the labour force. At age 6-7,

11.00% of children were living in jobless families, decreasing to 9.15% at age 8-9, and sitting at 8.26% at age 10-11. Table 19 shows that at each time point, children in jobless families were significantly more likely to experience both multi-dimensional deprivation and deep deprivation at the 1% significance level.

Table 19: Percentage of children living in multi-dimensional and deep deprivation by whether they live in jobless family and wave (%)

	Wave 4 (age 6-7)		Wave 5 (age 8-9)		Wave 6 (age 10-11)	
	In jobless family	Not in jobless family	In jobless family	Not in jobless family	In jobless family	Not in jobless family
Living in multi-dimensional deprivation	44.30% (***)	16.75%	47.74% (***)	15.79%	48.07% (***)	16.98%
Living in deep deprivation	33.49% (***)	12.67%	39.42% (***)	22.66%	47.71% (***)	22.69%

*** Significant at 1% significance level using chi-square test
** Significant at 5% significance level using chi-square test
* Significant at 10% significance level using chi-square test
- No significant difference between groups using chi-square test

Table 20 presents the deprivation rate for each indicator for children living in jobless and employed families for each wave. Similar to children living in monetary poverty, children in jobless families are significantly more likely to experience deprivations in all Nest dimensions compared to children in employed families. At all time points, they experience deprivation at a significantly higher rate in relationship with their friends, financial security of their family, access to a computer, eating breakfast, homelessness, adequate fruit and vegetables, school attendance, learning through cultural activities, and regular participation in extracurricular activities (where data for all time points exist). The explanation behind this increased likelihood of deprivation extends beyond financial disadvantage, as discussed in the following section,

Table 20: Deprivation rate by indicator, wave, and whether they live in jobless family (%)

Nest dimension	Indicator	Wave 4 (age 6-7)		Wave 5 (age 8-9)		Wave 6 (age 10-11)	
		In jobless family	Not in jobless family	In jobless family	Not in jobless family	In jobless family	Not in jobless family
Loved and Safe	Relationship with friends	23.88% (***)	9.83%	25.96% (***)	11.07%	26.13% (***)	15.83%
	Relationship with parents (Fun with family at wave 4)	5.98% (**)	3.19%	0.40% (-)	1.14%	3.88% (-)	5.47%
	Frequent yelling at home	N/A	N/A	19.10% (-)	20.10%	18.82% (*)	14.35%
	Frequent bullying or social exclusion	23.94% (-)	20.81%	38.10% (***)	27.36%	31.34% (***)	18.84%

Material Basics	Financial security of family	44.77% (***)	18.72%	48.76% (***)	17.35%	46.71% (***)	17.06%
	Access to computer	24.76% (***)	8.71%	N/A	N/A	N/A	N/A
	Eating breakfast	N/A	N/A	9.64% (***)	4.62%	13.67% (***)	6.32%
	Experience of no place to live	N/A	N/A	8.27% (***)	2.04%	7.91% (***)	1.65%
Healthy	Enjoyment of exercise	6.17% (-)	4.92%	9.11% (-)	7.66%	14.10% (***)	7.08%
	Adequate fruit and vegetables	30.08% (***)	18.99%	24.06% (**)	17.76%	38.00% (***)	25.18%
	Mental health	10.96% (-)	9.23%	13.06% (-)	9.75%	26.88% (***)	13.05%
Learning	School attendance	21.36% (***)	10.44%	18.48% (***)	10.07%	18.71% (***)	8.73%
	School satisfaction	27.47% (*)	22.34%	16.59 (-)	14.44%	14.09% (*)	9.91%
	Parent engagement in learning (wave 4, wave 5) Number of books in home (wave 6)	11.38% (***)	5.11%	14.46% (-)	12.48%	14.58% (***)	6.50%
	Participation in cultural activities	8.30% (***)	2.58%	6.91% (**)	3.55%	11.32% (***)	4.00%
Participating	Having a say in family decisions	N/A	N/A	N/A	N/A	9.11% (-)	6.20%
	Having a say within the community	N/A	N/A	N/A	N/A	N/A	N/A
	Regular participation in extracurricular activities	38.69% (***)	14.51%	31.11% (***)	8.18%	27.94% (***)	7.48%
	Sense of belonging	N/A	N/A	N/A	N/A	N/A	N/A

*** *Significant at 1% significance level using chi-square test*
** *Significant at 5% significance level using chi-square test*
* *Significant at 10% significance level using chi-square test*
- *No significant difference between groups using chi-square test*

4.4.3.1 Children in monetary poverty who live in jobless families

> **Key findings**
> - The majority of children who are in jobless families are also living in monetary poverty. However, there are a large proportion of children in monetary poverty who have at least one employed parent.
> - There is a compounding effect of living in monetary poverty, as well as having a jobless family, with children in the 'unemployed poor' having significantly higher deprivation rates than the 'working poor' in relationship with friends, frequent bullying or social exclusion, financial insecurity of the family, homelessness, mental health, and regular participation in extracurricular activities.

As noted in Section 3.7.5, given the expected high level of overlap between children in monetary poverty and children who live in jobless families, the impact of being in both these two groups on Nest outcomes was examined. As shown in Figure 9, the vast majority of children living in jobless families were also living in monetary poverty at each time point. In contrast, a large number of children in monetary poverty had employed parents at each time point.

Figure 9: Overlap between living in a jobless family and living in monetary poverty at wave 4, 5 and 6
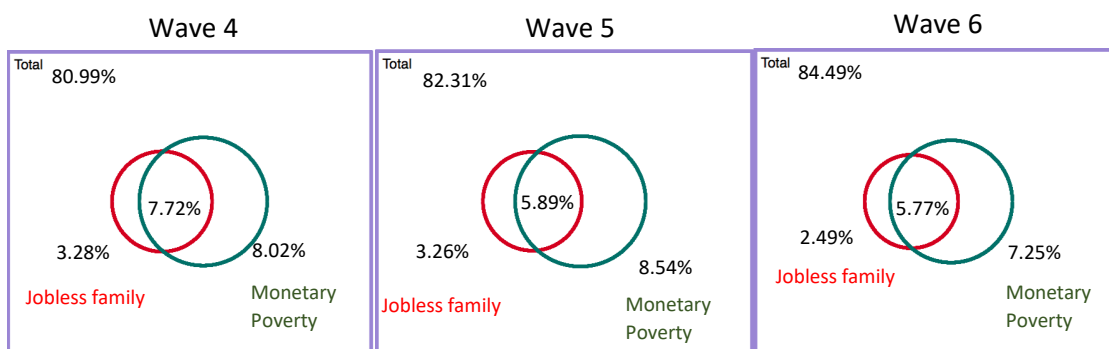
Table 21 examines the deprivation rate for each indicator for children who are both living in monetary poverty, and in a jobless family, and compares this to the deprivation rate for children who are in monetary poverty only and children who are in a jobless family only. It illustrates that there is a compounding effect of being in a jobless family and in monetary poverty, with children in this group being significantly more likely to experience deprivation on a range of indicators compared to children living in monetary poverty but with at least one employed parent. This includes deprivation in relationships with their friends from age 6-9, frequent bullying or social exclusion from age 8-11, financial insecurity from age 8-11, homelessness from age 8-11, mental health at age 10-11, and regular participation in extracurricular activities at all ages. This suggests that living in a jobless family may be driving much of the deprivation for children living in monetary poverty, illustrating that implementing policies to improve the situation of jobless parents would also have indirect effects on children in monetary poverty. There were very few significant differences when comparing children in monetary poverty and in a jobless family to those in a jobless family but not in monetary poverty.

Nest dimension	Indicator	Wave 4 (age 6-7)			Wave 5 (age 8-9)			Wave 6 (age 10-11)		
		Children in poverty and jobless family	Children in poverty only	Children in jobless family only	Children in poverty and jobless family	Children in poverty only	Children in jobless family only	Children in poverty and jobless family	Children in poverty only	Children in jobless family only
Loved and Safe	Relationship with friends	22.00% (**)	13.44%	28.32%	26.15% (***)	14.08%	25.61%	23.63% (-)	18.12%	31.93%
	Relationship with parents (Fun with family at wave 4)	5.40% (-)	2.80%	7.34%	0.27% (**)	2.53%	0.62%	4.58% (-)	7.26%	2.26%
	Frequent yelling at home	N/A	N/A	N/A	17.44% (-)	22.98%	22.09%	18.28% (-)	20.90%	20.08%
	Frequent bullying or social exclusion	23.71% (-)	22.72%	24.50%	35.80% (**)	23.98%	42.25%	30.38% (***)	16.67%	33.58%
Material Basics	Financial security of family	44.62% (-)	37.10%	45.11%	55.55% (***) (^^^)	33.39%	36.49%	47.98% (**)	35.20%	43.76%
	Access to computer	27.12% (***)	15.65%	19.24%	N/A	N/A	N/A	N/A	N/A	N/A
	Eating breakfast	N/A	N/A	N/A	8.24% (-)	7.22%	12.18%	11.99% (-)	9.67%	17.55%
	Experience of no place to live	N/A	N/A	N/A	7.54% (*)	3.45%	9.59%	7.51% (**)	1.87%	8.84%
Healthy	Enjoyment of exercise	6.38% (-)	7.66%	5.69%	8.47% (-)	8.36%	10.28%	12.94% (-)	8.02%	16.78%
	Adequate fruit and vegetables	30.46% (**)	21.25%	29.18%	23.26% (-)	20.28%	25.51%	38.63% (*)	27.92%	36.52%
	Mental health	11.03% (-)	12.17%	10.80%	14.03% (-)	14.44%	11.30%	25.70% (**)	14.93%	29.60%
Learning	School attendance	19.80% (**)	11.59%	25.02%	16.94% (-)	14.86%	21.27%	20.27% (**)	11.74%	15.11%

	School satisfaction	30.13% (**)	20.20%	21.21%	15.47% (-)	12.51%	18.62%	14.11% (-)	11.66%	14.04%
	Parent engagement in learning (wave 4, wave 5) Number of books in home (wave 6)	11.01% (-)	10.84%	12.25%	13.57% (-)	17.58%	16.08%	19.10% (^^^)	13.27%	4.10%
	Participation in cultural activities	6.95% (-)	3.36%	11.47%	7.35% (-)	5.02%	6.11%	14.75% (**) (^^)	5.84%	3.35%
Participating	Having a say in family decisions	N/A	N/A	N/A	N/A	N/A	N/A	8.60% (-)	6.50%	10.29%
	Having a say within the community	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Regular participation in extracurricular activities	42.03% (***) (^)	25.99%	30.86%	32.50% (***)	18.69%	28.60%	27.94% (***)	12.51%	27.92%
	Sense of belonging	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 21: Deprivation rate by indicator, wave, and monetary poverty and jobless family status (%)

*** Significant difference to children living in monetary poverty only at 1% significance level using chi-square test

** Significant difference to children living in monetary poverty only at 5% significance level using chi-square test

* Significant difference to children living in monetary poverty only at 10% significance level using chi-square test

^^^ Significant difference to children living in jobless family only at 1% significance level using chi-square test

^^ Significant difference to children living in jobless family only at 5% significance level using chi-square test

^ Significant difference to children living in jobless family only at 10% significance level using chi-square test

- No significant difference to either population group using chi-square test

The reasons behind why children who are in monetary poverty and jobless families are faring worse in some outcomes, compared to the working poor, are likely to be complex. As illustrated in Table 22, there is little difference in income between children living in a jobless family and in monetary poverty, compared to children living in monetary poverty only. The difference in income was significant only at age 8-9, with the discrepancy being relatively small. Therefore, the explanation behind this goes beyond financial disadvantage, and likely touches on issues such as stigma and social inclusion of the family. Further research would need to explore possible factors for this finding.

Table 22: Average per capita weekly equivalised income by jobless/monetary poverty status and wave ($)

Wave 4 (age 6-7)			Wave 5 (age 8-9)			Wave 6 (age 10-11)		
Children in poverty and jobless family	Children in poverty only	Children in jobless family only	Children in poverty and jobless family	Children in poverty only	Children in jobless family only	Children in poverty and jobless family	Children in poverty only	Children in jobless family only
$250.31 (^^^)	$252.48	$527.06	$268.11 (**) (^^^)	$288.27	$558.48	$272.96 (^^^)	$286.63	$659.29

*** *Significant difference to children living in monetary poverty only at 1% significance level using t-test*
** *Significant difference to children living in monetary poverty only at 5% significance level using t-test*
* *Significant difference to children living in monetary poverty only at 10% significance level using t-test*
^^^ *Significant difference to children living in jobless family only at 1% significance level using t-test*
^^ *Significant difference to children living in jobless family only at 5% significance level using t-test*
^ *Significant difference to children living in jobless family only at 10% significance level using t-test*
- *No significant difference to either population group using t-test*

5   Further Research

This analysis has helped to bring to light more information on the deprivations experienced by Australian children aged between 6 and 11 in all areas of their wellbeing. Further research could apply this measurement tool to uncover deeper insights into the wellbeing of children, as well as develop a tool for other age groups. This includes, but is not limited to:

- Assessing the persistence of deprivation over time using the LSAC B cohort by examining whether deprivation and multi-dimensional deprivation are transient states for children or if they are more permanent over time.
- Assessing the impact of disadvantage in the early years on deprivation later in life.
- Comparing the deprivation of children in other population groups, for example by gender, family type, or life experiences, such as living in out-of-home-care.
- Developing a similar index using the K cohort in LSAC, ranging from age 4-5 in 2004 to 14-15 in 2014.
- Developing an index for future waves in LSAC.

6 Policy Recommendations

The findings illustrated in Section 4 highlight that while around one quarter of children have high wellbeing in all Nest dimensions, there are some specific areas of concern, with certain population groups having a higher likelihood of deprivation than others. This section outlines six policy recommendations based on this evidence that governments and the community sector can use to help improve the wellbeing of Australia's children.

6.1 Increase assistance to low-income families

This analysis has demonstrated that around one in five children at each time point were living in families who had undergone some form of financial hardship in the 12 months leading up to the LSAC survey. Furthermore, we have seen the widespread impact financial disadvantage has on all areas of wellbeing, with children living in monetary poverty being more likely to experience a deprivation in all Nest dimensions.

