



# Measuring What Matters: Drawing on a Participatory Wellbeing Framework and Existing Data to Assess Child Wellbeing Outcomes Over Time

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## Abstract

A growing body of research highlights the importance of increasing children’s involvement in the measurement of their wellbeing. Using data from Australia, this paper outlines the first known attempt to apply an existing participatory wellbeing framework to an existing longitudinal dataset to measure child wellbeing over time. This approach enables analysis of the key areas where life could be improved for children based on what they themselves value, an examination of whether children are having wellbeing needs met in multiple dimensions and over time, and an exploration into the later wellbeing impacts of early life experiences. The results highlighted some areas of concern for children and young people in Australia, including the low proportion meeting the wellbeing threshold in health, and the high level of inequality within material basics when this is examined over time. We apply the indicator set to examine the implications of being born into monetary poverty on later wellbeing outcomes. Being born into poverty was associated with poorer outcomes in almost all wellbeing areas (Loved & Safe, Material Basics, Learning and Participating) by age 6–7 years. While some of these associations diminished as children got older, being born into poverty had a continued relationship with poorer outcomes in Material Basics and Participating in all time points examined (up until age 12–13). In sum, this paper provides an illustration of how a child participatory wellbeing framework can be applied to a longitudinal dataset to measure wellbeing over time, highlighting how this approach can help to ensure policy more effectively creates measurable and meaningful change for children and young people.

**Keywords** Child wellbeing · Wellbeing framework · Participatory approaches · Longitudinal · Multidimensional · Indicator selection · Monetary poverty · Early years

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## 1 Introduction and Background

There is a growing movement throughout the world to make better use of wellbeing measures to assess progress and guide policy (Stiglitz et al., 2009). Alongside this is a recognition that in order to measure “what matters to people”, the development of such indicators of wellbeing should be guided by how the target population defines a “good life”, or how they conceptualise wellbeing (Sen, 1999; White & Pettit, 2004), ensuring that policy and programs are targeted to address what matters most to individuals within a population. This has led to the development of participatory wellbeing frameworks throughout the world with people of all life stages, from young children to older adults (e.g. Biggeri et al., 2006; Clark, 2003; Grewal et al., 2006). It has been argued that while it is important to consult directly with all population groups as to how they understand and conceptualise wellbeing, it is particularly imperative for marginalised groups, who often have fewer opportunities to have their voices heard within the policy domain, and are likely to have varied understandings of wellbeing compared to the general population (Percy, 2003; Thomas et al., 2012; Yap & Yu, 2016).

Through not having the ability to vote and having little influence in policy, children and young people generally have limited opportunities to have their voices heard. Historically, this group has also been excluded from the research process, and had little say in how their wellbeing is measured (Ben-Arieh, 2005). This realisation has led to research studies making greater efforts to improve the level of research participation for children and young people. For example, over the last two decades we have seen more research studies using child-centric measures to directly reflect the perceptions, views and situation of the child themselves, instead of inferring this through household characteristics (Grané et al., 2020; Main & Bradshaw, 2012; McAuley, 2012). More recently, there has been a growing movement towards participatory approaches, whereby children and young people are seen as equal partners in the research process (Gallacher & Gallagher, 2008; Pole et al., 1999).

Involving children and young people in all stages of the research process can come with a number of benefits, such as improved agency (Biggeri et al., 2006) and more meaningful policy change (Fattore et al., 2007). However, one limitation of this approach is the capacity to meaningfully engage children in participatory studies (Holland et al., 2010; Pole et al., 1999). Another is the resources and funding required to undertake full-scale participatory projects.

An alternative in these instances would be to draw on existing child participatory wellbeing frameworks to measure wellbeing. Doing so can provide a healthy balance between not including children’s voices in the research process at all (low resourcing/funding, low participation) and involving children as equal partners in the research process (high resourcing/funding, high participation). A child participatory wellbeing framework, as defined in this study, is one that engages with children to develop a set of dimensions, domains or themes that reflect wellbeing, or a good life. While participatory wellbeing frameworks for children and young people have been developed in a range of contexts throughout the world, from young people with disability in Uganda (Biggeri & Ferrannini, 2014), to children in Ethiopia (Camfield & Tafere, 2009), and children in rural and urban areas of Australia (Fattore et al., 2007), very few have been used to guide indicator selection for quantitative cross-sectional analysis, and to the authors’ best knowledge, none have been applied for longitudinal analysis.

There are two key aims to this study. Firstly, the paper presents a methodology to apply a child participatory wellbeing framework to an existing longitudinal dataset, which can be

used as an exemplar for researchers seeking to more closely measure what matters to people. Secondly, the analysis examines the long-term wellbeing associations of being born into poverty on the measures that matter to children in Australia. This both highlights the value of utilising participatory wellbeing frameworks for indicator selection in existing datasets, and provides a deeper insight into the long-term trajectories of children born into higher levels of disadvantage in Australia.

There are four key benefits of applying a child participatory wellbeing framework to guide indicator selection to longitudinal analysis. Firstly, doing so ensures that the measures have direct relevance, and capture the aspects of life that matter, for children (De Berry et al., 2003; Fattore et al., 2009; González-Carrasco et al., 2019; Redmond et al., 2016; Saunders et al., 2019). This ultimately means that we obtain a more refined and nuanced conceptualisation of wellbeing that is directly applicable to the target population. Previous research has highlighted that processes to develop child wellbeing frameworks which exclude children's voices can overlook some aspects of life that are important to them (Fane et al., 2020; Vujčić et al., 2019).

Secondly, from a child rights-based perspective, it is vital that children are included in decisions that affect them. Article 12 of the United Nations Convention on the Rights of the Child emphasises the importance of respect for children's views, stipulating that children have a right to be heard on issues that affect them (UN General Assembly, 1989). Given the utility of wellbeing measurement to inform policy, it is vital that children are included in this process from the start, ensuring that they have agency and a say in how their wellbeing is defined.

Thirdly, incorporating children's voices into wellbeing measurement can ultimately help to ensure that policies and programs for children are developed and adapted to improve their lives in a meaningful way. As noted by Fattore et al., (2009, p. 74) "...when we seek to gain an understanding of the meanings that children attach to well-being, it prompts a reassessment both of the issues to be regarded as policy relevant and the parameters of existing policy debate on children's issues.". To ensure these meanings are considered for policy, we need to be developing measures that align with these conceptualisations of wellbeing. Thus, as well as providing a unique perspective into the wellbeing of children and ensuring children's rights are met, using participatory frameworks to guide indicator selection for the measurement of wellbeing also helps to ensure that policy considers children's understandings of wellbeing.

Finally, given the significant transition periods that are experienced throughout childhood and adolescence (Edwards, 2012; Elder et al., 1993; Morris et al., 2005; Sroufe, 1979), how wellbeing is understood is likely to be different for children and young people at different ages. Therefore, applying a flexible framework for wellbeing that incorporates the views of children and young people allows for variation in wellbeing measures over time. This ensures that indicators to measure child wellbeing over time can be adapted to reflect the changing nature of what matters to children and young people over their life course.

Within the international context, a small number of cross-sectional studies have drawn on participatory approaches to provide quantitative measurements of child wellbeing. For example, Trani et al. (2013) utilised a participatory wellbeing framework developed by Biggeri et al. (2006) to measure child wellbeing in Afghanistan using the Afghanistan National Disability Survey. Dimensions for which data was available were represented through the most relevant indicator, with analysis comprising of deprivation rates produced for each indicator, as well as aggregated dimensions. By taking a multidimensional lens, the authors were able to report on rates of multidimensional

wellbeing, as well as highlight specific dimensions of concern for children in Afghanistan. Specifically, access to education for girls and children with disability was identified as a crucial barrier, as well as access to healthcare facilities.

Redmond et al. (2016) drew on in-depth discussions on meanings of wellbeing for children in Australia to develop data items for a cross-sectional wellbeing survey. Data items within this survey were subsequently aggregated to develop a wellbeing index (Redmond et al., 2016, 2018). The results highlighted that young people with disability, young carers, and materially disadvantaged young people have, on average, lower wellbeing than non-marginalised young people. Finally, while measuring a slightly different construct, participatory approaches have been applied to measure child material deprivation using the consensus approach by Townsend (1987) in a number of contexts throughout the world (e.g. Gross-Manos, 2015; Main & Pople, 2011; Saunders et al., 2019; Swords et al., 2011). To the authors' best knowledge, there are no studies that have previously applied an adult or child participatory wellbeing framework for longitudinal analysis.

In sum, the research literature on applying child participatory wellbeing frameworks to support quantitative analysis has been limited to cross sectional studies, and absent for longitudinal studies. This is the case even for contexts where both child participatory wellbeing frameworks and longitudinal studies of children already exist, such as Ireland (Gabhainn & Sixsmith, 2005) and the United Kingdom (The Children's Society, 2006). Expanding the research base on how wellbeing changes over time is important to ascertain when best to intervene, what alters the trajectories of wellbeing, and the persistence of wellbeing states for certain groups.

This paper thus provides a unique approach to examining the wellbeing of children over time, with wellbeing defined by children and young people themselves. Building on an initial working paper by Sollis (2019), this study seeks to contribute to the literature base by providing an illustration of how participatory wellbeing frameworks can be applied to measure wellbeing over childhood using existing longitudinal data.