Increasing financial assistance to low-income families would help in improving the outcomes of children living in these families. Research by the Australian Council of Social Service (2015) examined the adequacy of the welfare system, finding that the vast majority (83%) of people in the study who were receiving Newstart or Youth Allowance found it inadequate to meet living costs, that around half of this group were living in housing stress (spending greater than 25% of their income on housing), and over half reported that they had unsustainable levels of personal debt. While families with children receive Family Tax Benefit Part A, and may also receive Family Tax Benefit Part B, these assist only with the additional costs to the household of having children and do not compensate for the income lost through unemployment.

Increasing Newstart to a more acceptable level that meets current living standards, for example by $75 a week as proposed by Deloitte (2018), would go some way in improving the wellbeing of children in all its dimensions.

6.2 Introduce regulation to reduce the amount of unhealthy food marketing reaching children

Analysis of the deprivation index found that between 18% and 26% of children are not getting an adequate intake of fruit and vegetables. As noted in the report, this is measured by whether the child had any fruit and/or vegetables in the day prior to the survey. Thus, when taking into account recommendations for fruit and vegetable intake by the National Health and Medical Research Council (2013), national figures suggest that this result is substantially worse (Australian Bureau of Statistics, 2018c).

Research has shown that discretionary foods (defined as energy dense and nutrient poor) make up a large proportion of energy intake among both children and adults, with data from the Australian Bureau of Statistics (2014) showing that 39% of children's energy consumption comes from discretionary foods. The latest data from the Australian Bureau of Statistics (2018b) shows that in 2017-18, almost one quarter of Australia's children aged 5-17 years were overweight or obese, and that this has remained largely unchanged over the last ten years. The National Health and Medical Research Council (2013) reports that there has been a significant increase in the prevalence of overweight and obesity over the past few decades, and that this has been influenced by the increased availability and marketing of discretionary foods, urban design, fewer opportunities for physical activity and economic and consumer changes.

Of significant concern to children in particular is the increased marketing of discretionary foods. As found by Cairns, Angus, Hastings, and Caraher (2013), the promotion of food has a direct effect on children's knowledge about nutrition, food preferences, purchase behaviour, consumption patterns and diet-related health. This, amongst other evidence, has led to the World Health Organization (2010) recommending that WHO Member States, which includes Australia, should introduce regulation to reduce children's exposure to the marketing of foods high in saturated fats, trans-fatty acids, free sugars and salt.

Currently, the marketing of unhealthy food to children in Australia is largely self-regulated by food and advertising industries (Obesity Policy Coalition, 2018). Hickey, Mandelbaum, Bloom, and Martin (2018) note a number of failures in this system, including that the industry codes are voluntary, that the codes don't apply to all types of marketing and that children over 14 years, or 12 in some cases, are not protected. A study by Watson, Lau, Wellard, Hughes, and Chapman (2017) evaluated the efficacy of two initiatives implemented in 2009 by the food industry to reduce the marketing of unhealthy food to children. They did this by comparing the food advertising rates shown on television between 2011 and 2015. The results suggested these initiatives had minimal impact on the rate of unhealthy food advertising to children, with no change observed between the two time points.

In light of this evidence, it is recommended that the Government implement regulation that reduces children's exposure to marketing of unhealthy foods. As noted by the Obesity Policy Coalition (2018), such regulation should be: mandatory, applying equally to all marketing of food and beverage products; comprehensive by applying to all forms of marketing, media and promotion; include any marketing that appeals to children either in its content or placement; make a clear definition of 'unhealthy food' by utilising an appropriate nutrient profiling model; apply to all children under 16 years of age at a minimum; and must have strong governance, compliance and enforcement provisions. Such regulation would help to improve the nutrition of Australia's children, resulting in a substantial increase in children's overall wellbeing.

6.3 Introduce evidence-based anti-bullying programs in all Australian schools

As shown in Table 10, between 20% and 28% of children are being bullied or experiencing social exclusion on a regular basis in Australia. Furthermore, certain disadvantaged groups, such as children with disability and children living in jobless families are significantly more likely to experience frequent bullying or social exclusion. The negative impacts of bullying on children have been well-researched. For example, Perren, Dooley, Shaw, and Cross (2010) have found that children who are bullied show significantly higher symptoms of depression.

A study of 25 schools by Rigby and Johnson (2016) found that while all schools had an anti-bullying policy, just over half of children in these schools, and only 35% of parents, were actually aware of the policy. This illustrates that while policies may exist, they are not properly implemented to improve the outcomes of children. A literature review of anti-bullying interventions by NSW Education Centre for Education Statistics & Evaluation (2017) found that there are four characteristics of effective anti-bullying programs. Firstly, they take a holistic approach, recognising that a positive school and community environment will foster positive relationships between peers. Secondly, they imbed educational content into the school curriculum that encourages social and emotional development and teach students appropriate ways to respond to children who are bullying. Thirdly, effective anti-bullying strategies support and provide development to teachers and other school staff on how to help encourage a positive school environment. Finally, effective interventions are systematically implemented and evaluated over time.

While a National Safe Schools Framework exists, outlining nine elements for applying a whole of school approach to address bullying, Rigby and Johnson (2016) found less than half of schools in their study had applied the framework in the development of an anti-bullying policy. Despite this, examples of high-quality interventions which have been shown to improve school culture and decrease bullying exist in the Australian context.

Firstly, the *Friendly Schools* program has been implemented in over 3,500 schools across Australia and aims to prevent bullying while also developing the social skills of students. Between 1999 and 2018, the program has been tested in seven randomised control trials, and nine quasi-experimental studies in more than 400 schools across Western Australia. This research comprised over 35,000 students, their teachers and school leaders (Cross & Barnes, 2014; Cross, Lester, Pearce, Barnes, & Beatty, 2018; Cross et al., 2011; Cross et al., 2003; Cross et al., 2016; Cross et al., 2012). The program has been shown to be effective, with students participating in the program being significantly less likely to be bullied and to bully others than comparison students in non-participating schools (NSW Education Centre for Education Statistics & Evaluation, 2017).

The PEACE Pack is another Australian program that provides resources with modules for teachers, school administrators, counsellors, parents and students to implement in their school or organisation. Evaluations of the program have found that the program results in significant reductions in self-reported victimisation, reductions in children bullying others, increased coping skills, greater feelings of safety at school, greater levels of school belonging and improvements in general wellbeing of students (Slee, 2017).

Lastly, the KidsMatter and MindMatters program, while not directly addressing bullying, provide schools with a framework to adopt a whole of school approach to teach social and emotional learning, engage families in their child's learning, and help support students with mental illness. A number of evaluations have found that the program is effective in improving school culture. These programs have now been merged into a new initiative run by beyondblue, called 'Be You' (beyondblue, 2018).

This illustrates that while a solid evidence base exists for effective anti-bullying strategies, including a national framework, greater investment by government and the community is required to ensure these evidence-based strategies to address bullying are implemented in schools. It is noted that the government is taking steps to reduce the high levels of bullying in Australian schools. For example, the Council of Australian Governments (COAG) is establishing a working group to combat bullying (Council of Australian Governments, 2018). Whether this, and other initiatives, translates into the implementation of more evidence-based anti-bullying programs and reduced incidences of bullying among children in Australia should be monitored into the future.

6.4 Prioritise preventative and early intervention programs to improve the mental health of Australia's infants and children

This report has shown that poor mental health can start early in a child's life, with almost 10% of children aged 6-7 showing signs of social emotional stress. Furthermore, children with more difficult life circumstances, such as children with disability and children living in poverty, are significantly more likely to have mental health concerns. Improving the mental health of Australia's young people has increasingly been recognised as a priority for Australian Governments, for example through the National Support for Child and Youth Mental Health program. The program includes the beyondblue Mental Health in Education initiative, which provides support to teachers and early childhood workers to foster positive social and emotional development, and the Emerging Minds: National Workforce Centre for Child Mental Health, which delivers support to health, social and community

services professionals working with infants, children and their parents to respond to the mental health needs of infants and children (The Hon Greg Hunt MP, 2018). Such investment should continue into the future, with greater priority placed on the prevention of infant and early childhood mental health to stop mental health concerns arising in the first place.

Infant-early childhood mental health is defined by Cohen, Oser, and Quigley (2012) as *"…the developing capacity of the child from birth to 5 years of age to form close and secure adult and peer relationships; experience, manage, and express a full range of emotions; and explore the environment and learn – all in the context of family, community, and culture"* (p1). Poor infant mental health can start as early as the prenatal period which has been recognised as a critical period for child development (Kitzman et al., 2010), and goes on to be heavily influenced by the attachment relationship between an infant and caregiver after birth (Clinton, Feller, & Williams, 2016). Research by Moore et al. (2017) highlights that adverse childhood experiences, such as stress during pregnancy, can impact an infant's behavioural and emotional development, as well as their cognitive development, language development, and physical and neuromuscular maturation. Furthermore, an insecure attachment between a child and their caregiver can result in a greater likelihood of social and emotional maladjustment later in life (Zeanah et al., 1999).

Interventions that seek to improve prenatal maternal health, as well as those that support children living in families who are experiencing adversity, should be prioritised to improve the mental health of Australia's children. Such adversity may include risk factors such as poor parental mental health, parental substance abuse, family conflict and child maltreatment (Toumbourou, Hall, Varcoe, & Leung, 2014). An example of such a program is right@home, which provides sustained nurse home visiting for families who are at risk of poorer parental and child health outcomes. A preliminary evaluation of the program has shown a number of positive outcomes, such as safer family homes, more regular bed time, and warmer and more agreeable parenting practices exhibited by the mother (Goldfeld, Price, & Kemp, 2018). In order to improve the mental health of Australia's children now, and as they progress into adulthood, greater investment should be made into this and similar programs that intervene early in life to improve the mental health of Australia's infants and children.

6.5 Establish a more inclusive education system with adequate resourcing

The analysis found that children with disability were significantly more likely to have deprivations across all Nest dimensions at some point between the ages of 6 and 11. One common theme that emerged from these findings is that children with disability tend to be socially excluded within the community and school environment. Furthermore, children with disability were significantly more likely to be living in a family experiencing financial stress.

Inclusive education with adequate resourcing may help to improve almost all these deprivations that children with disability are significantly more likely to experience. Inclusive education is defined by Queensland Department of Education (2018) as when students *"can access and fully participate in learning, alongside their similar-aged peers, supported by reasonable adjustment and teaching strategies tailored to meet their individual needs. Inclusion is embedded in all aspects of school life, and is supported by culture, policies and every day practices"* (p4).

Hehir et al. (2016) compiled evidence on the benefits of inclusive education to students with and without disability through a systematic review of 280 studies in 25 countries. They found that children with disabilities who are included in mainstream education *"develop stronger skills in reading and mathematics, have higher rates of attendance, are less likely to have behavioural problems, and are more likely to complete secondary school than students who have not been included"* (p2). Furthermore, they report that some studies found inclusion of children with disability

into mainstream education resulted in children without disability holding less prejudicial views and being more accepting of others.

A review of inclusive education in Australia by Forlin, Chambers, Loreman, Deppeler, and Sharma (2013) found that while all jurisdictions offer full inclusion into mainstream education, from primary through to secondary school, students' ability to access this differs both within and across jurisdictions. Anderson and Boyle (2015) observed similar results, finding that all eight jurisdictions are administering inclusive education in different ways, leading to inconsistent access and outcomes for students across the country.

It should be noted that any policy to include children with disability in mainstream education needs to be accompanied with adequate structural changes alongside adequate resourcing. As noted by Hehir et al. (2016) *"…placing students with disabilities within mainstream classes without accompanying structural changes to, for example, organisation, curriculum and teaching and learning strategies, does not constitute inclusion. Furthermore, integration does not automatically guarantee the transition from segregation to inclusion." (p3)*

In light of this evidence, we recommend that the Australian Government adopt a national approach to establishing a more inclusive education system with adequate resourcing. While the National School Resourcing Board, established by the Australian Government, will soon be reviewing additional funding for students with disability (Australian Government Department of Education and Training, 2018), it is strongly recommended that this be done alongside structural changes to improving inclusivity in schools. Doing so in an evidence-based manner will help to improve the social inclusion of children within the school and community, leading to lower rates of bullying, greater peer relationships, and better learning opportunities. Furthermore, this may have flow-on effects to improve the financial security of parents by enabling them to more easily access the labour market.

6.6 Collect better data on children and young people in Australia

Good children's policy relies on good data. Without a deep understanding of what the major issues facing the wellbeing of children are, we cannot hope to develop good policy. Furthermore, Australia has an international obligation to accurately collect data under both the Convention for the Rights of the Child and the Sustainable Development Goals. Therefore, greater investment needs to be made in collecting better data on children, and to ensure that their voices are heard through such collections. As noted by the National Children's Commissioner (2014):

> *"The ABS Census and a range of health and wellbeing data is not presented in ways that relate to the policy development needs of children and young people relative to their age and development stages…Some of the basic information, required to monitor the wellbeing of Australia's children and young people is not available. Too often, the administrative datasets which are available reflect the operations of various programs rather than measures of actual wellbeing." (p26-27)*

To enhance the availability of regular, good-quality quantitative data on children in Australia, the following recommendations are made:

1. Implement a repeated cross-sectional survey of children and young people in Australia

To measure improvements in wellbeing over time, it is vital that a survey is regularly conducted on a fixed age group and responded to by children. This survey should capture all elements of wellbeing as identified in the Nest framework.

While the Longitudinal Study of Australian Children has a broad range of information available on the wellbeing of children and allows for trends over the life-course to be examined, it is not a replacement for a robust, regular collection of cross-sectional data from children. Its narrow age ranges at each wave mean that we can only measure the wellbeing of children at a single age range at each wave.

Particular attention should be paid to areas for which data tends to be lacking, such as elements of having a positive sense of identity and culture and participating in society. Furthermore, the survey should seek to ensure adequate representation of population groups that tend to be under-represented in surveys, such as Aboriginal and Torres Strait Islander children and children with disability.

2. Introduce a new birth cohort study to capture experiences of the next generation of Australian Children

The Longitudinal Study of Australian Children (LSAC) was initiated in 2004 with a cohort of children aged 0-1 (B cohort) and children in kindergarten aged 4-5 (K cohort). This rich source of data has provided deeper insights into the developmental outcomes of children and their life trajectories. However, a significant data gap now exists for the next generation of children, who are not represented in a national longitudinal study. To ensure that the impact of policy and the changing nature of wellbeing is measured over time, it is important that we gather data over time from a new cohort of children.

Given the vast amount of change our society has experienced over the past 15 years since LSAC was initiated, Western, Haynes, Baffour, and Perales (2014) highlight the need for a new Australian birth cohort study to make cross-generational comparisons. They note that 12-15 years is the optimal time interval between birth cohort studies to do this, which emphasises that Australia is now almost overdue for a new study to be implemented. A new birth cohort study should also include adequate representation of Aboriginal and Torres Strait Islander children that allows for nationally representative data to be drawn.

3. Review the alignment of LSAC data items to the Nest

As noted in Section 3.4, there are a number of gaps in the index for which an adequate indicator in LSAC could not be found. For some age groups, this may simply reflect that this question isn't appropriate to be asked, however, for others, it is noted as a data gap. For example, children's access to the basic goods they deem necessary, such as toys, games and computers, could be asked at any age and children's ability to have a say within the community could be asked of the older cohort. In particular, more questions related to the dimensions of Participating and Positive Sense of Identity and Culture should be asked. These recommendations are further elaborated in Section 3.4.

These three recommendations will help bring to light a deeper understanding of the issues affecting children and young people, the ability to implement more effective policy, and, finally, to enable policy-makers and researchers to accurately evaluate the impact policies and programs have on children and young people.

7   Conclusion

This study has filled a research gap by developing an index of child deprivation based on an evidence-based framework, the Nest. By applying the UNICEF MODA methodology, we can now holistically examine, at a broad level, all aspects of a child's wellbeing using a simple tool. The findings illustrate that, while around one-quarter of children at each time point had high wellbeing in all Nest dimensions, there are pockets of deprivation with around 20% of children experiencing multi-dimensional deprivation and between 14% and 25% experiencing deep deprivation within a Nest dimension at each time point. When examining three population groups that tend to experience greater disadvantage; children in monetary poverty, children with disability and children living in jobless families, all groups were found to be more likely to experience deprivations, when compared to their peers, in indicators across all Nest dimensions in at least one time point.

Having such varied information about the wellbeing of children in one index allows us to more easily determine key concerns for children in Australia. While the findings highlight a number of issues, we have presented six opportunities that will help to improve the wellbeing of Australia's children. These are:

1. Increase assistance to low-income families
2. Introduce regulation to reduce the amount of unhealthy food marketing reaching children
3. Introduce evidence-based anti-bullying programs in all Australian schools
4. Prioritise preventative and early intervention programs to improve the mental health of Australia's infants and children
5. Establish a more inclusive education system with adequate resourcing
6. Collect better data on children and young people in Australia

The evidence suggests that implementing these policy recommendations will result in significant improvements to all aspects of a child's wellbeing, and will expand the opportunities available to them. With better data collection, we hope to be able to measure these improvements into the future.

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Appendix 1 – Indicators and cut-off points for wave 4

Indicator or scale	Questions and LSAC variable names	Response format	Cut-off point
Strengths and Difficulties Questionnaire peer problems scale	Please rate the following child's behaviours over the past 6 months: dse03a5a Rather solitary, tends to play alone dse03a5b Has at least one good friend (Reverse coded) dse03a5c Generally liked by other children (Reverse coded) dse03a5d Picked on or bullied by other children dse03a5e Gets on better with adults than with other children.	1. Not true 2. Somewhat true 3. Certainly true	Responses were scored according to the Strengths & Difficulties Questionnaire scoring criteria. Not true = 0 points, Somewhat true = 1 point, Certainly true = 2 points (reverse coded where noted). Responses were summed, and any child with a score of 4 or over (reflecting children who have high/very high levels of peer problems) was identified as deprived. Respondents who did not answer more than one-third of questions were automatically considered not deprived.
How often do you have fun with your family at the weekends?	dre08c2 How often do you have fun with your family at the weekends?	1. Lots of time 2. Sometimes 3. Hardly ever	Children who report 'hardly ever' were identified as deprived. Children who did not respond to this question were automatically considered not deprived.
Peers scale	dpc58d1 Are the children at school nice to you? dpc58d2 Do the children at school pick on you? (reverse coded) dpc58d3 Do the children at school ask you to play with them?	1. Yes 2. Sometimes 3. No	A child was flagged as deprived if: • Child responded '3 No' to dpc58d1 • Child responded '1 Yes' to dpc58d2 • Child responded '3 No' to dpc58d3 Children who did not respond to any question were automatically flagged as not deprived.
Hardship scale	In the last 12 months, have any of these happened to you/members of this household because any of you were short of money? dfn07a1 Could not pay gas, electricity or telephone bills on time? dfn07a2 Could not pay the mortgage or rent payments on time? dfn07a3 Went without meals? dfn07a4 Were unable to heat or cool your home? dfn07a5 Pawned or sold something because you needed cash? dfn07a6 Sought assistance from a welfare or community organisation? dfn07a8 Were unable to send your child to excursion/ extra-curricular activities/ tutoring as much as you would like?	1. Yes 0. No (-2 Don't know) (-3 Refused)	No established cut-off exists, child was flagged as deprived if parents had experienced any financial hardship. Children of parents who did not respond to any item were automatically flagged as not deprived.
Does study child have access to a computer at home?		1 Yes 2 No	Child was flagged as deprived in this item if parents reported that the study child did not have access to a computer at home. Children who did not respond to this item were automatically flagged as not deprived
How much does study child enjoy physical activity or exercise?	dhb14c3 How much does study child enjoy physical activity or exercise?	1 Very much dislikes activity 2 Somewhat dislikes activity 3 Neutral	No cut-off point established in the literature. Child was identified as deprived if reported that they 'very much dislike' or 'somewhat dislike' physical activity or exercise. Children who did not respond to this question were automatically flagged as not deprived.

Indicator or scale	Questions and LSAC variable names	Response format	Cut-off point
		4 Somewhat enjoys activity 5 Very much likes activity (-2 Don't know)	
How often did child have fresh fruit, cooked vegetables or raw vegetables/salad in the last 24 hours?	dhb21a1a1 In the last 24 hours how often did child have fresh fruit? dhb21a1b1 In the last 24 hours how often did child have cooked vegetables? dhb21a1c1 In the last 24 hours how often did child have raw vegetables or salad?	0 Not at all 1 Once 2 Twice 3 3 or more times (-2 Don't know)	Children were identified as deprived if they did not eat fresh fruit at all in the last 24 hours, or if they didn't eat any vegetables/salad. While the National Health and Medical Research Council (2013) specifies serving portions that children require, this cannot be determined through the possible responses in the data. Children of parents who did not respond to any item were automatically flagged as not deprived.
Social emotional problems scale	dse07a How often do you feel happy? (reverse coded) dse07b How often do you get scared or worried? dse07c How often do you feel sad? dse07d How often do you get angry or mad?	1 Lots of times 2 Sometimes 3 Hardly ever	A score for each child was calculated by tabulating the mean score where Lots of times = 1, Sometimes = 2 and Hardly ever = 3 (reverse coding where necessary). A child is identified was deprived if the mean score was less than 2. Children who did not respond to more than one-third of questions were automatically flagged as not deprived.
During the previous four weeks of school, how many days has study child been absent?	dpc48a1a During the previous four weeks of school, how many days has study child been absent?	Number 0-20	There is no established cut-off point for school attendance, and furthermore, Hancock et al. (2013) emphasise that a cut-off point cannot be determined as every additional day missed of school impacts on a child's educational outcomes. A cut-off point of 4+ days in the previous 4 weeks, averaging once per week, was used, as this amount infers a degree of regularity in missing school.
School liking and avoidance scale	*Liking* dpc58a1 Is school fun? dpc58a2 When you get up in the morning, do you feel happy about going to school? dc58a3 Are you happy when you are at school? *Avoidance* dpc58b1 Do you wish you didn't have to go to school? dpc58b2 Do you like maths and number work at school? (reverse coded) dpc58b3 Do you like reading? (reverse coded) dpc58b4 Do you like writing? (reverse coded) dpc58b5 Do you think you are good at your school work? (reverse coded) dpc58b6 Do you feel happier when it's time to go home from school? dpc58b7 Do you ask your mum or dad to let you stay home from school?	1 Yes 2 Sometimes 3 No	No established cut-off for either scale exists. A mean score for each child (and each scale) was calculated by taking the mean where Yes = 1, Sometimes = 2 and No = 3. A child was deprived in 'school liking' if their mean score was greater than 2 and deprived in 'school avoidance' if their mean score was less than 2 (reverse coding where necessary). A child was flagged as deprived in school satisfaction if they were deprived in either school liking or avoidance. Children who did not respond to one-third of items for either scale were automatically flagged as not deprived in that scale.
Home activities index	In the past week, on how many days have you or an adult in your family (Exclude older siblings or adults not living with the study child)?	0 Not in the past week 1 1 or 2 days	A score for total number of days parents participated in an activity with their child in the past week was calculated, where the mid-point of each range was

Indicator or scale	Questions and LSAC variable names	Response format	Cut-off point
	dhe02a1d Read with child from a book? dhe02a2d Told child a story, not from a book? dhe02a3d Drawn pictures or did other art or craft activities with child? dhe02a4d Played music, sang songs, danced or did other musical activities with child? dhe02a5d Played with toys or games indoors, like dolls or toy cars with child? he02a6d Involved child in everyday activities at home, such as cooking or caring for pets? hde02a7d Played a game outdoors or exercised together like walking, swimming, cycling?	2 3-5 days 3 6-7 days	used in the calculation to determine the number of days. A child was flagged as deprived if they had participated in, on average, less than one activity per day in the last 7 days. Children of parents who did not respond to more than one-third of items were automatically flagged as not deprived.
Out of home activities index	In the past month, has child done any of these things with you or another family member? dhe05a1a Gone to a movie? dhe05a2a Gone to a playground or a swimming pool? dhe05a1b Gone to a sporting event in which child was not a player? dhe05a3 Gone to a concert, play, museum, art gallery or community or school event? dhe05a4 Attended a religious service, church, temple, synagogue or mosque? dhe05a5 Visited a library?	0 No 1 Yes	Children were flagged as deprived in this indicator if they had not done any of these activities in the past month. Children of parents who did not respond to any item were automatically flagged as not deprived.
Extracurricular activities	In the last 12 months, has study child regularly participated in any of the following activities? dhe09a1a Community group or club (e.g. scouts, guides, or cultural group) dhe09a2a Team sport (e.g. football, cricket or netball) dhe09a3a Individual sport, coached or lessons (e.g. swimming, tennis, karate or gymnastics) dhe09a4a Art, music or performance lessons (e.g. piano, dance, choir or drama) dhe09a5a Classes to improve academic skills (e.g. remedial reading or extra tutoring) dhe09a6a Classes to learn new skills (e.g. computing or learning another language) dhe09a7a Religious services or classes dhe09a8a Other (specify)	0 No 1 Yes	Children were flagged as deprived in this item if they had not participated in any of these activities in the past 12 months. Parents of children who did not respond to any item were automatically flagged as not deprived.

Appendix 2 – Indicators and cut-off points for wave 5

Indicator or scale	Questions and LSAC variable names	Response format	Cut-off point
Strengths and Difficulties Questionnaire peer problems scale	Please rate the following child's behaviours over the past 6 months: ese03a5a Rather solitary, tends to play alone ese03a5b Has at least one good friend (Reverse coded) ese03a5c Generally liked by other children (Reverse coded) ese03a5d Picked on or bullied by other children ese03a5e Gets on better with adults than with other children.	1. Not true 2. Somewhat true 3. Certainly true	Responses were scored according to the Strengths & Difficulties Questionnaire scoring criteria. Not true = 0 points, Somewhat true = 1 point, Certainly true = 2 points (reverse coded where noted). Responses were summed, and any child with a score of 4 or more (reflecting children who have high/very high levels of peer problems) was identified as deprived. Children of parents who did not answer more than one-third of questions were automatically considered not deprived.
Enjoyment of time spent with parents and ability to ask for help	epa21a2 Do you enjoy spending time with your mum? epa21a5 If you had a problem could you ask your mum for help? epa21b2 Do you enjoy spending time with your dad? epa21b5 If you had a problem could you ask your dad for help?	1 Definitely true 2 Mostly true 3 Mostly not true 4 Definitely not true	No established cut-off point exists. Average of scores were taken where Definitely true = 1, Mostly true = 2, Mostly not true = 3, Definitely not true = 4. Child was flagged as deprived if the mean of their scores was greater than 2.5. Children who did not respond to any items were automatically flagged as not deprived.
How often do people in your family yell at each other?	ese12b How often do people in your family yell at each other?	1 Never 2 Hardly ever 3 Sometimes 4 Often 5 Always	No established cut-off point exists. Children were flagged as deprived in this indicator if they reported 'Often' or 'Always'. Children who did not respond to this item were automatically flagged as not deprived.
Bullying and victimisation	I am going to read out some sentences and I want you to tell me how often these things happen. During the past month at school… epc58f1 Kids hit or kicked you on purpose epc58f2 Kids grabbed or shoved you on purpose epc58f3 Kids threatened to hurt you or take your things epc58f4 Kids said mean things to you or called you names epc58f5 Kids tried to keep others from being your friend epc58f6 Kids stopped you from joining in what they were doing epc58f7 Kids sent you a mean text message/email; or posted mean things about you on the Internet e.g. on Facebook, Myspace	1 Never 2 Once or twice 3 About once a week 4 Several times a week	Children were flagged as deprived if they had experienced any of these events regularly in the past month, so therefore answered '3 About once a week' or '4 Several times a week' to any. Children who did not respond to any item were automatically flagged as not deprived.
Hardship scale	In the last 12 months, have any of these happened to you/members of this household because any of you were short of money? efn07a Could not pay gas, electricity or telephone bills on time? efn07b Could not pay the mortgage or rent payments on time? efn07c Went without meals? efn07d Were unable to heat or cool your home? efn07e Pawned or sold something because you needed cash? efn07f Sought assistance from a welfare or community organisation?	1. Yes 0. No (-2 Don't know)	No established cut-off exists. A child was flagged as deprived if parents had experienced any financial hardship in the last 12 months. Children were automatically flagged as not deprived if parents didn't respond to any item.