The analysis also contributes to the existing research base in Australia on child wellbeing (e.g. Bessell, 2019; Edwards & Baxter, 2013; Mishra et al., 2017; Redmond et al., 2018; Saunders & Brown, 2020; Warren, 2017) by developing an indicator set for use with a widely-used nationally-representative longitudinal dataset, the Longitudinal Study of Australian Children (LSAC), which can be used to more deeply examine the influences, trends and trajectories of child wellbeing. In particular, this paper will use the indicator set developed to examine the long-term associations of being born into poverty. The LSAC data has been used extensively to explore various aspects of child wellbeing through longitudinal analysis (e.g. Howard & Williams, 2018; Mishra et al., 2017; O'Loughlin et al., 2022; Wang et al., 2019; Warren, 2017). For example, in developing a longitudinal multi-dimensional poverty index based on the UN Convention on the Rights of the Child, Mishra et al. (2017) found that health and emotional wellbeing were the largest areas of concern, driven predominantly through poor body weight and bullying. Warren (2017) examined the influence of poverty on cognitive, social and health outcomes, finding that children who had experienced poverty at some points in their lives were significantly more likely to have poorer outcomes on all measures. This was exacerbated for children who lived in persistent levels of poverty. This study will make a substantial contribution to this existing research by selecting dimensions and indicators for analysis based on what children and young people in Australia themselves have identified as important for their wellbeing, as well as examining the associations between early experiences of poverty and these wellbeing measures. Furthermore, researchers can utilise this indicator set in LSAC for further

analysis of child wellbeing outcomes.<sup>1</sup> This will help to inform Australian governments and the community on where resources can be best placed from a child's perspective.

This paper will firstly outline the methodology applied for this study, which included the use of the Nest framework developed by ARACY (2012), UNICEF's Multiple Overlapping Deprivation Analysis (MODA) (De Neubourg et al., 2013) and the Longitudinal Study of Australian Children (LSAC). Four time points were examined, when children were aged between 6 and 13. The findings will then be outlined through descriptive statistics, with the value of the approach demonstrated through a case study examining the impact of being born into poverty on later wellbeing outcomes. Finally, the paper will conclude by discussing the results in greater detail, as well as providing some reflections on the value of taking utilising a participatory wellbeing framework to examine wellbeing using an existing longitudinal dataset.

## 2 Methodology

This section will outline the methodology used to develop an indicator set based on for use with an existing longitudinal dataset to measure child wellbeing over time based on data in Australia. The methodology is based on the Multiple Overlapping Deprivation Analysis (MODA) approach, developed by UNICEF to measure the deprivation, wellbeing, or poverty of children (De Neubourg et al., 2013), with a number of exceptions as described below. MODA was chosen as the most suitable method due to its emphasis on seeing the child as the unit of analysis, and its acknowledgement that the needs of children change throughout the life course. MODA also discourages aggregating wellbeing or deprivation information into one single index or number, so that individual dimensions can be examined separately. Enabling the analysis of individual dimensions was seen as vital in order to comprehensively investigate the wellbeing of children in all its forms (De Neubourg et al., 2013).

However, despite MODA broadly being a highly suitable approach for this analysis, the methodology to develop the indicator set diverged somewhat from the step-by-step guidelines put forward by De Neubourg et al. (2013). This was done to ensure its appropriateness for measuring wellbeing, as defined by a participatory wellbeing framework, and to accord with the available data source. Firstly, this study applies the MODA methodology, but explicitly uses it as an approach to measure wellbeing, as opposed to deprivation. Focusing on wellbeing is consistent with the original intention of the MODA methodology, however previous studies using this approach have used it to measure deprivation (e.g. Chzhen et al., 2018; Chzhen & Ferrone, 2017; Ferrone & de Marlous, 2018). Moreover the value of using a strengths-based approach to measure wellbeing has been established through previous literature (Armstrong et al., 2012; Bornstein et al., 2003).

Secondly, where established indicator thresholds for indicators were not available, an alternative method was applied to determine thresholds based off the available data. While the MODA methodology suggests using a relative approach in this case (De Neubourg et al., 2013), there are no clear recommendations on how to determine the relative indicator threshold. Furthermore, utilising a relative approach would not align with

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<sup>1</sup> The Stata code to create the indicator set can be accessed at <http://dx.doi.org/10.26193/AJQSF>.

the strengths-based approach we are utilising for this study. For this reason, we applied an alternative approach which is described in Sect. 2.3.

Finally, in contrast to the MODA approach of using correlations to inform the choice of indicators within dimensions (De Neubourg et al., 2013), we rely on the participatory wellbeing framework to drive choices on the placing of indicators within dimensions. Given the multiple waves over time, this approach also avoids arbitrary aggregation of indicators to one dimension at one time point and then another dimension at another time point. Furthermore, it is well established that different dimensions of wellbeing are highly correlated, mutually reinforcing, and synergistic (e.g. Navarro et al., 2019).

The rest of the section will describe each of the steps taken to develop an indicator set to measure the wellbeing of children and young people over time using an existing dataset. Firstly, we will outline the participatory wellbeing framework that was used to guide the development of the measurement tool, before describing how this framework was operationalised to guide indicator selection to measure wellbeing. Thirdly, the available data will be described. Fourthly, the approach to guide indicator selection and identify indicator thresholds with the available data will be outlined. We also describe how missing data was dealt with. Finally, the approach used to aggregate dimensions and identify dimension thresholds will be articulated, before summarising the analysis approach.

## 2.1 Applying an Australian Participatory Wellbeing Framework

There are a number of child participatory wellbeing frameworks that have been developed in the Australian context (e.g. ARACY, 2012; Fane et al., 2020; Fattore et al., 2007; Foley et al., 2012; Redmond et al., 2016). Given that this project sought to develop an indicator set to measure child wellbeing at the national level throughout the life course, the Nest framework, developed by ARACY (2012), was seen as the most appropriate framework to apply for this study. This is due to it being reflective of wellbeing at the national level, as well as children and young people from the ages of 4–24 being included in the consultation process. The motivation for the framework was primarily driven from a child rights perspective, to amplify the voices of children and young people in setting future priorities.

The consultations comprised of activities with children and young people themselves, as well as parents. In total, 557 children and young people, and 28 parents were included in consultation activities in various locations across Australia. These workshops were predominantly run in partnership with organisations across the country, including early child-care centres and service providers (including those providing services to children with disability). Consultations with younger children involved creative activities and role play, while consultations with young people included forums, discussion sessions, and engagement with individuals in public spaces such as local shopping malls and skate parks. The consultations highlighted five key wellbeing areas children and young people identified as important to their wellbeing; being loved and safe, having material basics, being healthy, learning, and participating.<sup>2</sup> Being loved and safe comprised of connections and relationships, friendships, being in an environment with nurture, safety and support, and being safe through a stable, secure home and school environment, and the absence of conflict,

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<sup>2</sup> Having a positive sense of identity and culture was later added as a sixth dimension (ARACY, 2014), however this dimension is not included in the analysis as it was not drawn out of the participatory process. Furthermore, recent research suggests this dimension has high overlap with the other Nest dimensions (Renshaw, 2019).

abuse and harm. Material basics consisted of the provision of food and water, housing and shelter, sanitation, service provision, and other material goods. Healthy included physical health (nutrition and exercise), and mental health (state of mind and sense of self), as well as mental stimulation. Learning included access to and participation of formal education, self-learning and development, participation and satisfaction with school, exposure to different environments and situations, and having social connections and interactions. Finally, the Participating domain consisted of having a say, engaging in community, sense of belonging, a network of support and provision, and activities/leisure pursuits (ARACY, 2012).

In order to measure the wellbeing of children and young people based on the Nest framework, each dimension was operationalised into four sub-domains based on the detailed description provided in the consultation document (ARACY, 2012, pp. 27–32), outlined in Table 1. A consistent number of four sub-domains (which go on to guide indicator selection) was chosen to ensure conciseness, while also allowing for breadth in reflecting the key areas of wellbeing raised by children and young people. As noted in the MODA guidelines, it is important to keep the number of sub-domains within each dimension consistent so as not to distort the probability of a child being more likely to meet the wellbeing threshold for a particular dimension simply due to their being fewer sub-domains within that dimension (De Neubourg et al., 2013). These sub-domains comprehensively reflect the key areas highlighted by the children and young people through the consultation process. However, one area, ‘the provision of basic services such as health, education and welfare’, was not able to be incorporated into the ‘Material Basics’ dimension, given the importance of maintaining only four sub-domains in each dimension. While this is a limitation in the methodology, this area is proxied elsewhere within the indicator set, through ‘Attending school’ within the Learning dimension and ‘Financial security of family’ within the Material Basics dimension.

## 2.2 Using the Longitudinal Study of Australian Children (LSAC)

The Longitudinal Study of Australian Children (LSAC) was identified as the most appropriate data source for this study, given that it collects in-depth information on various aspects of children’s wellbeing over time. Its theoretical framework is grounded in the ecological model of child development established by Bronfenbrenner (1979). LSAC surveys two nationally representative cohorts of children, who were randomly selected in 2004. The Babies (B) cohort were aged 0–1, while the Kindergarten (K) cohort were aged 4–5 (Australian Institute of Family Studies, 2018). The most recent available wave at the time of writing was wave 7, which was conducted in 2016 when the B cohort were aged 12–13, and the K cohort were aged 16–17. The B cohort was chosen as the population of interest, to allow for analysis of the impact of experiences in the early years on later wellbeing outcomes. Waves 4–7 were used for the analysis, which corresponds to an age range of age 6–7 in 2010, to 12–13 in 2016.