Indicator or scale	Questions and LSAC variable names	Response format	Cut-off point
	efn07i Were unable to send your child to excursion/ extra-curricular activities/ tutoring as much as you would like?		
Did child eat breakfast today?	ehb22a Did study child eat breakfast today?	1 Yes 2 No	Children were identified as deprived if their parent reported they did not eat breakfast today. Children were automatically flagged as not deprived if parents didn't respond to this item.
Experience of no place to live	In the last two years, have you experienced any of these things because you did not have a permanent place to live? eho11p1b Stayed with relatives eho11p1c Stayed at a friend's house eho11p1d Stayed in a caravan eho11p1e Stayed at a boarding house/hostel eho11p1f Stayed in a refuge/shelter (e.g. night shelter, shelter for homeless, women's shelter) eho11p1g Slept rough (including squatted in an abandoned building, sleeping in cars, tents) eho11p1h Other	0 No 1 Yes	Child was identified as deprived if parents reported having experienced any of these things in the past two years. Children were automatically flagged as not deprived if parents didn't respond to any item.
How much does study child enjoy physical activity or exercise?	ehb14c3 How much does study child enjoy physical activity or exercise?	1 Very much dislikes activity 2 Somewhat dislikes activity 3 Neutral 4 Somewhat enjoys activity 5 Very much likes activity (-2 Don't know)	No cut-off point established in the literature. A child was identified as deprived if they reported that they 'very much dislike' or 'somewhat dislike' physical activity or exercise.
How often did child have fresh fruit, cooked vegetables or raw vegetables/salad in the last 24 hours?	ehb21a1a1 In the last 24 hours how often did child have fresh fruit? ehb21a1b1 In the last 24 hours how often did child have cooked vegetables? ehb21a1c1 In the last 24 hours how often did child have raw vegetables or salad?	0 Not at all 1 Once 2 Twice 3 3 or more times (-2 Don't know)	Children were identified as deprived if they did not eat fresh fruit at all in the last 24 hours, or if they didn't eat any vegetables/salad. While the National Health and Medical Research Council (2013) specifies serving portions that children require, this cannot be determined through the possible responses in the data. Children were automatically flagged as not deprived if parents didn't respond to any item.

Indicator or scale	Questions and LSAC variable names	Response format	Cut-off point
Social emotional problems scale	ese07a How often do you feel happy? (reverse coded) ese07b How often do you get scared or worried? ese07c How often do you feel sad? ese07d How often do you get angry or mad?	1 Lots of times 2 Sometimes 3 Hardly ever	A score for each child was calculated by tabulating the mean score where Lots of times = 1, Sometimes = 2 and Hardly ever = 3 (reverse coding where necessary). A child was identified as deprived if the mean score was less than 2. Children who didn't respond to more than one-third of items were automatically flagged as not deprived.
During the previous four weeks of school, how many days has study child been absent?	epc48a1a During the previous four weeks of school, how many days has study child been absent?	Number 0-20	There is no established cut-off point for school attendance, and furthermore, Hancock et al. (2013) emphasise that a cut-off point cannot be determined as every additional day missed of school impacts on a child's educational outcomes. A cut-off point of 4+ days in the previous 4 weeks was established, averaging once per week, as this amount infers a degree of regularity in missing school.
School liking and avoidance scale	epc58a1 Is school fun? epc58a2 When you get up in the morning, do you feel happy about going to school? epc58a3 Are you happy when you are at school? epc58a4 Do you like being in school? epc58a5 Do you hate school? (reverse coded) *Avoidance* epc58b1 Do you wish you didn't have to go to school? epc58b2 Do you like maths and number work at school? (reverse coded) epc58b5 Do you think you are good at your school work? (reverse coded) epc58b6 Do you feel happier when it's time to go home from school? (reverse coded) epc58b7 Do you ask your mum or dad to let you stay home from school? (reverse coded) epc58b8 Do you like reading and writing activities at school? (reverse coded)	1 Yes 2 Sometimes 3 No	No established cut-off for either scale exists. A mean score for each child (and each scale) was calculated by taking the mean where Yes = 1, Sometimes = 2 and No = 3. A child was flagged as deprived in 'school liking' if their mean score was greater than 2 and they were flagged as deprived in 'school avoidance' if their mean score was less than 2 (reverse coding where necessary). A child was flagged as deprived in school satisfaction if they were deprived in either school liking or avoidance. Children who did not respond to one-third of items for either scale were automatically flagged as not deprived in that scale.
Home activities index	In the past week, on how many days have you or an adult in your family… ehe02a1d Read with child from a book ehe02a2d Told child a story, not from a book? ehe02a3d Drawn pictures or done other art or craft activities with child? ehe02a4d Played music, sang songs, danced or done other musical activities with child? ehe02a5d Played with toys or games indoors, like dolls or toy cars with child? ehe02a6d Involved child in everyday activities at home, such as cooking or caring for pets? ehe02a7d Played a game outdoors or exercised together like walking, swimming, cycling?	0 Not in the past week 1 1 or 2 days 2 3-5 days 3 6-7 days	A score for total number of days parents participated in an activity with their child in the past week was calculated, where the mid-point of each range was used in the calculation to determine the number of days. A child was flagged as deprived if they had participated in, on average, less than one activity per day in the last 7 days. Children of parents who did not respond to more than one-third of items were automatically flagged as not deprived.
Out of home activities index	In the past month, has child done any of these things with you or another family member? ehe05a1a Gone to a movie? ehe05a2 Gone to a playground or a swimming pool? ehe05a1b Gone to a sporting event in which child was not a player? ehe05a3 Gone to a concert, play, museum, art gallery or community or school event? dhe05a4 Attended a religious service, church, temple, synagogue or mosque?	0 No 1 Yes	Children were flagged as deprived in this indicator if they had not done any of these activities in the past month. Children were automatically flagged as not deprived if their parents did not answer any item.

Indicator or scale	Questions and LSAC variable names	Response format	Cut-off point
	dhe05a5 Visited a library?		
Extracurricular activities	In the last 12 months, has study child regularly participated in any of the following activities? ehe09a1a Community group or club (e.g. scouts, guides, or cultural group) ehe09a2a Team sport (e.g. football, cricket or netball) ehe09a3a Individual sport, coached or lessons (e.g. swimming, tennis, karate or gymnastics) ehe09a4a Art, music or performance lessons (e.g. piano, dance, choir or drama) ehe09a5a Classes to improve academic skills (e.g. remedial reading or extra tutoring) ehe09a6a Classes to learn new skills (e.g. computing or learning another language) ehe09a7a Religious services or classes ehe09a8a Other (specify)	0 No 1 Yes	Children were flagged as deprived in this item if they had not participated in any of these activities in the past 12 months. Children were automatically flagged as not deprived if their parents did not respond to any item.

Appendix 3 – Indicators and cut-off points for Wave 6

Indicator or scale	Questions and LSAC variable names	Response format	Cut-off point
Strengths and Difficulties Questionnaire peer problems scale	Please give your answers on the basis of how things have been for you over the last six months. fse03c5a Rather solitary, tends to play alone fse03c5b Has at least one good friend (Reverse coded) fse03c5c Generally liked by other children (Reverse coded) fse03c5d Picked on or bullied by other children fse03c5e Gets on better with adults than with other children.	1. Not true 2. Somewhat true 3. Certainly true	Responses were scored according to the Strengths & Difficulties Questionnaire scoring criteria. Not true = 0 points, Somewhat true = 1 point, Certainly true = 2 points (reverse coded where noted). Responses were summed, and any child with a score of 4 or over (reflecting children who have high/very high levels of peer problems) was identified as deprived. Children who did not respond to one-third of items are automatically flagged as not deprived.
Trust and Communication Scale	fre09a My parents accept me as I am. fre09b My parents understand me. fre09c I trust my parents. fre09d I can count on my parents to help me when I have a problem. fre09e My parents pay attention to me. fre09f I talk with my parents when I have a problem. fre09g If my parents know that something is bothering me, they ask me about it. fre09h I share my thoughts and feelings with my parents	1. Almost never or never true 2. Sometimes true 3. Often true 4. Almost always or always true	No established cut-off point exists. A score for each child was tabulated by taking the mean score where 'Almost never or never true' = 1, 'Sometimes true' = 2, 'Often true' = 3 and 'Almost always or always true' = 4. Children with a mean score of less than 2.5 were identified as deprived. Children who did not respond to more than one-third of questions are automatically flagged as not deprived.
How often do people in your family yell at each other?	fre08c How often do people in your family yell at each other?	1 Never 2 Hardly ever 3 Sometimes 4 Often 5 Always	No established cut-off point exists. Children were flagged as deprived in this indicator if they report 'Often' or 'Always'. Children who did not respond to this item are automatically flagged as not deprived.
Bullying and victimisation	How many times did these things happen during the last month? fre22a2 kids hit or kicked me on purpose fre22b2 kids grabbed or shoved me on purpose fre22c2 kids threatened to hurt me fre22d2 kids threatened to take my things fre22e2 kids said mean things to me or called me names fre22f2 kids tried to keep others from being my friend fre22g2 kids did not let me join in what they were doing fre22h2 kids used force to steal something from me fre22i2 kids hurt me or tried to hurt me with a weapon fre22j2 kids stole my things to be mean to me fre22k2 kids forced me to do something I didn't want to do	1 Never 2 Once or twice 3 About once a week 4 Several times a week	Children were flagged as deprived if they had experienced any of these events regularly in the past month, so therefore answered '3 About once a week' or '4 Several times a week' to any. Children who did not respond to any item were automatically flagged as not deprived.
Hardship scale	In the last 12 months, have any of these happened to you/members of this household because any of you were short of money? ffn07a Could not pay gas, electricity or telephone bills on time? ffn07b Could not pay the mortgage or rent payments on time?	0 No 1 Yes	No established cut-off exists. A child was flagged as deprived if parents had experienced any financial hardship. Children were automatically flagged as not deprived if their parents did not respond to any item.

	ffn07c Went without meals? ffn07d Were unable to heat or cool your home? ffn07e Pawned or sold something because you needed cash? ffn07f Sought assistance from a welfare or community organisation? ffn07i Were unable to send your child to excursion/ extra-curricular activities/ tutoring as much as you would like?		
Did you have breakfast today?	fhb22c Did you have breakfast today?	1 Yes 2 No	Children were identified as deprived if they reported they did not eat breakfast today. Children were automatically flagged as not deprived if they did not respond to this item.
Experience of no place to live	In the last two years, have you experienced any of these things because you did not have a permanent place to live? fho11a1b Stayed with relatives fho11a1c Stayed at a friend's house fho11a1d Stayed in a caravan fho11a1e Stayed at a boarding house/hostel fho11a1f Stayed in a refuge/shelter (e.g. night shelter, shelter for homeless, women's shelter) fho11a1g Slept rough (including squatted in an abandoned building, sleeping in cars, tents) fho11a1h Other	0 No 1 Yes	A child was flagged as deprived if parents reported having experienced any of these things in the past two years. Children were automatically flagged as not deprived if their parents did not respond to any item.
How much do you enjoy being physically active (doing things like sports, active games, walking, running or swimming)?	fhb14c5 How much do you enjoy being physically active (doing things like sports, active games, walking or running, swimming)?	1. A lot 2. Quite a lot 3. Not very much 4. Not at all	No cut-off point established in the literature. A child was identified as deprived if they don't enjoy being physically active at all, or not very much. Item is reported on by the child for this wave. Children who did not respond to this item were automatically flagged as not deprived.
How often did you have fresh fruit, cooked vegetables or raw vegetables/salad yesterday?	Thinking about yesterday, how often did you have… fhb21c1a1 fresh fruit? fhb21c1b1 In the last 24 hours how often did child have cooked vegetables? fhb21c1c1 In the last 24 hours how often did child have raw vegetables or salad?	0 Not at all 1 Once 2 Twice 3 More than twice	Children were identified as deprived if they did not eat fresh fruit at all in the last 24 hours, or if they didn't eat any vegetables/salad. While the National Health and Medical Research Council (2013) specifies serving portions that children require, this cannot be determined through the possible responses in the data. Children who did not respond to any item are automatically flagged as not deprived.
Social Difficulties Questionnaire Emotional Problems Scale	fse03c3a I get a lot of headaches, stomach-aches or sickness fse03c3b I worry a lot fse03c3c I am often unhappy, depressed or tearful fse03c3d I am nervous in new situations. I easily lose confidence fse03c3e I have many fears. I am easily scared	1. Not true 2. Somewhat true 3. Certainly true	A score for each child was calculated by summing the scores for each question where Not true = 1, Somewhat true = 2 and Certainly true = 3. A child was identified as deprived if the summed score is greater than or equal to 6, as in the cut-off for SDQ score guidelines. Children who did not respond to one-third of items are automatically flagged as not deprived.

During the previous four weeks of school, how many days has study child been absent?	fpc48a1a During the previous four weeks of school, how many days has study child been absent?	Number 0-20	There is no established cut-off point for school attendance, and furthermore, Hancock et al. (2013) emphasise that a cut-off point cannot be determined as every additional day missed of school impacts on a child's educational outcomes. A cut-off point of 4+ days in the previous 4 weeks was used, averaging once per week, as this amount infers a degree of regularity in missing school.
School adjustment scale	fpc58a1a I feel happy. fpc58a1b I really like to go to each day. fpc58a1c I find that learning is a lot of fun. fpc58a1d I feel safe and secure. fpc58a1e I like learning. fpc58a1f I get enjoyment from being there. fpc58a1g The work we do is interesting. fpc58a1h I like to ask questions in class. fpc58a1i I like to do extra work. fpc58a1j I enjoy what I do in class. fpc58a1k I always try to do my best. fpc58a1l I get excited about the work we do.	1. Strongly disagree 2. Disagree 3. Agree 4. Strongly agree	No established cut-off for either scale exists. A mean score for each child (and each scale) was calculated by taking the mean where Strongly disagree = 1, Disagree = 2, Agree = 3 and Strongly agree = 4. A child was flagged as deprived in 'school liking' if their mean score was less than 2.5. Children were automatically flagged as not deprived if they did not respond to more than one-third of items.
Number of books in home	fhe04 About how many books does study child have in your home now, including any library books?	0. None 1. 1-10 2. 11-20 3. 21-30 4. More than 30	No established cut-off point exists. A child was flagged as deprived if they reported having fewer than 11 books in the house. Children were automatically flagged as not deprived if their parents did not respond to this item.
Out of home activities index	In the past month, has child done any of these things with you or another family member? fhe05a1a Gone to a movie? fhe05a2 Gone to a playground or a swimming pool? fhe05a1b Gone to a sporting event in which child was not a player? fhe05a3 Gone to a concert, play, museum, art gallery or community or school event? fhe05a4 Attended a religious service, church, temple, synagogue or mosque? fhe05a5 Visited a library?	0 No 1 Yes	Children were flagged as deprived in this indicator if they had not done any of these activities in the past month. Children were automatically flagged as not deprived if their parents did not respond to any item.
How often do you have a say in what the family does, such as what to watch on TV, what to do on the weekends, where to go on family outings or holidays?	fre10a How often do you have a say in what the family does, such as what to watch on TV, what to do on the weekends, where to go on family outings or holidays?	1. Always 2. Often 3. Sometimes 4. Never	No established cut-off point exists. A child will be identified as deprived if they respond that they 'never' have a say in what the family does. Children who did not respond to this item are automatically flagged as not deprived.

| Extracurricular activities | In the last 12 months, has study child regularly participated in any of the following activities?

fhe09a1a Community group or club (e.g. scouts, guides, or cultural group)
fhe09a2a Team sport (e.g. football, cricket or netball)
fhe09a3a Individual sport, coached or lessons (e.g. swimming, tennis, karate or gymnastics)
fhe09a4a Art, music or performance lessons (e.g. piano, dance, choir or drama)
fhe09a5a Classes to improve academic skills (e.g. remedial reading or extra tutoring)
fhe09a6a Classes to learn new skills (e.g. computing or learning another language)
fhe09a7a Religious services or classes
fhe09a8a Other (specify) | 0 No
1 Yes | Children were flagged as deprived in this item if they had not participated in any of these activities in the past 12 months. Children were automatically flagged as not deprived if they did not respond to this item. |

Appendix 4 – Missing data

Table 23: Missing data prior to removing observations with high level of missingness

Nest dimension	Indicator	Wave 4 (age 6-7)	Wave 5 (age 8-9)	Wave 6 (age 10-11)
Loved and Safe	Relationship with friends	0.7%	1.9%	4.7%
	Relationship with family (Fun with family at wave 4)	2.1%	2.5%	5.1%
	Frequent yelling at home	N/A	2.4%	5.1%
	Frequent bullying or social exclusion	1.7%	2.0%	4.9%
Material Basics	Financial security of family	1.5%	2.6%	3.7%
	Access to computer	0.1%	N/A	N/A
	Eating breakfast	N/A	1.1%	5.2%
	Experience of no place to live	N/A	1.0%	2.0%
Healthy	Enjoyment of exercise	0.1%	0.9%	2.0%
	Adequate fruit and vegetables	0.2%	1.0%	4.4%
	Mental health	2.1%	2.0%	4.7%
Learning	School attendance	0.4%	0.6%	0.9%
	School satisfaction	1.7%	1.9%	4.6%
	Parent engagement in learning (wave 4, wave 5) Number of books in home (wave 6)	0.1%	0.9%	2.9%
	Participation in cultural activities	0.1%	0.9%	1.9%
Participating	Having a say in family decisions	N/A	N/A	5.1%
	Having a say within the community	N/A	N/A	N/A
	Regular participation in extracurricular activities	0.1%	0.9%	1.9%
	Sense of belonging	N/A	N/A	N/A

Table 24: Regression of observations with more than 1/3 missing indicators on population groups (wave 4, age 6-7)

	(1)
	Missing observation
Missing observation	
Female	0
	(.)
Male	0.0363
	(0.08)
No disability	0
	(.)
Has disability	0.0151
	(0.01)
Not living in monetary poverty	0
	(.)
Living in monetary poverty	-0.456
	(-0.51)
Lives in employed household	0
	(.)
Lives in jobless household	0.677
	(0.75)
Constant	-5.432***
	(-15.61)
Observations	4242

z statistics in parentheses
* *p* < 0.10, ** *p* < 0.05, *** *p* < 0.01

Table 25: Regression of observations with more than 1/3 missing indicators on population groups (wave 5, age 8-9)

	(1)
	Missing observation
Missing observation	
Female	0
	(.)
Male	0.138
	(0.66)
No disability	0
	(.)
Has disability	0.731*
	(1.91)
Not living in monetary poverty	0
	(.)
Living in monetary poverty	-0.242
	(-0.69)
Lives in employed household	0
	(.)
Lives in jobless household	0.846**
	(2.38)
Constant	-3.895***
	(-24.05)
Observations	4085

z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 26: Regression of observations with more than 1/3 missing indicators on population groups (wave 6, age 10-11)

	(1) Missing observation
Missing observation	
Female	0
	(.)
Male	0.0953
	(0.64)
No disability	0
	(.)
Has disability	1.072***
	(4.51)
Not living in monetary poverty	0
	(.)
Living in monetary poverty	-0.0633
	(-0.25)
Lives in employed household	0
	(.)
Lives in jobless household	0.979***
	(3.75)
Constant	-3.135***
	(-27.08)
Observations	3764

z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 27: Missing data after removing observations with high level of missingness

Nest dimension	Indicator	Wave 4 (age 6-7)	Wave 5 (age 8-9)	Wave 6 (age 10-11)
Loved and Safe	Relationship with friends	0.5%	1.1%	0%
	Relationship with family (Fun with family at wave 4)	1.8%	0.5%	0.4%
	Frequent yelling at home	N/A	0.6%	0.4%
	Frequent bullying or social exclusion	1.4%	0.2%	0.3%
Material Basics	Financial security of family	1.4%	1.7%	1.8%
	Access to computer	0%	N/A	N/A
	Eating breakfast	N/A	0.2%	N/A
	Experience of no place to live	N/A	0.1%	0.1%
Healthy	Enjoyment of exercise	0%	0%	0.1%
	Adequate fruit and vegetables	0.1%	0.1%	0%
	Mental health	1.8%	0.2%	0%
Learning	School attendance	0.3%	0.3%	0.5%
	School satisfaction	1.3%	0.1%	0.1%
	Parent engagement in learning (wave 4, wave 5) / Number of books in home (wave 6)	0%	0%	1.0%
	Participation in cultural activities	0%	0%	0%
Participating	Having a say in family decisions	N/A	N/A	0.4%
	Having a say within the community	N/A	N/A	N/A
	Regular participation in extracurricular activities	0%	0%	0%
	Sense of belonging	N/A	N/A	N/A

Appendix 5 – Correlation tables for each wave

Table 28: Correlation matrix for wave 4 indicators

	Relationship with friends	Fun with family	Frequent bullying or social exclusion	Financial security of family	Access to computer	Enjoyment of exercise	Adequate fruit and vegetables	Mental health	School attendance	School satisfaction	Parent engagement in learning	Participation in cultural activities	Regular participation in extracurricular activities
Relationship with friends	1.000												
Fun with family	0.0473	1.000											
Frequent bullying or social exclusion	0.1110	0.0548	1.000										
Financial security of family	0.1133	0.0487	0.0546	1.000									
Access to computer	0.0720	0.0356	0.0401	0.0721	1.000								
Enjoyment of exercise	0.0500	0.0119	0.0292	0.0293	0.0111	1.000							
Adequate fruit and vegetables	0.0418	0.0407	0.0307	0.1044	0.0071	-0.0041	1.000						
Mental health	0.0603	0.0813	0.1131	0.0591	0.0046	0.0295	0.0293	1.000					
School attendance	0.0638	0.0070	0.0008	0.0815	0.0162	0.0029	0.0379	0.0244	1.000				
School satisfaction	0.0576	0.1097	0.1917	0.0417	0.0193	0.0130	0.0520	0.1492	0.0217	1.000			
Parent engagement in learning	0.0271	0.0378	-0.019	0.0234	0.0641	0.0239	0.0926	0.0134	-0.0119	0.0239	1.000		
Participation in cultural activities	0.0728	0.0362	0.0624	0.0351	0.0597	0.0063	0.0870	-0.0097	0.0145	0.0295	0.0981	1.000	
Regular participation in extracurricular activities	0.0991	0.0461	0.0356	0.1416	0.1088	0.0467	0.1145	0.0248	0.0517	0.0065	0.0894	0.1275	1.000

Table 29: Correlation matrix for wave 5 indicators

	Relationship with friends	Relationship with parents	Frequent yelling at home	Frequent bullying or social exclusion	Financial security of family	Eating breakfast	Experience of no place to live	Enjoyment of exercise	Adequate fruit and vegetables	Mental health	School attendance	School satisfaction	Parent engagement in learning	Participation in cultural activities	Regular participation in extracurricular activities
Relationship with friends	1.0000														
Relationship with parents	0.0382	1.0000													
Frequent yelling at home	0.0400	0.0475	1.0000												
Frequent bullying or social exclusion	0.1609	0.0721	0.1434	1.0000											
Financial security of family	0.1397	0.0203	0.0589	0.0698	1.0000										
Eating breakfast	0.0354	0.0294	0.0546	0.0345	0.0601	1.0000									
Experience of no place to live	0.0380	0.0171	0.0029	0.0324	0.1094	-0.0034	1.0000								
Enjoyment of exercise	0.0557	0.0805	0.0133	0.0410	0.0021	0.0047	0.0092	1.0000							
Adequate fruit and vegetables	0.0168	0.0087	0.0204	0.0427	0.0527	0.0997	0.0299	0.0469	1.0000						
Mental health	0.1448	0.0647	0.1565	0.2015	0.0822	0.0345	0.0128	0.0414	0.0484	1.0000					
School attendance	0.0642	-0.0152	0.0140	0.0052	0.0406	0.0273	0.0107	-0.0106	-0.0062	0.0179	1.0000				
School satisfaction	0.1237	0.0473	0.1230	0.1626	0.0233	0.0642	0.0104	0.0377	0.0546	0.1511	0.0416	1.0000			
Parent engagement in learning	-0.0097	0.0052	0.0452	-0.0328	-0.0179	0.0419	-0.0130	0.0090	0.0949	-0.0047	0.0096	0.0274	1.0000		
Participation in cultural activities	0.0226	0.0095	-0.0099	0.0690	0.0373	0.0394	0.0303	-0.0069	0.0231	0.0220	-0.0035	-0.0010	0.0774	1.0000	
Regular participation in extracurricular activities	0.1260	0.0163	-0.0051	0.0642	0.1225	0.0661	0.0651	0.0335	0.0704	0.0322	0.0581	0.0267	0.0534	0.0938	1.0000

Table 30: Correlation matrix for wave 6 indicators

	Relationship with friends	Relationship with parents	Frequent yelling at home	Frequent bullying or social exclusion	Financial security of family	Eating breakfast	Experience of no place to live	Enjoyment of exercise	Adequate fruit and vegetables	Mental health	School attendance	School satisfaction	Parent engagement in learning	Participation in cultural activities	Having a say in family decisions	Regular participation in extracurricular activities
Relationship with friends	1.0000															
Fun with family	0.1166	1.0000														
Frequent yelling at home	0.1448	0.2011	1.0000													
Frequent bullying or social exclusion	0.3310	0.1173	0.1702	1.0000												
Financial security of family	0.0435	0.0333	0.0878	0.0354	1.0000											
Eating breakfast	0.0517	0.0200	0.0648	0.0504	0.0894	1.0000										
Experience of no place to live	0.0375	-0.0133	0.0238	0.0103	0.1199	0.0343	1.0000									
Enjoyment of exercise	0.1240	0.0874	0.0671	0.0475	0.0536	0.0285	0.0007	1.0000								
Adequate fruit and vegetables	0.0922	0.0164	0.0725	0.0137	0.0738	0.1014	-0.0046	0.0848	1.0000							
Mental health	0.2799	0.0093	0.1759	0.2317	0.0618	0.0378	0.0077	0.1011	0.0662	1.0000						
School attendance	0.0642	0.0137	0.0302	0.0405	0.0750	0.0256	0.0552	0.0423	0.0382	0.0477	1.0000					
School satisfaction	0.1531	0.1476	0.0875	0.1420	0.0422	0.0877	0.0365	0.1266	0.0987	0.1116	0.0786	1.0000				
Books in home	0.0301	0.0154	0.0324	0.0126	0.0470	0.0509	0.0263	-0.0171	0.0316	0.0105	0.0437	0.0204	1.0000			
Participation in cultural activities	0.0239	-0.0179	-0.0093	-0.0087	0.0159	0.0449	0.0258	0.0027	0.0344	0.0134	-0.0210	-0.0049	0.0396	1.0000		
Having a say in family decisions	0.0847	0.1271	0.1446	0.0877	0.0235	0.0536	-0.0028	0.0722	0.0534	0.0752	0.0153	0.0987	0.0152	0.0036	1.0000	
Regular participation in extracurricular activities	0.0856	0.0381	0.0586	0.0560	0.1253	0.0788	0.0529	0.1119	0.0948	0.0391	0.0517	0.0868	0.0940	0.0727	0.0450	1.0000

Appendix 6 – Robustness check

Indicators and cut-off points

Table 31: Wave 4 Indicators and cut-off points for robustness check

Nest dimension	Sub-domain	Measure	Indicator or scale	Respondent	Criteria for deprivation
Loved and Safe	Relationships and friendships	Relationship with friends	Strengths and Difficulties Questionnaire peer problems scale	Parent 1	Summing criteria – score ≥5
		Relationship with family	How often do you have fun with your family at the weekends?	Study child	3 Hardly ever
	Safe from harm	Safe at home	Not available		
		Safe at school	Peers scale	Study child	Child has been picked on or experienced social exclusion
Material Basics	Financial security and access to basic goods	Financial security of family	Hardship scale	Parent 1	Experiencing 2 or more hardships on scale
		Access to basic goods (toys, clothes, computer)	Does study child have access to a computer at home?	Parent 1	0 No
	Access to food, water, shelter and sanitation	Access to adequate food and water	Not available		
		Access to adequate shelter and sanitation	Not available		
Healthy	Physical health	Exercise	How much does study child enjoy physical activity or exercise?	Parent 1	1 Very much dislikes activity
		Nutrition	How often did child have fresh fruit, cooked vegetables or raw vegetables/salad in the last 24 hours?	Parent 1	0 Not at all to fresh fruit OR (0 Not at all to cooked vegetables AND raw vegetables/salad)
	Mental health	Anxiety	Social emotional problems scale	Study child	Mean < 1.5
		Depression			
Learning	Engagement in school	School attendance	During the previous four weeks of school, how many days has study child been absent?	Parent 1	8+
		School satisfaction	School liking and avoidance scale	Study child	Liking – mean > 2.5 OR Avoidance – mean < 1.5
	Learning through other environments, situations and interactions	Learning at home	Home activities index	Parent 1	Participating in an activity on less than 5 days in past week
		Learning in the community	Out of home activities index	Parent 1	0 No to all OR 1 Yes to one ONLY