Each wave of LSAC includes questions relevant to the wellbeing of the study child which are responded to either by 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, 2018). The questions vary by wave to reflect any societal changes, as well as to account for the changing nature of wellbeing throughout the life-course. As the cohorts of children get older, the number of questions that they themselves respond to increases.



**Table 1** Sub-domains to reflect each Nest dimension

Nest dimension	Sub-domains	Description of sub-domain in consultation report
Loved and safe	Relationship with friends	Connections and relationships that children and young people have, as well as friendships, were frequently mentioned (p27)
	Relationship with parents	Immediate family relationships (parents and siblings) were identified to be the most important (p27)
	Safe home environment	Perceptions of safety were noted to be “underpinned by being in a stable, secure home environment with care and provision from those around you” (p28)
	Safe school environment	Young people in particular discussed “safety in relation to the school environment and the issue of bullying” (p28)
	Financial security of family	This sub-domain was identified to broadly capture the various aspects of material basics identified, such as “food and water, housing and shelter, health, and sanitation, as well as provision of services such as “health, education, and welfare” (p32)
Material basics	Access to basic goods (e.g. toys, clothes, computer)	Access to material goods, such as “toys, phones, and computers/access to the internet” (p32)
	Food security	Access to food and water (p32)
	Access to adequate shelter and sanitation	Access to housing and shelter (p32)
	Exercising regularly	Being healthy was commonly linked to exercise, which was expressed by children and young people through “participation in sports, both in and out of school”, as well as leisure activities such as “skateboarding and surfing” (p28)
	Healthy diet	The notion of nutrition was frequently raised in relation to being healthy, with participants talking of eating well, tied closely to mentions of fresh fruit and vegetables, and eating less ‘fast food’ or ‘junk food’ (pp28-29)
Healthy	Good mental health	Mental health was raised less frequently than physical health. For some, healthiness was seen as an absence of depression, anxiety and self-harm (p29)
	Good state of mind	Participants also noted a “positive, happy state-of-mind and sense of self-worth” in relation to health (p29)
	Attending school	Access to formal education were noted as important to learn and develop (p29)
	Satisfied at school	Participants noted that participation in school, including enjoyment and engagement, was crucial to learning and overall wellbeing (p29)
	Learning at home	The opportunity for self-learning and development, as well as learning in different environments were strongly emphasised in the consultations (p29)
Learning	Participating in cultural activities	Being exposed to different environments and situations, as well as interactions with peers in the community were seen as important learning and development opportunities (p30)



**Table 1** (continued)

Nest dimension	Sub-domains	Description of sub-domain in consultation report
Participating	Having a say in family decisions	Children and young people highlighted the importance of having a say, including being both listened to and taken seriously. This was “driven primarily by a sense that their opinion is not taken seriously because they are young” (p30)
	Having a network of support	A ‘network of support and provision’ was noted as being vital to community belonging and engagement. This was of particular importance for those with less support in their immediate home environment (p31)
	Involvement in community	Engagement in communal events and activities, and contributing towards these, were seen as important aspects of being part of a community, as well as activities and leisure pursuits (p31)
	Sense of belonging	Community was also described as being more internalised, through connection with others and a sense of belonging in their community (p31)

Page numbers of relevant sections in consultation document (ARACY, 2012) listed in brackets

The attrition rate in LSAC is relatively low. The wave 4 B cohort sample was 4242 children with a response rate of 82% with respect to the starting sample. The sample size decreased to 4085 in wave 5; 3764 in wave 6; and 3381 in wave 7 (Australian Institute of Family Studies, 2018). Both cross-sectional and longitudinal weights are available in the data, both of which were utilised in this analysis. Indicators for the study are driven predominantly through an expert advisory committee.<sup>3</sup>

### 2.3 Indicator Selection and Determining Indicator Thresholds

By using the framework outlined in Table 1, indicators in waves 4, 5, 6 and 7 of the B cohort in LSAC that most closely represented each sub-domain were identified. Given the changing nature of wellbeing throughout the life course, indicators were not intentionally sought to be consistent over time. Rather, the most applicable data item at each wave, which was the closest representation to that sub-domain, was chosen. This means that some caution needs to be taken in comparing changes across time for those indicators which are not consistent. To avoid skewing of results, a sub-domain was represented through data items only if it was available in more than one wave. This resulted in the ‘exercising regularly’ sub-domain not being measured in any wave due to a relevant data item being available only at wave 7 (days of 60 min + exercise per week).

Two principles guided the selection of indicators. Firstly, all survey questions incorporated within a sub-domain must be asked of all study children (or their parents/teachers, where applicable). Secondly, recognising the importance of hearing the voices of children, items answered by the study child were prioritised over items answered by parents or teachers. Where no appropriate child-responded data item was available, items from parents and/or teachers were used. It should be noted that around half of the indicators were responded to by children themselves, with the number of child-responded indicators growing as the waves progressed. This reflects the challenges in engaging directly with young children through surveys, with ethical guidelines ensuring that children are protected from potential harms of participation, and that young children have the ability or aptitude to answer certain questions (Powell et al., 2020). A broad literature base highlights the value and necessity of parental-proxy reports for certain questions related to young children (e.g. Butten et al., 2021; Ghysels & Van Vlasselaer, 2008; Varni et al., 2007), which explains the large proportion of proxy indicators collected in the LSAC study for children at younger waves. Finally, if no indicator was available that adequately reflected (in at least some form) the sub-domain, that sub-domain was left as missing for a given wave.

A summary of the indicators selected at each wave is shown in Table 2. When contrasting these indicators with the sub-domains described in Table 1, we can see that the vast majority of selected indicators closely reflect the conceptualisations of wellbeing reported by children and young people.

In order to determine the threshold for a child achieving wellbeing according to a particular indicator, indicator thresholds were established. The MODA methodology suggests using either internationally agreed definitions, national norms or legislation, or a relative approach to identify indicator thresholds (De Neubourg et al., 2013). Figure 1 documents how we addressed these guidelines for item selection. Firstly, internationally agreed definitions, or national norms and legislation were used where they were available. Where no

<sup>3</sup> <https://growingupinaustralia.gov.au/about-study/research-team>.

**Table 2** Summary of indicators by wave

Nest dimension	Sub-domain	Wave 4 indicator	Wave 5 indicator	Wave 6 indicator	Wave 7 indicator
Loved and safe	Relationship with friends	Strengths & difficulties questionnaire peer problems scale (P1, P2, PLE, T)	Marsh peer relations scale (C)	Marsh peer relations scale (C)	Inventory of peer attachment (C)
	Relationship with parents	Fun with family at weekends (C)	Enjoyment of time with parents and seeking help (C)	Trust and communication scale (C)	Trust and communication scale (C)
	Safe home environment	Anger/hostility, violence between parents or feeling afraid of other parent (P1, P2, PLE)	Anger/hostility, violence between parents or feeling afraid of other parent (P1, P2, PLE)	Anger/hostility, violence between parents or feeling afraid of other parent (P1, P2, PLE)	Anger/hostility, violence between parents or feeling afraid of other parent (P1, P2, PLE)
	Safe school environment	Peers scale (C)	Bullying and Social Exclusion (C)	Bullying and Social Exclusion (C)	Bullying and Social Exclusion (C)
Material basics	Financial security of family	Hardship scale (P1)	Hardship scale (P1)	Hardship scale (P1)	Hardship scale (P1)
	Access to basic goods	Computer access (P1)	Internet access (P1)	Internet access (P1)	Internet access (P1)
	Food security	-	Ate breakfast today (P1)	Ate breakfast today (C)	Ate breakfast today (C)
	Access to adequate shelter	Overcrowding (P1) and condition of dwelling (I)	Experience of homelessness (P1), overcrowding (P1) and condition of dwelling (I)	Experience of homelessness (P1), overcrowding (P1) and condition of dwelling (I)	Experience of homelessness (P1), overcrowding (P1) and condition of dwelling (I)
Healthy	Exercising regularly	-	-	-	-
	Healthy diet	Food diary (P1)	Food diary (P1)	Food diary (C)	Food diary (C)
	Good mental health	Social emotional problems scale (C)	Social emotional problems scale (C)	Strengths & difficulties questionnaire emotional problems scale (C)	Short Mood and Feelings Scale, spence anxiety scale (C)
	Good state of mind	-	Marsh general-self scale (C)	Marsh general-self scale (C)	Life satisfaction (C)

Table 2 (continued)