Participating	Having a say	Having a say within the family	Not available		
		Having a say within the community	Not available		
	Involvement in community and sense of belonging	Involvement in community	Extracurricular activities	Parent 1	0 No to all OR 1 Yes to one ONLY
		Sense of belonging	Not available		

Table 32: Wave 5 Indicators and cut-off points for robustness check

Nest dimension	Sub-domain	Measure	Indicator or scale	Respondent	Criteria for deprivation
Loved and Safe	Relationships and friendships	Relationship with friends	Strengths and Difficulties Questionnaire peer problems scale	Parent 1	Summing criteria – score ≥ 5
		Relationship with family	Enjoyment of time spent with parents and ability to ask for help	Study child	Mean > 3
	Safe from harm	Safe at home	How often do people in your family yell at each other?	Study child	5 Always
		Safe at school	Bullying and victimisation	Study child	4 Several times a week to any
Material Basics	Financial security and access to basic goods	Financial security of family	Hardship scale	Parent 1	1 Experiencing 2 or more hardships on scale
		Access to basic goods (toys, clothes, computer)	Not available		
	Access to food, water, shelter and sanitation	Access to adequate food and water	Did child eat breakfast today?	Parent 1	2 No
		Access to adequate shelter and sanitation	Experience of no place to live	Parent 1	1 Yes to ANY
Healthy	Physical health	Exercise	How much does study child enjoy physical activity or exercise?	Parent 1	1 Very much dislikes activity
		Nutrition	How often did child have fresh fruit, cooked vegetables or raw vegetables/salad in the last 24 hours?	Parent 1	0 Not at all to fresh fruit OR (0 Not at all to cooked vegetables AND raw vegetables/salad)
	Mental health	Anxiety	Social emotional problems scale	Study child	Mean < 1.5
		Depression			
Learning	Engagement in school	School attendance	During the previous four weeks of school, how many days has study child been absent?	Parent 1	8+
		School satisfaction	School liking and avoidance scale	Study child	Liking – mean > 2.5 OR Avoidance – mean < 1.5
	Learning through other environments, situations and interactions	Learning at home	Home activities index	Parent 1	Participating in an activity on less than 5 days in past week
		Learning in the community	Out of home activities index	Parent 1	0 No to all
Participating	Having a say	Having a say within the family	Not available		
		Having a say within the community	Not available		
	Involvement in community and sense of belonging	Involvement in community	Extracurricular activities	Parent 1	0 No to all
		Sense of belonging	Not available		

Table 33: Wave 6 Indicators and cut-off points for robustness check

Nest dimension	Sub-domain	Measure	Indicator or scale	Respondent	Criteria for deprivation
Loved and Safe	Relationships and friendships	Relationship with friends	Strengths and Difficulties Questionnaire peer problems scale	Study child	Summing criteria score ≥ 5
		Relationship with family	Trust and Communication Scale	Study child	Mean < 2
	Safe from harm	Safe at home	How often do people in your family yell at each other?	Study child	5 Always
		Safe at school	Bullying and victimisation	Study child	3 Several times a week to any
Material Basics	Financial security and access to basic goods	Financial security of family	Hardship scale	Parent 1	1 Experiencing 2 or more hardships on scale
		Access to basic goods (toys, clothes, computer)	Not available		
	Access to food, water, shelter and sanitation	Access to adequate food and water	Did you have breakfast today?	Study child	2 No
		Access to adequate shelter and sanitation	Experience of no place to live	Parent 1	1 Yes to ANY
Healthy	Physical health	Exercise	How much do you enjoy being physically active (doing things like sports, active games, walking, running or swimming)?	Study Child	4 Not at all
		Nutrition	How often did you have fresh fruit, cooked vegetables or raw vegetables/salad yesterday?	Study child	0 Not at all to fresh fruit OR (0 Not at all to cooked vegetables AND raw vegetables/salad)
	Mental health	Anxiety	Social Difficulties Questionnaire Emotional Problems Scale	Study child	Summing criteria score >=7
		Depression			
Learning	Engagement in school	School attendance	During the previous four weeks of school, how many days has study child been absent?	Parent 1	8+
		School satisfaction	School adjustment scale	Study child	Mean < 2
	Learning through other environments, situations and interactions	Learning at home	Number of books in home	Parent 1	0 None
		Learning in the community	Out of home activities index	Parent 1	0 No to all
Participating	Having a say	Having a say within the family	How often do you have a say in what the family does, such as what to watch on TV, what to do on the weekends, where to go on family outings or holidays?	Study Child	4 Never
		Having a say within the community	Not available		
	Involvement in community and sense of belonging	Involvement in community	Extracurricular activities	Parent 1	0 No to all
		Sense of belonging	Not available		

Robustness check output

Table 34: Deprivation rate for each indicator – robustness check (%)

Nest dimension	Indicator	Wave 4 (age 6-7)	Wave 5 (age 8-9)	Wave 6 (age 10-11)
Loved and Safe	Relationship with friends *^Indicator consistent at wave 4 and 5*	4.92%	5.98%	7.96%
	Relationship with parents (Fun with family at wave 4) *^Indicator inconsistent at all waves*	3.50%	0.31%	1.96%
	Frequent yelling at home *^Indicator consistent at wave 5 and 6*	N/A	5.39%	2.78%*
	Frequent bullying or social exclusion *^Indicator inconsistent at all waves*	21.16%	13.95%	10.64%
Material Basics	Financial security of family *^Indicator consistent at all waves*	9.03%	7.82%	7.81%
	Access to computer	10.47%	N/A	N/A
	Eating breakfast *^Indicator inconsistent at all waves*	N/A	5.08%	6.93%
	Experience of no place to live *^Indicator consistent at wave 5 and 6*	N/A	2.61%	2.17%
Healthy	Enjoyment of exercise *^Indicator consistent at wave 3 and 4*	3.17%	4.83%	0.32%
	Adequate fruit and vegetables *^Indicator consistent at wave 4 and 5*	20.21%	18.34%	26.24%
	Mental health *^Indicator consistent at wave 4 and 5*	0.92%	0.88%	7.89%
Learning	School attendance *^Indicator consistent at all waves*	3.07%	1.95%	1.70%
	School satisfaction *^Indicator inconsistent at all waves*	7.57%	3.37%	2.65%
	Parent engagement in learning (wave 4, wave 5) Number of books in home (wave 6) *^Indicator consistent at wave 4 and 5*	3.59%	7.97%	0.21%
	Participation in cultural activities *^Indicator consistent at all waves*	3.21%	3.86%	4.61%
Participating	Having a say in family decisions	N/A	N/A	6.44%
	Having a say within the community	N/A	N/A	N/A
	Regular participation in extracurricular activities *^Indicator consistent at all waves*	17.17%	10.28%	9.17%
	Sense of belonging	N/A	N/A	N/A

Green = Deprivation rate 0-4.99%
Orange = Deprivation rate 5-9.99%
Red = Deprivation rate 10%+

Figure 10: Deprivation rate by dimension and wave - robustness check (%)
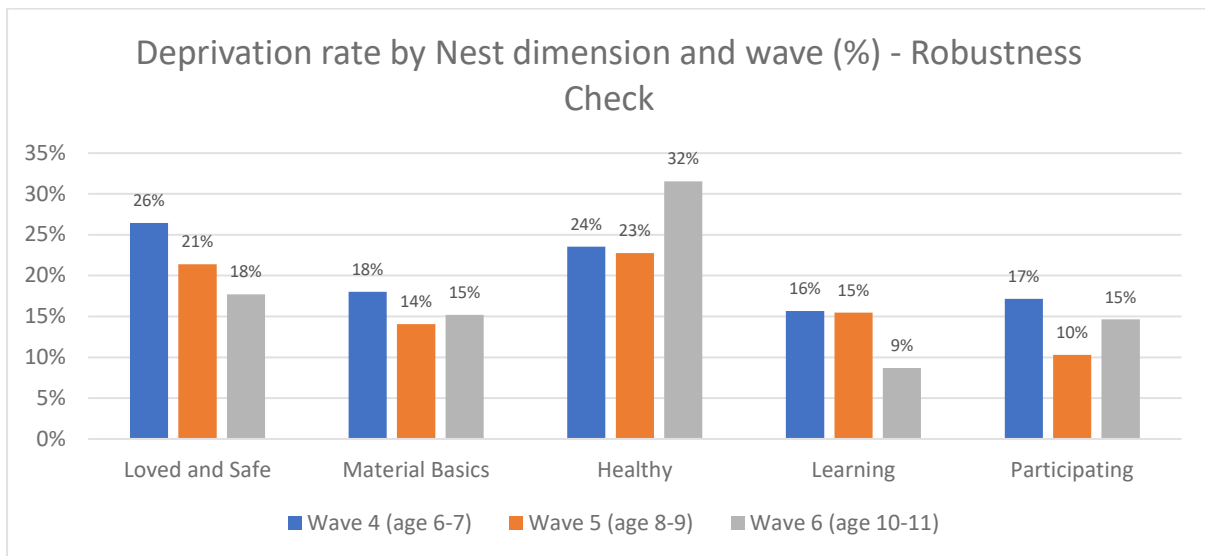
Deprivation rate by Nest dimension and wave (%) - Robustness Check

Note: The height of bars reflecting identical percentages may differ due to rounding

Figure 11: Distribution of number of deprived dimensions children experience by wave - robustness check (%)

Distribution of number of deprived dimensions children experience, by wave (%) - Robustness Check
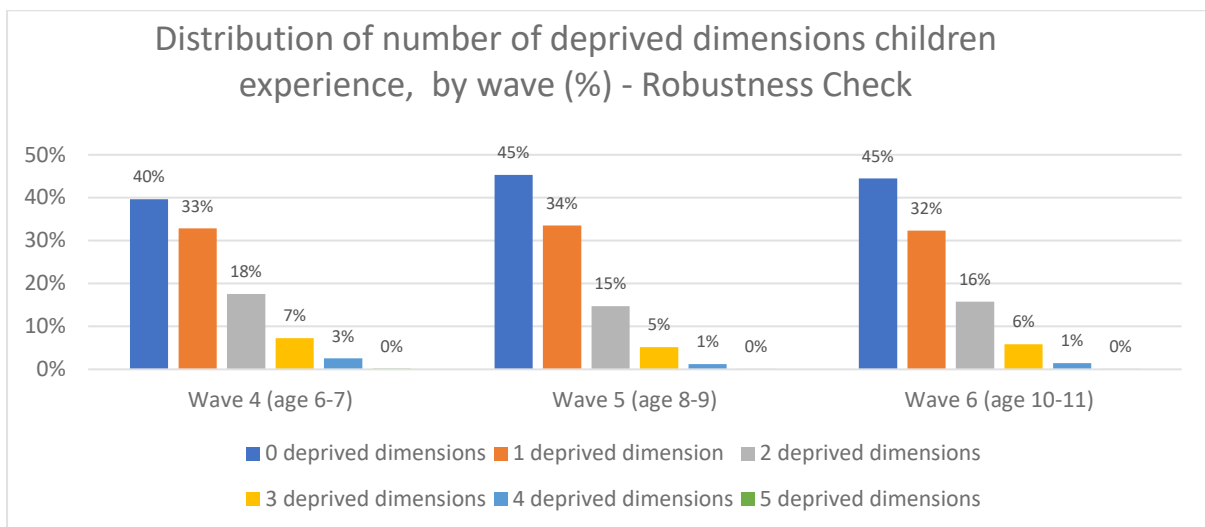
Note: The height of bars reflecting identical percentages may differ due to rounding

Figure 12: Deep deprivation rate by dimension and wave – robustness check (%)

Deep deprivation rate by dimension and wave (%) - Robustness Check
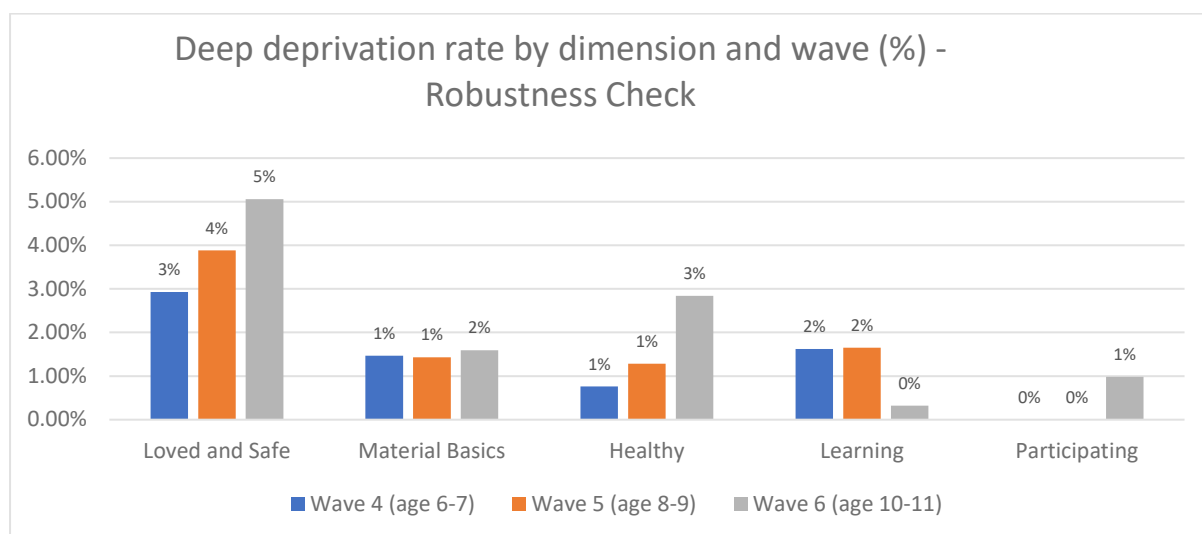
Note: The height of bars reflecting identical percentages may differ due to rounding

Table 35: Percentage of children living in multi-dimensional and deep deprivation by disability status and wave – robustness   check

	Wave 4 (age 6-7)		Wave 5 (age 8-9)		Wave 6 (age 10-11)	
	With disability	Without disability	With disability	Without disability	With disability	Without disability
Living in multi-dimensional deprivation	16.88% (***)	9.60%	11.42% (**)	6.29%	17.88% (***)	6.95%
Living in deep deprivation	11.29% (**)	6.03%	15.67% (***)	7.38%	16.64% (**)	9.67%

*** Significant at 1% significance level using chi-square test

** Significant at 5% significance level using chi-square test

* Significant at 10% significance level using chi-square test

- No significant difference between groups using chi-square test

Table 36: Deprivation rate by indicator, wave, and disability status – robustness check (%)

Nest dimension	Indicator	Wave 4 (age 6-7)		Wave 5 (age 8-9)		Wave 6 (age 10-11)	
		With disability	Without disability	With disability	Without disability	With disability	Without disability
Loved and Safe	Relationship with friends	5.37% (-)	4.90%	20.93% (***)	5.35%	14.79% (***)	7.65%
	Relationship with parents (Fun with family at wave 4)	4.10% (-)	3.46%	0.00% (-)	0.32%	3.53% (-)	1.89%
	Frequent yelling at home	N/A	N/A	5.04% (-)	5.40%	4.14% (-)	2.71%
	Frequent bullying or social exclusion	22.04% (-)	21.11%	25.49% (***)	13.47%	17.19% (**)	10.34%
Material Basics	Financial security of family	19.76% (***)	8.42%	18.71% (***)	7.36%	15.05% (***)	7.48%
	Access to computer	14.75% (*)	10.23%	N/A	N/A	N/A	N/A
	Eating breakfast	N/A	N/A	7.96% (-)	4.96%	9.17% (-)	6.82%
	Experience of no place to live	N/A	N/A	4.65% (-)	2.53%	4.10% (-)	2.08%
Healthy	Enjoyment of exercise	2.53% (-)	3.20%	7.20% (-)	4.73%	1.63% (**)	0.26%
	Adequate fruit and vegetables	25.38% (-)	19.92%	20.46% (-)	18.25%	32.19% (-)	25.96%
	Mental health	0.00% (-)	0.97%	2.08% (*)	0.83%	13.84% (**)	7.62%
Learning	School attendance	7.67% (***)	2.81%	3.18% (-)	1.90%	5.41% (***)	1.52%
	School satisfaction	4.29% (*)	7.76%	7.86% (***)	3.18%	7.89% (***)	2.41%
	Parent engagement in learning (wave 4, wave 5) / Number of books in home (wave 6)	6.04% (-)	3.45%	4.79% (-)	8.11%	0.00% (-)	0.22%
	Participation in cultural activities	6.77% (**)	3.01%	2.99% (-)	3.90%	3.26% (-)	4.67%

Participating	Having a say in family decisions	N/A	N/A	N/A	N/A	10.64% (*)	6.24%
	Having a say within the community	N/A	N/A	N/A	N/A	N/A	N/A
	Regular participation in extracurricular activities	26.18% (***)	16.66%	9.23% (-)	10.33%	9.68% (-)	9.15%
	Sense of belonging	N/A	N/A	N/A	N/A	N/A	N/A

*** Significant at 1% significance level using chi-square test
** Significant at 5% significance level using chi-square test
* Significant at 10% significance level using chi-square test
- No significant difference between groups using chi-square test

Table 37: Percentage of children living in multi-dimensional and deep deprivation by monetary poverty status and wave - robustness check

	Wave 4 (age 6-7)		Wave 5 (age 8-9)		Wave 6 (age 10-11)	
	In poverty	Not in poverty	In poverty	Not in poverty	In poverty	Not in poverty
Living in multi-dimensional deprivation	22.78% (***)	7.61%	12.90% (***)	5.42%	15.37% (***)	6.24%
Living in deep deprivation	13.24% (***)	5.02%	11.95% (***)	7.00%	16.43% (***)	9.02%

*** Significant at 1% significance level using chi-square test
** Significant at 5% significance level using chi-square test
* Significant at 10% significance level using chi-square test
- No significant difference between groups using chi-square test

Table 38: Deprivation rate by indicator, wave, and monetary poverty status – robustness check (%)

Nest dimension	Indicator	Wave 4 (age 6-7)		Wave 5 (age 8-9)		Wave 6 (age 10-11)	
		In poverty	**Not in poverty**	**In poverty**	**Not in poverty**	**In poverty**	**Not in poverty**
Loved and Safe	Relationship with friends	8.82% (***)	4.19%	9.75% (***)	5.34%	9.17% (-)	7.78%
	Relationship with parents (Fun with family at wave 4)	4.07% (-)	3.39%	0.39% (-)	0.30%	2.18% (-)	1.93%
	Frequent yelling at home	N/A	N/A	7.60% (**)	5.01%	3.82% (-)	2.62%
	Frequent bullying or social exclusion	23.20% (-)	20.78%	15.07% (-)	13.76%	12.10% (-)	10.42%

Material Basics	Financial security of family	21.54% (***)	6.70%	21.16% (***)	5.56%	19.96% (***)	5.99%
	Access to computer	21.27% (***)	8.46%	N/A	N/A	N/A	N/A
	Eating breakfast	N/A	N/A	7.64% (**)	4.65%	10.70% (***)	6.36%
	Experience of no place to live	N/A	N/A	5.12% (***)	2.19%	4.37% (***)	1.84%
Healthy	Enjoyment of exercise	4.49% (-)	2.92%	5.49% (-)	4.72%	1.06% (***)	0.21%
	Adequate fruit and vegetables	25.77% (***)	19.18%	21.49% (*)	17.80%	32.67% (***)	25.27%
	Mental health	1.50% (-)	0.81%	1.59% (-)	0.76%	10.97% (**)	7.43%
Learning	School attendance	3.96% (-)	2.90%	2.29% (-)	1.90%	4.30% (***)	1.31%
	School satisfaction	9.58% (*)	7.20%	3.75% (-)	3.30%	3.57% (-)	2.52%
	Parent engagement in learning (wave 4, wave 5) Number of books in home (wave 6)	8.05% (***)	2.75%	11.34% (***)	7.40%	0.76% (*)	0.13%
	Participation in cultural activities	5.12% (**)	2.86%	5.97% (**)	3.50%	9.79% (***)	3.83%
Participating	Having a say in family decisions	N/A	N/A	N/A	N/A	7.43% (-)	6.29%
	Having a say within the community	N/A	N/A	N/A	N/A	N/A	N/A
	Regular participation in extracurricular activities	33.85% (***)	14.06%	24.33% (***)	7.91%	19.35% (***)	7.65%
	Sense of belonging	N/A	N/A	N/A	N/A	N/A	N/A

***   *Significant at 1% significance level using chi-square test*
**   *Significant at 5% significance level using chi-square test*
*   *Significant at 10% significance level using chi-square test*
-   *No significant difference between groups using chi-square test*

Table 39: Percentage of children living in multi-dimensional and deep deprivation by whether or not they live in jobless family and wave – robustness check (%)

	Wave 4 (age 6-7)		Wave 5 (age 8-9)		Wave 6 (age 10-11)	
	In jobless family	Not in jobless family	In jobless family	Not in jobless family	In jobless family	Not in jobless family
Living in multi-dimensional deprivation	29.87% (***)	7.54%	20.25% (***)	5.12%	24.07% (***)	5.93%
Living in deep deprivation	17.10% (***)	4.98%	16.65% (***)	6.81%	25.93% (***)	8.54%

*** Significant at 1% significance level using chi-square test
** Significant at 5% significance level using chi-square test
* Significant at 10% significance level using chi-square test
- No significant difference between groups using chi-square test

Table 40: Deprivation rate by indicator, wave, and whether they live in jobless family – robustness check (%)

Nest dimension	Indicator	Wave 4 (age 6-7)		Wave 5 (age 8-9)		Wave 6 (age 10-11)	
		In jobless family	Not in jobless family	In jobless family	Not in jobless family	In jobless family	Not in jobless family
Loved and Safe	Relationship with friends	12.08% (***)	4.04%	12.52% (***)	5.32%	12.22% (**)	7.58%
	Relationship with parents (Fun with family at wave 4)	5.98% (**)	3.19%	0.18% (-)	0.32%	1.91% (-)	1.96%
	Frequent yelling at home	N/A	N/A	7.37% (-)	5.19%	3.70% (-)	2.69%
	Frequent bullying or social exclusion	23.94% (-)	20.81%	20.95% (***)	13.25%	16.68% (***)	10.10%
Material Basics	Financial security of family	25.71% (***)	6.97%	24.54% (***)	6.13%	25.50% (***)	6.22%
	Access to computer	24.76% (***)	8.71%	N/A	N/A	N/A	N/A
	Eating breakfast	N/A	N/A	9.64% (***)	4.62%	13.67% (***)	6.32%
	Experience of no place to live	N/A	N/A	8.27% (***)	2.04%	7.91% (***)	1.65%
Healthy	Enjoyment of exercise	4.15% (-)	3.05%	5.94% (-)	4.72%	1.76% (***)	0.19%
	Adequate fruit and vegetables	30.08% (***)	18.99%	24.06% (**)	17.76%	38.00% (***)	25.18%
	Mental health	1.21% (-)	0.89%	1.66% (-)	0.80%	17.56% (***)	7.02%

Learning	School attendance	7.16% (***)	2.57%	4.70% (***)	1.68%	6.33% (***)	1.28%
	School satisfaction	10.69% (**)	7.19%	4.67% (-)	3.24%	3.62% (-)	2.56%
	Parent engagement in learning (wave 4, wave 5) Number of books in home (wave 6)	8.52% (***)	2.98%	11.34% (*)	7.63%	0.85% (-)	0.15%
	Participation in cultural activities	8.30% (***)	2.58%	6.91% (**)	3.55%	11.32% (***)	4.00%
Participating	Having a say in family decisions	N/A	N/A	N/A	N/A	9.11% (-)	6.20%
	Having a say within the community	N/A	N/A	N/A	N/A	N/A	N/A
	Regular participation in extracurricular activities	38.69% (***)	14.51%	31.11% (***)	8.18%	27.94% (***)	7.48%
	Sense of belonging	N/A	N/A	N/A	N/A	N/A	N/A

***   *Significant at 1% significance level using chi-square test*
**   *Significant at 5% significance level using chi-square test*
*   *Significant at 10% significance level using chi-square test*
\-   *No significant difference between group using chi-square test*

Nest dimension	Indicator	Wave 4 (age 6-7)			Wave 5 (age 8-9)			Wave 6 (age 10-11)		
		Children in poverty and jobless family	Children in poverty only	Children in jobless family only	Children in poverty and jobless family	Children in poverty only	Children in jobless family only	Children in poverty and jobless family	Children in poverty only	Children in jobless family only
Loved and Safe	Relationship with friends	12.52% (**)	5.25%	11.07%	12.74% (-)	7.68%	12.11%	12.14% (-)	6.81%	12.41%
	Relationship with parents (Fun with family at wave 4)	5.40% (-)	2.80%	7.34%	0.27% (-)	0.48%	0.00%	2.74% (-)	1.73%	0.00%
	Frequent yelling at home	N/A	N/A	N/A	6.82% (-)	8.13%	8.36%	4.11% (-)	3.58%	2.74%
	Frequent bullying or social exclusion	23.71% (-)	22.72%	24.50%	19.99% (**)	11.68%	22.70%	17.30% (**)	7.95%	15.22%
Material Basics	Financial security of family	24.08% (-)	19.09%	29.52%	28.90% (***) (^^)	15.82%	16.66%	25.20% (**)	15.79%	26.19%
	Access to computer	27.12% (***)	15.65%	19.24%	N/A	N/A	N/A	N/A	N/A	N/A
	Eating breakfast	N/A	N/A	N/A	8.24% (-)	7.22%	12.18%	11.99% (-)	9.67%	17.55%
	Experience of no place to live	N/A	N/A	N/A	7.54% (*)	3.45%	9.59%	7.51% (**)	1.87%	8.84%
Healthy	Enjoyment of exercise	5.14% (-)	3.86%	1.82%	5.76% (-)	5.30%	6.28%	1.94% (-)	0.36%	1.33%
	Adequate fruit and vegetables	30.46% (**)	21.25%	29.18%	23.26% (-)	20.28%	25.51%	38.63% (*)	27.92%	36.52%
	Mental health	1.73% (-)	1.29%	0.00%	2.19% (-)	1.18%	0.71%	15.45% (**)	7.40%	22.46%
Learning	School attendance	6.21% (**)	1.80%	9.39%	3.19% (-)	1.66%	7.41%	7.84% (***)	1.48%	2.83%

	School satisfaction	13.04% (**) (^)	6.25%	5.16%	5.12% (-)	2.81%	3.87%	3.72% (-)	3.44%	3.37%
	Parent engagement in learning (wave 4, wave 5) Number of books in home (wave 6)	8.09% (-)	8.01%	9.53%	10.02% (-)	12.25%	13.72%	1.22% (-)	0.40%	0.00%
	Participation in cultural activities	6.95% (-)	3.36%	11.47%	7.35% (-)	5.02%	6.11%	14.75% (**) (^^)	5.84%	3.35%
Participating	Having a say in family decisions	N/A	N/A	N/A	N/A	N/A	N/A	8.60% (-)	6.50%	10.29%
	Having a say within the community	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Regular participation in extracurricular activities	42.03% (***) (^)	25.99%	30.86%	32.50% (***)	18.69%	28.60%	27.94% (***)	12.51%	27.92%
	Sense of belonging	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 41: Deprivation rate by indicator, wave, and monetary poverty and jobless family status (%)

*** Significant difference to children living in monetary poverty only at 1% significance level using chi-square test

** Significant difference to children living in monetary poverty only at 5% significance level using chi-square test

* Significant difference to children living in monetary poverty only at 10% significance level using chi-square test

^^^ Significant difference to children living in jobless family only at 1% significance level using chi-square test