Nest dimension	Sub-domain	Wave 4 indicator	Wave 5 indicator	Wave 6 indicator	Wave 7 indicator
Learning	Attending school	Number of days absent (P)	Number of days absent (P)	Number of days absent (P)	Number of days absent (P), truanting (C)
	Satisfied at school	School liking and avoidance scale (C)	School liking and avoidance scale (C)	School adjustment scale (C)	School adjustment scale (C)
	Opportunity to learn at home	Home activities index (P1)	Books in home, discussion about school activities, help with homework (P1, P2, PLE)	Books in home, discussion about school activities, help with homework (P1, P2, PLE)	Parental interest in learning and education (C)
Participating	Participating in cultural activities	Out of home activities index (P1)	Out of home activities index (P1)	Out of home activities index (P1)	Out of home activities index (P1)
	Having a say in family decisions	–	–	Having a say in family decisions (C)	Having a say in family decisions (C)
	Having a network of support	Emotional, informational & tangible support (P1, P2)	Emotional, informational & tangible support (P1, P2)	Emotional, informational & tangible support (P1, P2), Child social support (C)	Emotional, informational & tangible support (P1, P2), child social support (C)
Sense of belonging	Involvement in community	Extracurricular activities (P1)	Extracurricular activities (P1)	Extracurricular activities (P1)	Extracurricular activities, volunteering (C)
	Sense of belonging	Neighbourhood safety (P1, P2), sense of belonging in community (P1, P2)	Neighbourhood safety (P1), sense of belonging in community (P1, P2)	Neighbourhood safety (P1, P2), sense of belonging in community (P1, P2)	Experience of discrimination (C)

Due to a lack of information in LSAC on sanitation, this sub-domain has been amended to “Access to adequate shelter” only

While a data item for exercising regularly (days of 60 min + exercise per week) was available at wave 7, it was not used in the analysis to circumvent skewing of results due to it only being available at one wave

C = Child responded, P1 = Parent 1 responded, P2 = Parent 2 responded, PLE = Parent living elsewhere responded, T = Teacher responded, I = Interviewer responded

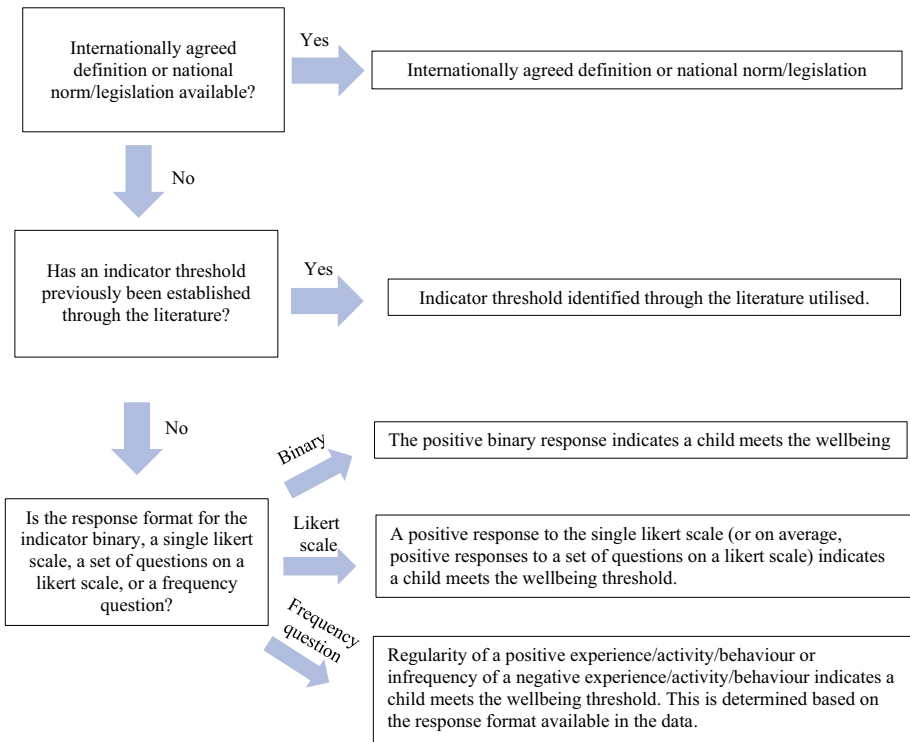


Fig. 1 Flowchart on how indicator thresholds were determined

such guidelines or norms were available for a given indicator, the literature was examined to identify whether an appropriate threshold had already been established.

In the absence of any of these guidelines, an indicator threshold was determined which aligned with the strengths-based approach emphasised within this study. Namely, to meet the threshold for wellbeing in a given indicator, a child should respond positively to an item (or respond positively on average to a set of items within a scale), or report engaging frequently in positive experiences/activities (or infrequently in negative experiences/activities). Figure 1 illustrates how indicator thresholds were established based on the available information, and the indicator’s response format. Information about each indicator threshold for each sub-domain at each wave is illustrated in "Appendix 1".

While the MODA guidelines suggest using a relative approach to measuring wellbeing where international guidelines or national norms are not available, this could result in developing indicator thresholds that are at odds with the strengths-based approach purported within this study. For example, if many children have high wellbeing in a certain area, a relative approach may still claim that a proportion of these children are not meeting the wellbeing threshold. Similarly, if many children have low wellbeing in a given area, a relative approach could claim that a proportion of these children are meeting the wellbeing threshold. The pragmatic approach we applied to identifying indicator thresholds presents an important balance between robustness, and making use of the data available. Furthermore, it provides a useful framework to guide the identification of indicator thresholds for future studies.

Where relevant data items were missing from a child, that respective sub-domain was coded to a missing value. This was seen as the most robust way to handle missing data, given that information on siblings is not collected (i.e. there is only one study child in each family in LSAC) which can be an approach used to overcome missing data items (De Neubourg et al., 2013). Imputation based on other data from the study child was not used to avoid inflating correlations between different indicators.

Where scales were applied, the respective indicator was coded to missing if greater than one third of scale items were missing. Similarly, a child was completely removed from the analysis for a wave if more than one third of sub-domains were missing. This removed 0.28%, 1.00%, 4.65% and 5.12% of records for waves 4, 5, 6 and 7 respectively. Analysis of the bias introduced through the removal of these records indicated that there was little significant relationship between a record being removed and the study child's sex, household income and highest qualification of the parents, as shown in "Appendix 2". After removing these records, the percentage of children with missing sub-domains were generally very close to 0%, as shown in "Appendix 3".

After identifying indicators and thresholds, as well as taking into account missing data, the correlations between sub-domains were compared at each wave. This was conducted for illustrative purposes, to examine the relationships between the different sub-domains. As shown in "Appendix 4", there were some moderate correlations (as defined by Cohen 1988) across different sub-domains in different dimensions, which highlights the inter-relatedness between wellbeing dimensions. While the MODA approach suggests that the correlations between sub-domains within a given dimension should be high, while those across different dimensions should be low (and indicators should thus be adjusted accordingly), we argue that it is of greater importance to ensure sub-domains are represented by how children themselves conceptualise their wellbeing. Furthermore, The Nest framework emphasises how the different wellbeing dimensions overlap (ARACY, 2012). We should therefore expect to see some high correlations between sub-domains in different dimensions.

A subsequent correlation check, outlined in "Appendix 5", presents the correlations of sub-domains at consecutive waves. Given that the methodology resulted in inconsistent data items being used to reflect the same sub-domain (due to both the changing nature of child wellbeing over time, and the availability of data items), it is important to assess the degree to which these inconsistent indicators correlate over time. The analysis indicated that while consistent indicators between waves (unsurprisingly) tended to be higher, the majority of correlations calculated using inconsistent indicators were significantly greater than zero. This analysis of correlations at the indicator level provides further credibility to the selection of indicators and their comparability over time.

## 2.4 Aggregation and Determining Dimension Thresholds

The aggregation technique utilised the union approach, which is encouraged by the MODA methodology. The union approach dictates that a child is automatically flagged as not meeting the threshold for wellbeing within a dimension if they are lacking wellbeing in any sub-domain within that dimension (De Neubourg et al., 2013). This approach was used given that it aligns closely with the theoretical basis for The Nest framework, which emphasises that children need to be having their needs met in all areas to be said to have high wellbeing.

## 2.5 Analysis Approach

The indicator set was firstly used to produce descriptive statistics at the dimension level (with results at the sub-domain level presented in "Appendix 6"). This included examining the rate of children meeting the wellbeing threshold at each dimension by wave, the distribution of the number of dimensions where children meet the wellbeing threshold for each wave, a longitudinal analysis exploring the persistence in meeting wellbeing thresholds over time, and a correlational analysis to assess the overlap in different dimensions.

The value of the approach was then further assessed by conducting a longitudinal analysis exploring the long-term wellbeing implications of being born into monetary poverty. This firstly involved developing a poverty flag for children when they were aged 0–1 based on wave 1 data, collected in 2004. A poverty line of \$304.29 for families where at least one parent is in the workforce, and \$246.74 for families where no parent was in the workforce (based off a single person living alone) was applied based on the poverty lines reported by Melbourne Institute of Applied Economic and Social Research (2004). Equivalence scales were applied using 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). When applying weights in LSAC, this resulted in a monetary poverty rate of 13.89% of children aged 0–1, which is roughly comparable to the 15% child poverty rate (for those aged 0–15) for the same period as reported by Davidson et al. (2018) when using data from the Australian Bureau of Statistics Survey of Income and Housing. While the poverty rate tends to be higher for families with children in their early years (Cassells et al., 2020), this lower rate may be influenced by greater non-response from those in more disadvantaged households (Soloff et al., 2006), which may not have been fully captured in the weighting strategy.

Several logit models were used to examine the implications of being born into poverty on all wellbeing dimensions at waves 4, 5, 6 and 7. Each dimension at each wave was used as a dependent variable, with poverty status at birth used as the independent variable. Additional models were also developed using current equivalised household income as a control variable.

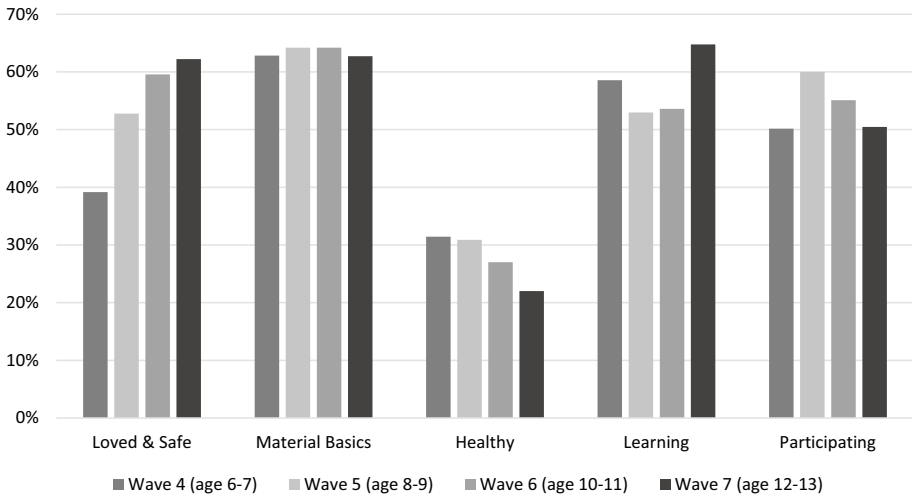
## 3 Results

This section will firstly outline the descriptive statistics from the indicator set, before going on to highlight the value of the value of this approach by analysing the long-term wellbeing associations of being born into monetary poverty.

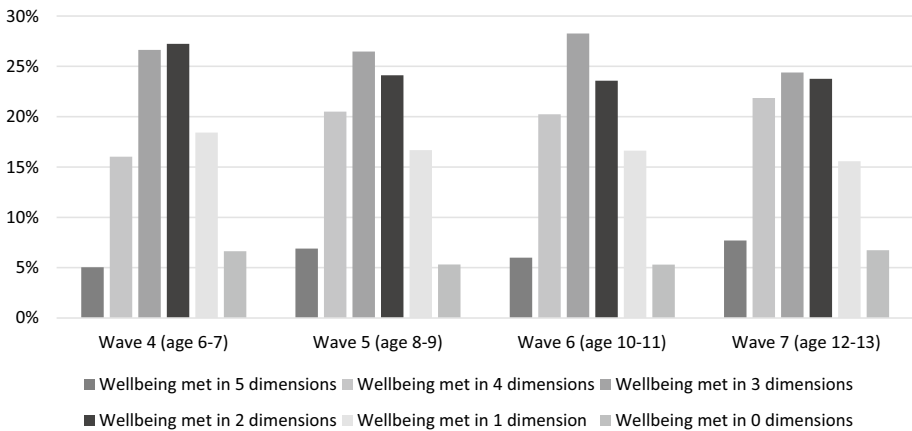
### 3.1 Descriptive Statistics

The rate of children and young people achieving the threshold for wellbeing in each dimension at each wave is illustrated in Fig. 2. As outlined in the methodology section, sub-domains were aggregated into dimensions by applying the union approach, which specifies that a child does not meet the threshold for wellbeing in a dimension if they do not meet the threshold for *any* sub-domain within a given dimension. Of all dimensions,





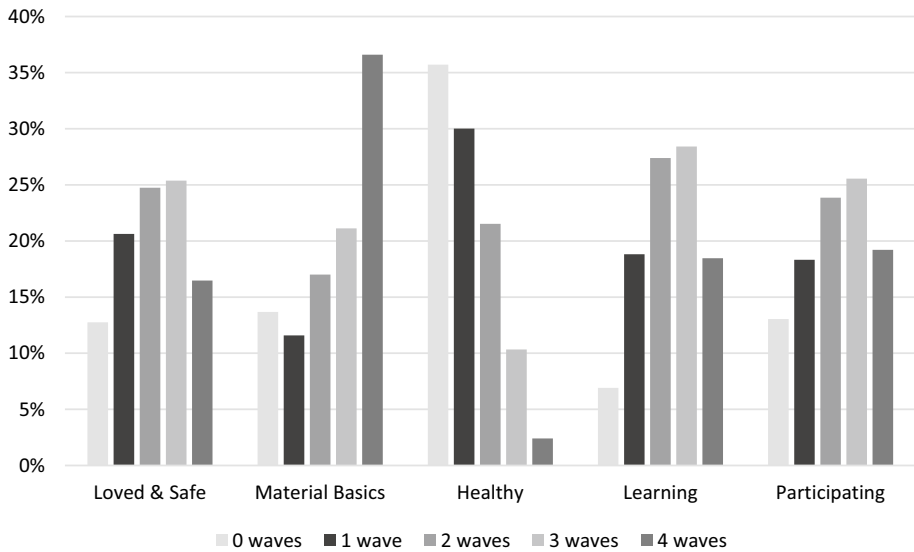
**Fig. 2** Percentage of children meeting wellbeing threshold in each dimension, by wave (unbalanced panel)



**Fig. 3** Distribution of number of dimensions where children meet wellbeing threshold (%) (unbalanced panel)

Healthy had the lowest proportion of children meeting the wellbeing threshold, with only around 20–30% of children meeting the wellbeing threshold at each wave. This was predominantly driven by poor diet at each wave (see "Appendix 6" for sub-domain breakdowns).

The findings also illustrate that for some dimensions, such as Material Basics, Learning and Participating, there is less variation in the percentage of children meeting the wellbeing threshold over time. On the other hand, the percentage of children meeting the threshold for wellbeing in Loved & Safe improved over time, predominantly driven by improvements in children being safe at school (see "Appendix 6"). It should be noted that the substantial increase from ages 6–7 and 8–9 may be driven by inconsistent



**Fig. 4** Percentage of children meeting wellbeing threshold in given number of waves, by dimension (balanced panel)

indicators being used to reflect the safe at school sub-domain. The decline in the percentage of children meeting the threshold for Healthy at ages 10–11 and 12–13 is a result of poorer levels of mental health and having a ‘good state of mind’ in these waves (keeping in mind that these sub-domains utilised inconsistent indicators). The decline in wellbeing for the Participating dimension from age 8–9 to 12–13 may have been influenced by the inclusion of the ‘having a say’ indicator at age 10–11, and worsening sense of belonging between waves and 7 (which may have been impacted by use of inconsistent indicators).

In examining the achievement of wellbeing in multiple dimensions at each of the four waves, Fig. 3 shows that each wave follows a relatively normal distribution, with the distribution peaking at meeting the wellbeing threshold in two or three dimensions.

Longitudinally, we can also determine the persistence of not having wellbeing needs met in the same dimension over time. The results show that the dimensions of Loved & Safe, Learning and Participating follow similar distributions, with the rate of children not meeting the threshold for wellbeing in any wave being particularly low for Learning at 6.9%. A relatively large proportion of children (36.6%) have their wellbeing needs at all waves in the Material Basics dimension, however a sizeable minority (13.7%) are not meeting the threshold for wellbeing at any wave on this dimension. This indicates a relatively higher degree of inequality over time within the Material Basics dimension, when compared to the other dimensions. Finally, the distribution for the Healthy dimension shows a concerning positive skew, with only 2.4% of children meeting the threshold for wellbeing at all waves, and 35.7% not meeting the threshold for wellbeing at *any* wave. This is predominantly driven by poor diet at all waves (Fig. 4).

Finally, a correlation analysis can provide some interesting insights into the way the different dimensions overlap. Table 3 shows significant weak positive correlations between all dimensions at all waves. While there is a high level of inter-connection between the different dimensions, all of these correlations are considered to be small (Cohen, 1988).

**Table 3** Correlation matrix for Nest dimensions by wave

	Loved and safe	Material basics	Healthy	Learning
Material basics				
Age 6–7	0.09***			
Age 8–9	0.10***			
Age 10–11	0.11***			
Age 12–13	0.11***			
Healthy				
Age 6–7	0.09***	0.08***		
Age 8–9	0.10***	0.12***		
Age 10–11	0.12***	0.11***		
Age 12–13	0.16***	0.11***		
Learning				
Age 6–7	0.12***	0.08***	0.11***	
Age 8–9	0.13***	0.13***	0.10***	
Age 10–11	0.07***	0.11***	0.09***	
Age 12–13	0.15***	0.15***	0.16***	
Participating				
Age 6–7	0.09***	0.12***	0.07***	0.03**
Age 8–9	0.11***	0.14***	0.06***	0.11***
Age 10–11	0.14***	0.14***	0.07***	0.09***
Age 12–13	0.23***	0.17***	0.14***	0.17***

\*Significant at the 10% level

\*\*Significant at the 5% level

\*\*\*Significant at the 1% level

While these descriptive statistics bring to light some important findings, such as the large proportion of children not having their wellbeing needs met in the Healthy dimension, and the relatively higher level of inequality within the Material Basics dimension, the real value of this approach lies in being able to examine the long-term impacts of early-life experiences. This will be explored in the following section.