^^ Significant difference to children living in jobless family only at 5% significance level using chi-square test

^ Significant difference to children living in jobless family only at 10% significance level using chi-square test

- No significant difference to either population group using chi-square test

Appendix 7 – Odds ratios and p-values from comparison of population groups

Table 42: Odds ratio and p-values for multi-dimensional and deep deprivation for children with disability

	Wave 4 (age 6-7)	Wave 5 (age 8-9)	Wave 6 (age 10-11)
Living in multi-dimensional deprivation	1.70 (0.004)	2.42 (0.000)	2.72 (0.000)
Living in deep deprivation	1.35 (0.176)	1.86 (0.001)	2.07 (0.000)

Notes: - Dependent variable is the living in multi-dimensional/deep deprivation and independent variable is whether child
has a disability
- Children without disability used as reference group
- p-value from chi-square test in brackets

Table 43: Odds ratio and p-values for deprivation in indicators for children with disability

Nest dimension	Indicator	Wave 4 (age 6-7)	Wave 5 (age 8-9)	Wave 6 (age 10-11)
Loved and Safe	Relationship with friends	1.40 (0.152)	3.06 (0.000)	1.62 (0.028)
	Relationship with parents (Fun with family at wave 4)	1.19 (0.699)	1.51 (0.582)	1.77 (0.086)
	Frequent yelling at home	N/A	0.73 (0.173)	1.24 (0.380)
	Frequent bullying or social exclusion	1.06 (0.779)	1.50 (0.028)	1.79 (0.005)
Material Basics	Financial security of family	2.47 (0.000)	2.55 (0.000)	2.04 (0.001)
	Access to computer	1.52 (0.090)	N/A	N/A
	Eating breakfast	N/A	1.66 (0.125)	1.38 (0.398)
	Experience of no place to live	N/A	1.88 (0.130)	2.01 (0.154)
Healthy	Enjoyment of exercise	0.79 (0.604)	1.46 (0.199)	2.29 (0.001)
	Adequate fruit and vegetables	1.37 (0.104)	1.15 (0.534)	1.35 (0.137)
	Mental health	0.99 (0.968)	2.22 (0.000)	2.10 (0.001)

Learning	School attendance	1.76 (0.012)	1.62 (0.058)	2.55 (0.000)
	School satisfaction	0.70 (0.099)	1.50 (0.067)	2.02 (0.004)
	Parent engagement in learning (wave 4, wave 5) Number of books in home (wave 6)	2.26 (0.005)	0.64 (0.122)	0.99 (0.973)
	Participation in cultural activities	2.34 (0.021)	0.76 (0.580)	0.69 (0.456)
Participating	Having a say in family decisions	N/A	N/A	1.79 (0.051)
	Having a say within the community	N/A	N/A	N/A
	Regular participation in extracurricular activities	1.77 (0.003)	0.88 (0.675)	1.06 (0.854)
	Sense of belonging	N/A	N/A	N/A

Notes: - Dependent variable is the deprivation indicator and independent variable is whether child has a disability
- Children without disability used as reference group
- p-value from chi-square test in brackets

Table 44: Odds ratio and p-values for multi-dimensional and deep deprivation for children living in monetary poverty

	Wave 4 (age 6-7)	Wave 5 (age 8-9)	Wave 6 (age 10-11)
Living in multi-dimensional deprivation	2.72 (0.000)	3.16 (0.000)	2.80 (0.000)
Living in deep deprivation	3.02 (0.000)	1.76 (0.000)	2.10 (0.000)

Notes: - Dependent variable is the living in multi-dimensional/deep deprivation and independent variable is whether child is living in monetary poverty
- Children not in monetary poverty used as reference group
- p-value from chi-square test in brackets

Table 45: Odds ratio and p-values for deprivation in indicators for children living in monetary poverty

Nest dimension	Indicator	Wave 4 (age 6-7)	Wave 5 (age 8-9)	Wave 6 (age 10-11)
Loved and Safe	Relationship with friends	1.88 (0.000)	1.84 (0.000)	1.35 (0.052)
	Relationship with parents (Fun with family at wave 4)	1.21 (0.485)	1.65 (0.245)	1.17 (0.539)
	Frequent yelling at home	N/A	1.05 (0.697)	1.51 (0.008)
	Frequent bullying or social exclusion	1.15 (0.259)	1.03 (0.822)	1.22 (0.176)

Material Basics	Financial security of family	3.14 (0.000)	3.74 (0.000)	3.55 (0.000)
	Access to computer	2.93 (0.000)	N/A	N/A
	Eating breakfast	N/A	1.70 (0.020)	1.76 (0.009)
	Experience of no place to live	N/A	2.41 (0.001)	2.44 (0.007)
Healthy	Enjoyment of exercise	1.54 (0.055)	1.10 (0.631)	1.45 (0.071)
	Adequate fruit and vegetables	1.46 (0.002)	1.26 (0.075)	1.43 (0.006)
	Mental health	1.33 (0.102)	1.62 (0.002)	1.59 (0.003)
Learning	School attendance	1.51 (0.008)	1.67 (0.001)	1.94 (0.000)
	School satisfaction	1.15 (0.250)	0.92 (0.564)	1.33 (0.141)
	Parent engagement in learning (wave 4, wave 5) Number of books in home (wave 6)	2.41 (0.000)	1.38 (0.039)	3.02 (0.000)
	Participation in cultural activities	1.84 (0.022)	1.75 (0.024)	2.72 (0.000)
Participating	Having a say in family decisions	N/A	N/A	1.20 (0.448)
	Having a say within the community	N/A	N/A	N/A
	Regular participation in extracurricular activities	3.13 (0.000)	3.74 (0.000)	2.90 (0.000)
	Sense of belonging	N/A	N/A	N/A

Notes: - Dependent variable is the deprivation indicator and independent variable is whether child is in monetary poverty
 - Children not in monetary poverty used as reference group
 - p-value from chi-square test in brackets

Table 46: Odds ratio and p-values for multi-dimensional and deep deprivation for children in jobless families

	Wave 4 (age 6-7)	Wave 5 (age 8-9)	Wave 6 (age 10-11)
Living in multi-dimensional deprivation	3.95 (0.000)	4.87 (0.000)	4.53 (0.000)
Living in deep deprivation	3.47 (0.000)	2.22 (0.000)	3.11 (0.000)

Notes: - Dependent variable is the living in multi-dimensional/deep deprivation and independent variable is whether child is in a jobless family
- Children not in jobless family used as reference group
- p-value from chi-square test in brackets

Table 47: Odds ratio and p-values for deprivation in indicators for children living in jobless families

Nest dimension	Indicator	Wave 4 (age 6-7)	Wave 5 (age 8-9)	Wave 6 (age 10-11)
Loved and Safe	Relationship with friends	2.88 (0.000)	2.82 (0.000)	1.88 (0.000)
	Relationship with parents (Fun with family at wave 4)	1.93 (0.024)	0.34 (0.149)	0.70 (0.351)
	Frequent yelling at home	N/A	0.94 (0.715)	1.38 (0.098)
	Frequent bullying or social exclusion	1.20 (0.238)	1.63 (0.001)	1.97 (0.000)
Material Basics	Financial security of family	3.52 (0.000)	4.53 (0.000)	4.26 (0.000)
	Access to computer	3.45 (0.000)	N/A	N/A
	Eating breakfast	N/A	2.20 (0.002)	2.35 (0.000)
	Experience of no place to live	N/A	4.32 (0.000)	4.10 (0.000)
Healthy	Enjoyment of exercise	1.27 (0.409)	1.21 (0.440)	2.15 (0.001)
	Adequate fruit and vegetables	1.83 (0.000)	1.47 (0.020)	1.82 (0.000)
	Mental health	1.21 (0.363)	1.39 (0.111)	2.45 (0.000)

Learning	School attendance	2.33 (0.000)	2.02 (0.000)	2.41 (0.000)
	School satisfaction	1.32 (0.063)	1.18 (0.366)	1.49 (0.094)
	Parent engagement in learning (wave 4, wave 5) Number of books in home (wave 6)	2.38 (0.000)	1.18 (0.398)	2.45 (0.000)
	Participation in cultural activities	3.41 (0.000)	2.02 (0.013)	3.06 (0.000)
Participating	Having a say in family decisions	N/A	N/A	1.52 (0.140)
	Having a say within the community	N/A	N/A	N/A
	Regular participation in extracurricular activities	3.72 (0.000)	5.07 (0.000)	4.80 (0.000)
	Sense of belonging	N/A	N/A	N/A

Notes: - Dependent variable is the deprivation indicator and independent variable is whether child is in a jobless family
- Children not in jobless family used as reference group
- p-value from chi-square test in brackets

Nest dimension	Indicator	Wave 4 (age 6-7)		Wave 5 (age 8-9)		Wave 6 (age 10-11)	
		Compared to children in poverty only	Compared to children in jobless family only	Compared to children in poverty only	Compared to children in jobless family only	Compared to children in poverty only	Compared to children in jobless family only
Loved and Safe	Relationship with friends	1.82 (0.026)	0.71 (0.289)	2.16 (0.004)	1.03 (0.930)	1.40 (0.246)	0.66 (0.255)
	Relationship with parents (Fun with family at wave 4)	1.98 (0.185)	0.72 (0.575)	0.11 (0.038)	0.44 (0.564)	0.61 (0.332)	2.08 (0.501)
	Frequent yelling at home	N/A	N/A	0.71 (0.197)	0.75 (0.392)	0.85 (0.573)	0.89 (0.772)
	Frequent bullying or social exclusion	1.06 (0.813)	0.96 (0.893)	1.77 (0.012)	0.76 (0.334)	2.18 (0.005)	0.86 (0.675)
Material Basics	Financial security of family	1.37 (0.129)	0.98 (0.944)	2.49 (0.000)	2.17 (0.006)	1.70 (0.026)	1.19 (0.605)
	Access to computer	2.00 (0.007)	1.56 (0.203)	N/A	N/A	N/A	N/A
	Eating breakfast	N/A	N/A	1.15 (0.733)	0.65 (0.363)	1.27 (0.547)	0.64 (0.351)
	Experience of no place to live	N/A	N/A	2.28 (0.071)	0.77 (0.560)	4.26 (0.032)	0.84 (0.771)
Healthy	Enjoyment of exercise	0.82 (0.637)	1.13 (0.846)	1.01 (0.973)	0.81 (0.657)	1.71 (0.156)	0.74 (0.516)
	Adequate fruit and vegetables	1.62 (0.039)	1.06 (0.840)	1.19 (0.486)	0.88 (0.709)	1.63 (0.053)	1.09 (0.791)
	Mental health	0.89 (0.727)	1.02 (0.960)	0.97 (0.912)	1.28 (0.559)	1.97 (0.020)	0.82 (0.599)
Learning	School attendance	1.88 (0.030)	0.74 (0.361)	1.17 (0.608)	0.76 (0.434)	1.91 (0.049)	1.43 (0.435)
	School satisfaction	1.70 (0.021)	1.60 (0.151)	1.28 (0.399)	0.80 (0.529)	1.24 (0.551)	1.01 (0.992)
	Parent engagement in learning (wave 4, wave 5) Number of books in home (wave 6)	1.02 (0.960)	0.89 (0.795)	0.74 (0.311)	0.82 (0.617)	1.54 (0.191)	5.52 (0.008)
	Participation in cultural activities	2.15 (0.110)	0.58 (0.263)	1.50 (0.368)	1.22 (0.710)	2.79 (0.015)	4.99 (0.038)

						1.35 (0.494)	0.82 (0.727)
Participating	Having a say in family decisions	N/A	N/A	N/A	N/A	1.35 (0.494)	0.82 (0.727)
	Having a say within the community	N/A	N/A	N/A	N/A	N/A	N/A
	Regular participation in extracurricular activities	2.06 (0.001)	1.62 (0.098)	2.09 (0.003)	1.20 (0.547)	2.71 (0.001)	1.00 (0.998)
	Sense of belonging	N/A	N/A	N/A	N/A	N/A	N/A

Table 48: Odds ratio and p-values for deprivation in indicators for children who are in jobless families and in monetary poverty

Notes: - Dependent variable is the deprivation indicator and independent variable is whether child is in both a jobless family and in monetary poverty

- To calculate the "compared to children in poverty only" odds ratios, the sample was restricted to those in monetary poverty. To calculate the "compared to children in jobless families only" odds ratio, the sample was restricted to those in jobless families.

- Children living in monetary poverty only, or in jobless family only used as reference group

- p-value from chi-square test in brackets

Appendix 8 – Deprivation groupings for analysis of multi-dimensional deprivation

Table 49: Breakdown of combinations of deprivations for children who are multi-dimensionally deprived (%)

Combination of dimensions deprived	Wave 4 (age 6-7)	Wave 5 (age 8-9)	Wave 6 (age 10-11)
Loved and Safe; and Material Basics; and Healthy	5.34%	14.98%	14.08%
Loved and Safe; and Material Basics; and Learning	10.64%	12.29%	6.04%
Loved and Safe; and Material Basics; and Participating	4.48%	3.21%	2.46%
Loved and Safe; and Healthy; and Learning	15.15%	23.02%	15.79%
Loved and Safe; and Healthy; and Participating	2.81%	3.38%	8.40%
Loved and Safe; and Learning; and Participating	3.85%	5.18%	4.02%
Material Basics; and Healthy; and Learning	9.40%	4.85%	5.65%
Material Basics; and Healthy; and Participating	5.76%	1.87%	3.43%
Material Basics; and Learning; and Participating	5.54%	1.50%	2.33%
Healthy; and Learning; and Participating	5.82%	1.80%	1.95%
Loved and Safe; and Material Basics; and Healthy; and Learning	9.23%	12.66%	10.48%
Loved and Safe; and Material Basics; and Healthy; and Participating	2.36%	3.19%	5.30%
Loved and Safe; and Material Basics; and Learning; and Participating	5.23%	2.27%	1.73%

Loved and Safe; and Healthy; and Learning; and Participating	3.58%	3.35%	6.30%
Material Basics; and Healthy; and Learning; and Participating	5.55%	2.53 %	4.76%
Loved and Safe; and Material Basics; and Healthy; and Learning; and Participating	5.26%	3.90%	7.27%
Total	100%	100%	100%

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