### 3.2 Exploring the Long-Term Wellbeing Impacts of Being Born into Monetary Poverty

To provide an exemplar on how this approach can be applied to gain deeper insights into the wellbeing outcomes of children and young people, the indicator set was used to better understand the long-term wellbeing associations of being born into poverty. This particular analysis was chosen given that child poverty is well-known to have long-term detrimental impacts on a range of outcomes (e.g. Lesner, 2018; Warren, 2017; Wickham et al., 2016). This analysis thus contributes to this body of evidence through better understanding the long-term impacts of being born into poverty on the outcomes that matter to children and young people themselves.

A range of logit models were produced to examine these impacts, with each dimension used as dependent variables, and poverty status at birth used as an independent variable. Current equivalised household income was used as a control variable. Table 4 shows

**Table 4** Odds ratios for logit models exploring long-term wellbeing impacts of being born into monetary poverty

Dimensions	Wave 4 (age 6–7) odds ratio		Wave 5 (age 8–9) odds ratio		Wave 6 (age 10–11) odds ratio		Wave 7 (age 12–13) odds ratio	
	No controls	Controlling for current income	No controls	Controlling for current income	No controls	Controlling for current income	No controls	Controlling for current income
<b>Loved and safe models</b>								
Loved and safe	0.73***	0.75**	0.80**	0.92	1.11	1.19	0.93	1.01
Income		1.00*		1.00***		1.00***		1.00***
<b>Material basics models</b>								
Material basics	0.49***	0.77**	0.42***	0.69***	0.49***	0.73**	0.54***	0.70**
Income		1.00***		1.00***		1.00***		1.00***
<b>Healthy models</b>								
Healthy	0.78**	0.94	0.67***	0.74**	0.74**	0.83	0.66**	0.77
Income		1.00***		1.00***		1.00***		1.00***
<b>Learning models</b>								
Learning	0.76**	0.77**	0.76***	0.93	0.71***	0.90	0.76*	0.82
Income		1.00**		1.00***		1.00***		1.00***
<b>Participating models</b>								
Participating	0.63***	0.65***	0.62***	0.70***	0.66***	0.78**	0.58***	0.76*
Income		1.00***		1.00***		1.00***		1.00***

Each logit model uses dimension as dependent variable, and flag indicating poverty status at birth as independent variable. Household equivalised income used as control variable

\*\*\*Significant at the 1% level; \*\* Significant at the 5% level; \* Significant at the 10% level

that after controlling for current income, being born into poverty had a significant negative association with almost all wellbeing dimensions up to 8–9 years of age. The exceptions were the Healthy dimension at 6–7 years, and Loved and Safe and Learning at 8–9 years. However, some of these associations diminish over time, with only the dimensions of Material Basics and Participating showing significant associations (at the 5% and 10% level respectively) when children reach the age of 10–11 and 12–13 (after controlling for current income). The results of the modelling by sub-domain are presented in "Appendix 7", showing that these findings are driven by poorer outcomes through the adequate shelter and sense of belonging sub-domains at age 11–12, and the food security, adequate shelter, and involvement in community sub-domains at age 12–13. Overall, these results indicate that even when controlling for current household income, being born into poverty has long-term associations with poorer outcomes on almost all wellbeing dimensions. While some of these associations diminish over time, young people born into poverty were less likely to achieve their wellbeing needs in the dimensions of Material Basics and Participating at all time points from the age of 6–13. Further research would need to examine whether these associations continue throughout adolescence and young adulthood.

## 4 Discussion

To the best of the authors' knowledge, this study is the first attempt to draw on an existing participatory wellbeing framework to measure child wellbeing over time using existing data. Doing so has firstly provided a deeper insight into the extent to which children and young people in Australia are having their wellbeing needs (as defined by them) met. Secondly, the measurement framework has allowed for an examination of early life experiences on later wellbeing outcomes. In this paper, we explored the long-term implications of being born into monetary poverty.

The results have highlighted three key benefits to applying an existing participatory wellbeing framework to the analysis and reporting of child wellbeing over time. Firstly, by definition, a participatory wellbeing framework will provide a multidimensional lens through which wellbeing can be examined from various dimensions. Doing so ensures that a more holistic representation of child wellbeing is examined, enabling policy measures to target key areas of concern more easily. For example, the findings highlighted that the majority of children are not having their needs met in the Healthy dimension, with poor diet prevalent amongst the sample. Furthermore, while the sub-domain of 'regular exercise' could not be incorporated into the indicator set, existing research indicates that only around 23% of children aged 5–14 are undertaking the recommended 60 min of physical activity every day (Australian Institute of Health & Welfare, 2020). Thus, if this data item were available, the rates of having wellbeing needs met in this dimension would likely be even lower. These findings align with previous research on multidimensional child wellbeing in Australia. For example, Mishra et al. (2017) found that health and emotional wellbeing were key dimensions of concern for children and young people in Australia.

Examining wellbeing multidimensionally also allows us to analyse the degree to which children and young people are having their needs met in multiple dimensions. The results showed that up to only 7.7% of children and young people had their wellbeing needs met in all dimensions. Furthermore, the longitudinal analysis allows us to examine the persistence of not having wellbeing needs met in the same dimension over time. Our analysis highlighted that while a relatively large proportion (36.6%) of children have their wellbeing

needs met in Material Basics at all waves, a sizeable minority (13.7%) did not meet the wellbeing threshold for this dimension at any wave, indicating a degree of inequality within this dimension. These results again highlighted concerns for children and young people having their wellbeing needs met in the Healthy dimension, with only 2.4% of children and young people meeting the wellbeing threshold for Healthy over all waves.

Secondly, an indicator set based on a participatory wellbeing framework allows us to examine the impact of early life experiences on later wellbeing outcomes based on what matters to children and young people in Australia. Our results highlighted that when controlling for current income, being born into poverty was significantly negatively associated with almost all wellbeing dimensions from 6 to 9 years of age. However, some of these negative associations of being born into poverty diminish over time, indicating that a family coming out of poverty can counteract some of the impacts of disadvantage in the early years. It also illustrates there are likely longer-lasting implications for some dimensions of wellbeing, with children and young people born into poverty being significantly less likely to have their wellbeing needs met in Material Basics and Participating at all time points. These findings are consistent with other research, that does not use participatory frameworks, of the deleterious impacts of poverty on various aspects of wellbeing (Chaudry & Wimer, 2016; Lesner, 2018; Warren, 2017). By using a participatory wellbeing framework, our findings have highlighted the long-term implications of child poverty for later participation in society, an aspect of wellbeing raised as important for children. Data from the OECD (2019) shows that while Australia's child poverty rate is slightly below the OECD average, there was still a sizeable 13% of children and young people aged 0–17 in poverty in 2016. While poverty's capacity to rob children from the opportunity of being able to participate fully in society has been well documented in qualitative and cross-sectional studies (e.g. Skattebol & Redmond, 2018), our study is the first to document the long-term implications for this dimension of wellbeing.

Finally, by applying a participatory wellbeing framework we can have greater confidence that we are measuring aspects of wellbeing that matter to children. The dimensions, sub-domains and indicators used within this indicator set capture a nuanced collection of wellbeing areas that are tailored to the experiences of children and young people in Australia, determined through consultation with a large number of children and young people (ARACY, 2012). Utilising a different approach for indicator selection would have resulted in a set of indicators that were less meaningful for children and young people, thereby diverting the attention of policy makers to areas of wellbeing that are less relevant to this group. Previous research contrasting participatory wellbeing frameworks to global frameworks have highlighted that generic, global frameworks often miss elements of wellbeing important to the group, and also miss nuances in how wellbeing is conceptualised (Greco et al., 2015; Kinghorn et al., 2015; Scott, 2012). Therefore, applying a participatory wellbeing framework thus ensures that any policy changes made to address issues identified in this report are going to have a measurable and meaningful impact for children and young people in Australia.

While our study has a number of strengths, there are several limitations that should be noted. Firstly, while a participatory lens was used to select indicators and measure child wellbeing, the study was not truly participatory as children and young people were not

included as research partners in the study to help identify relevant indicators. This study pioneers an alternative approach for when the required funding and resourcing is not available to undertake a participatory study, or where it is not practical or feasible to do so. Secondly, the framework used to select indicators, as shown in Table 1, is a simplification of the sub-domains within each dimension that were raised by children through consultations (ARACY, 2012). To ensure consistency between dimensions, and to avoid an overwhelming number of indicators, each dimension was limited to four sub-domains, which did oversimplify some of the areas raised by children and young people. Furthermore, it should be noted that as this framework was developed in 2012, the conceptualisations of wellbeing articulated through these consultations may be different to how wellbeing is truly conceptualised during the years of survey enumeration.

Thirdly, while the majority of sub-domains were able to be represented through indicators in LSAC, there were some gaps for the sub-domains of 'food security' and 'good state of mind' at wave 4, 'having a say in the family' at waves 4–5, and 'exercising regularly' at all waves (while this was available at wave 7, it was not included in the analysis to avoid skewing of results). This means that children may be more likely to be meeting the wellbeing threshold in dimensions where not all four sub-domains were available. This should be considered when analysing the results by dimension. Fourthly, item non-response resulted in some children being excluded from the analysis, which may result in bias if some population groups are more likely to be not respond to particular data items (as outlined in "Appendix 2", there was no bias found by family socioeconomic characteristics, however there may be other unobservable characteristics associated with non-response which could result in bias). The use of longitudinal weights has helped to reduce the bias introduced by attrition.

Finally, there is variation in the relevance of an indicator to the sub-domain it is intending to reflect. While some indicators closely represent a particular construct, others may only partially if a better indicator was not available. Therefore, when conducting analysis using this indicator set, care should be taken to ensure that the indicators are well-understood. Furthermore, indicators did change by wave to reflect the changing nature of wellbeing, as well as a change in the available data. Thus, consideration as to whether indicator has been consistently used over time is important when analysing the results of this study.

## 5 Conclusion

Participatory wellbeing frameworks are a valuable resource that can help to guide the measurement of wellbeing throughout the world. This study has applied a wellbeing framework developed in consultation with children and young people in Australia, to guide indicator selection for an existing nationally-representative longitudinal dataset to measure



child wellbeing over time. Not only does this ensure that the indicators are appropriate and valid for the target population, but also ensures that wellbeing is measured in a holistic, multidimensional, and age-appropriate way.

The paper has provided an initial insight into the extent to which children and young people in Australia are living a good life, as defined by them. The analysis highlighted some key areas of concern, such as the relatively low proportion of children and young people having their wellbeing needs met in the Healthy dimension, and the degree of inequality in relation to meeting the threshold for wellbeing in the Material Basics dimension over time. Perhaps more importantly, the approach provides a valuable means to examine the later impacts of early life experiences. This was demonstrated by examining the later wellbeing associations of being born into monetary poverty, finding a significant relationship in almost all dimensions in the more short-term, with some of these associations dissipating over time.

This study provides the first illustration of how a child participatory wellbeing framework can be applied to an existing longitudinal dataset to measure wellbeing over time. Participatory wellbeing frameworks are an under-utilised resource, and have been developed in a number of countries where longitudinal studies of children exist, including Ireland where a wellbeing framework developed by Gabhainn and Sixsmith (2005) could be applied to the Growing up in Ireland study, and the United Kingdom where a framework developed by The Children's Society (2006) could be applied to the Millennium Cohort Study (Connelly & Platt, 2014). Thus, the approach taken in this paper can be used as an exemplar to guide the analysis of wellbeing over time within other contexts, helping to ensure that wellbeing is measured in a holistic, relevant and meaningful way for children, and other population groups, throughout the world.

## Appendix 1: Indicator and Threshold by Wave

See Tables 5, 6, 7 and 8

**Table 5** Wave 4 (age 6–7) indicators

Nest dimension	Measure	Indicator or scale	Respondent	Threshold to identify wellbeing needs are met
Loved and Safe	Relationship with friends	Strengths and Difficulties Questionnaire peer problems scale	Parent 1, Parent 2, Parent living elsewhere, Teacher	All respondents report that child does not have high/very high levels of peer problems according to the Strengths & Difficulties Questionnaire scoring criteria (SDQInfo, 2015)
	Relationship with parents	How often do you have fun with your family at the weekends?	Study child	Children have fun with family at weekends 'Lots of times' or 'Sometimes' (frequency of positive experience)
Safe home environment	Safe home environment	Hostility/violence between parents and feeling afraid of other partner	Parent 1, Parent 2, Parent living elsewhere	All parents respond with 'Never' to experiencing violence (national norm) <sup>a</sup> AND All parents respond that they never or rarely experience anger or hostility from other parent (infrequency of negative experience) AND All parents report that they do not ever feel afraid of partner (binary response)
			Study child	Child responds 'Yes' or 'Sometimes' to children at school being nice to you AND Child responds 'Yes' or 'Sometimes' to children at school asking you to play with them AND Child responds 'No' to children at school picking on you (Regularity of a positive experience and infrequency of a negative experience)
			Peers scale	
Safe school environment	Safe school environment	Peers scale	Study child	

**Table 5** (continued)

Nest dimension	Measure	Indicator or scale	Respondent	Threshold to identify wellbeing needs are met
Material Basics	Financial security of family	Hardship scale	Parent 1	No form of financial hardship in the last 12 months (binary response)
	Access to basic goods (toys, clothes, computer)	Does study child have access to a computer at home?	Parent 1	Access to a computer at home (binary response)
	Food security	Not available		
	Access to adequate shelter	External/internal condition of dwelling and overcrowding	Interviewer	Home not overcrowded (based on Canadian National Occupancy Standard and replicating a measure for LSAC developed by Maguire et al. (2011)) AND Home uncluttered (binary response) AND External condition of dwelling not badly deteriorated (national norm)
Healthy	Exercising regularly	Not available		
	Healthy diet	Food diary	Parent 1	Child eats 'enough' of all healthy food groups (fruit, vegetables, water, and milk products or alternatives, and not too much of all unhealthy food groups (fatty foods, sugary foods, and sweetened drinks) according to food groupings developed by Gasser et al. (2017)
	Good mental health	Social emotional problems scale	Study child	On average, positive responses to a set of questions on a likert scale (> 2, reverse coding where necessary)
	Good state of mind	Not available		

Table 5 (continued)

Nest dimension	Measure	Indicator or scale	Respondent	Threshold to identify wellbeing needs are met
Learning	Attending school	During the previous four weeks of school, how many days has study child been absent?	Parent 1	Missed less than one day of school per week on average in the last month (infrequency of negative experience)
	Satisfied at school	School liking and avoidance scale	Study child	On average, positive responses to the school liking scale ( $\leq 2$ ) AND On average, positive responses to the school avoidance scale ( $> 2$ )
	Learning at home	Home activities index	Parent 1	Child participated in, on average (calculated by taking mid-point of each response option), at least one of any activity per day in the last 7 days (regularity of positive experience)
	Participating in cultural activities	Out of home activities index	Parent 1	Participated in at least one activity in the past month (binary response)
Participating	Having a say in family decisions	Not available		
	Having a network of support	Emotional, informational and tangible support for parents	Parent 1, Parent 2	Both parents report, on average, positive responses to a set of questions on a likert scale ( $\geq 3$ )
	Involvement in community	Extracurricular activities	Parent 1	Participated in any activity in the last 12 months (binary response)
	Sense of belonging	Neighbourhood safety and belonging	Parent 1, Parent 2	Both parents report, on average, positive responses to a set of questions on sense of belonging in the community ( $\geq 3$ ) AND Both parents report that it is safe to play outside in their neighbourhood (binary response)

<sup>a</sup><https://www.ag.gov.au/families-andmarriage/families/family-violence>

**Table 6** Wave 5 (age 8–9) indicators

Nest dimension	Measure	Indicator or scale	Respondent	Threshold to identify wellbeing needs are met
Loved and Safe	Relationship with friends	Marsh peer relations scale	Study child	On average, positive responses to a set of questions on a likert scale ( $\geq 3$ )
	Relationship with parents	Enjoyment of time spent with parents and ability to ask for help	Study child	On average, positive responses to a set of questions on a likert scale ( $\leq 2.5$ )
	Safe home environment	Hostility/violence between parents and feeling afraid of other partner	Parent 1, Parent 2, Parent living elsewhere	All parents respond with ‘Never’ to experiencing violence (national norm) <sup>a</sup> AND All parents respond that they never or rarely experience anger or hostility from other parent (infrequency of negative experience) AND All parents report that they do not ever feel afraid of partner (binary response)
Safe school environment	Bullying and victimisation		Study child	Has not experienced any form of bullying or social exclusion in the past week AND has not experienced 4+ different instances of bullying in the past month (infrequency of a negative experience)

Table 6 (continued)

Nest dimension	Measure	Indicator or scale	Respondent	Threshold to identify wellbeing needs are met
Material Basics	Financial security of family	Hardship scale	Parent 1	No form of financial hardship in the last 12 months (binary response)
	Access to basic goods (toys, clothes, computer)	Access to internet	Parent 1	Access to internet at home (binary response)
	Food security	Did child eat breakfast today?	Parent 1	Ate breakfast today (binary response)
	Access to adequate shelter	Experience of no place to live, external/internal condition of dwelling and overcrowding	Parent 1, Interviewer	Has not experienced having no place to live in past two years (binary response) AND Home not overcrowded (based on Canadian National Occupancy Standard and replicating a measure for LSAC developed by Maguire et al. (2011)) AND Home uncluttered (binary response) AND External condition of dwelling not badly deteriorated (national norm)

**Table 6** (continued)

Nest dimension	Measure	Indicator or scale	Respondent	Threshold to identify wellbeing needs are met
Healthy	Exercising regularly	Not available	Parent 1	Child eats 'enough' of all healthy food groups (fruit, vegetables, water, and milk products or alternatives, and not too much of all unhealthy food groups (fatty foods, sugary foods, and sweetened drinks) according to food groupings developed by Gasser et al. (2017)
	Healthy diet	Food diary		
	Good mental health	Social emotional problems scale	Study child	On average, positive responses to a set of questions on a likert scale (> 2, reverse coding where necessary)
	Good state of mind	Marsh general self scale	Study child	On average, positive responses to a set of questions on a likert scale (≥ 3)



Table 6 (continued)

Nest dimension	Measure	Indicator or scale	Respondent	Threshold to identify wellbeing needs are met
Learning	Attending school	During the previous four weeks of school, how many days has study child been absent?	Parent 1	Missed less than one day of school per week on average in the last month (infrequency of negative experience)
	Satisfied at school	School liking and avoidance scale	Study child	On average, positive responses to the school liking scale ( $\leq 2$ ) AND On average, positive responses to the school avoidance scale ( $> 2$ )
	Learning at home	Number of books at home and parental interest in school	Parent 1, Parent 2, Parent living elsewhere	Child has 30 + books at home (threshold previously identified through the literature e.g. Araujo & Costa, 2012; Edwards & Baxter, 2013) AND All parents either talked to their child about school at least about once a week or helped with homework at least once a week (regularity of positive experience)
	Participating in cultural activities	Out of home activities index	Parent 1	Participated in at least one activity in the past month (binary response)

**Table 6** (continued)

Nest dimension	Measure	Indicator or scale	Respondent	Threshold to identify wellbeing needs are met
Participating	Having a say in family decisions	Not available		
	Having a network of support	Emotional, informational and tangible support for parents	Parent 1, Parent 2	On average, both parents report positive responses to a set of questions on a likert scale ( $\geq 3$ )
	Involvement in community	Extracurricular activities	Parent 1	Participated in any activity in the last 12 months (binary response)
	Sense of belonging	Neighbourhood safety and belonging	Parent 1, Parent 2	Both parents report, on average, positive responses to a set of questions on sense of belonging in the community ( $\geq 3$ ) AND Parent 1 (Parent 2 not asked) reports that it is safe to play outside in their neighbourhood (binary response)

<sup>a</sup><https://www.ag.gov.au/families-andmarriage/families/family-violence>

**Table 7** Wave 6 (age 10–11) indicators

Nest dimension	Measure	Indicator or scale	Respondent	Threshold to identify wellbeing needs are met
Loved and Safe	Relationship with friends	Marsh peer relations scale	Study child	On average, positive responses to a set of questions on a likert scale ( $\geq 3$ )
	Relationship with parents	Trust and Communication Scale	Study child	On average, positive responses to a set of questions on a likert scale ( $\geq 2$ )
	Safe home environment	Hostility/violence between parents and feeling afraid of other partner	Parent 1, Parent 2, Parent living elsewhere	All parents respond with "Never" to experiencing violence (national norm) <sup>a</sup> AND All parents respond that they never or rarely experience anger or hostility from other parent (infrequency of negative experience) AND All parents report that they do not ever feel afraid of partner (binary response)
	Safe school environment	Bullying and victimisation	Study child	Has not experienced any form of bullying or social exclusion in the past week AND has not experienced 4+ different instances of bullying in the past month (infrequency of a negative experience)

**Table 7** (continued)

Nest dimension	Measure	Indicator or scale	Respondent	Threshold to identify wellbeing needs are met
Material Basics	Financial security of family	Hardship scale	Parent 1	No form of financial hardship in the last 12 months (binary response)
	Access to basic goods (toys, clothes, computer)	Access to internet	Parent 1	Access to internet at home (binary response)
	Food security	Did you have breakfast today?	Study child	Ate breakfast today (binary response)
	Access to adequate shelter	Experience of no place to live, external/internal condition of dwelling and overcrowding	Parent 1, Interviewer	Has not experienced having no place to live in past two years (binary response) AND Home not overcrowded (based on Canadian National Occupancy Standard and replicating a measure for LSAC developed by Maguire et al. (2011)) AND Home uncluttered (binary response) AND External condition of dwelling not badly deteriorated (national norm)

**Table 7** (continued)

Nest dimension	Measure	Indicator or scale	Respondent	Threshold to identify wellbeing needs are met
Healthy	Exercising regularly	Not available		
	Healthy diet	Food diary	Study child	Child eats 'enough' of all healthy food groups (fruit, vegetables, water, and milk products or alternatives, and not too much of all unhealthy food groups (fatty foods, sugary foods, and sweetened drinks) according to food groupings developed by Gasser et al. (2017)
	Good mental health	Strengths and Difficulties Questionnaire Emotional Problems Scale	Study child	Child does not report high/very high levels of emotional problems according to the Strengths & Difficulties Questionnaire scoring criteria (SDQInfo, 2015)
	Good state of mind	Marsh general self scale	Study child	On average, positive responses to a set of questions on a likert scale ( $\geq 3$ )

**Table 7** (continued)

Nest dimension	Measure	Indicator or scale	Respondent	Threshold to identify wellbeing needs are met
Learning	Attending school	During the previous four weeks of school, how many days has study child been absent?	Parent 1	Missed less than one day of school per week on average in the last month (infrequency of negative experience)
	Satisfied at school	School adjustment scale	Study child	On average, positive responses to a set of questions on a likert scale ( $\geq 2.5$ )
	Learning at home	Number of books at home and parental interest in school	Parent 1, Parent 2, Parent living elsewhere	Child has 30 + books at home (threshold previously identified through the literature e.g. Araujo & Costa, 2012; Edwards & Baxter, 2013)) AND All parents either talked to their child about school at least about once a week or helped with homework at least once a week (regularity of positive experience)
	Participating in cultural activities	Out of home activities index	Parent 1	Participated in at least one activity in the past month (binary response)

Table 7 (continued)

Nest dimension	Measure	Indicator or scale	Respondent	Threshold to identify wellbeing needs are met
Participating	Having a say in family decisions	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	Child sometimes, often or always has a say in family decisions (positive response to a single likert scale)
	Having a network of support	Emotional, informational and tangible support for parents, child social support	Parent 1, Parent 2, Study child	On average, both parents report positive responses to a set of questions on emotional informational and tangible support ( $\geq 3$ ) AND Child has someone to talk to if they had a problem (binary response)
	Involvement in community	Extracurricular activities	Parent 1	Participated in any activity in the last 12 months (binary response)
	Sense of belonging	Neighbourhood safety and belonging	Parent 1, Parent 2	Both parents report, on average, positive responses to a set of questions on sense of belonging in the community ( $\geq 3$ ) AND Both parents report that it is safe to play outside in their neighbourhood (binary response)

<sup>a</sup><https://www.ag.gov.au/families-andmarriage/families/family-violence>



**Table 8** Wave 7 (age 12–13) indicators

Nest dimension	Measure	Indicator or scale	Respondent	Threshold to identify wellbeing needs are met
Loved and Safe	Relationship with friends	Inventory of peer attachment	Study child	On average, positive responses to a set of questions on a likert scale ( $\leq 3$ )
	Relationship with parents	Trust and Communication Scale	Study child	On average, positive responses to a set of questions on a likert scale ( $\geq 2$ )
	Safe home environment	Hostility/violence between parents and feeling afraid of other partner	Parent 1, Parent 2, Parent living elsewhere	All parents respond with "Never" to experiencing violence (national norm) <sup>a</sup> AND All parents respond that they never or rarely experience anger or hostility from other parent (infrequency of negative experience) AND All parents report that they do not ever feel afraid of partner (binary response)
	Safe school environment	Bullying and victimisation	Study child	Has not experienced any form of bullying or social exclusion in the past week AND has not experienced 4+ different instances of bullying in the past month (infrequency of a negative experience)

Table 8 (continued)

Nest dimension	Measure	Indicator or scale	Respondent	Threshold to identify wellbeing needs are met
Material Basics	Financial security of family	Hardship scale	Parent 1	No form of financial hardship in the last 12 months (binary response)
	Access to basic goods (toys, clothes, computer)	Access to internet	Parent 1	Access to internet at home (binary response)
	Food security	Did you have breakfast today?	Study child	Ate breakfast today (binary response)
	Access to adequate shelter	Experience of no place to live, external/internal condition of dwelling and overcrowding	Parent 1, Interviewer	Has not experienced having no place to live in past two years (binary response) AND Home not overcrowded (based on Canadian National Occupancy Standard and replicating a measure for LSAC developed by Maguire et al. (2011)) AND Home uncluttered (binary response) AND External condition of dwelling not badly deteriorated (national norm)

**Table 8** (continued)

Nest dimension	Measure	Indicator or scale	Respondent	Threshold to identify wellbeing needs are met
Health	Exercising regularly	Available (Frequency of 60 min + exercise per week), but not used due to data item being available only at this wave		
	Healthy diet	Food diary	Study child	Child eats 'enough' of all healthy food groups (fruit, vegetables, water, and milk products or alternatives, and not too much of all unhealthy food groups (fatty foods, sugary foods, and sweetened drinks) according to food groupings developed by Gasser et al. (2017)
	Good mental health	Short Mood and Feelings Questionnaire, Spence Anxiety scale	Study child	On average, positive responses to the Short Mood and Feelings Scale (>2) AND On average, positive responses to the Spence Anxiety Scale (<2)
	Good state of mind	Life Satisfaction	Study child	Child reports that they agree or strongly agree to them being happy with how things are for them in their life right now (positive response to a single likert scale)
Learning	Attending school	Absent from school, and skipping class/truanting	Parent 1, Study Child	Missed less than one day of school per week on average in the last month (infrequency of negative experience) AND Did not skip class or truant 7 + times in the last 6 months (infrequency of negative experience)
	Satisfied at school	School adjustment scale	Study child	On average, positive responses to a set of questions on a likert scale ( $\geq 2.5$ )
	Learning at home	Interest in learning	Study child	Both parents show at least some interest in child's education (positive response to single likert scale)
	Participating in cultural activities	Out of home activities index	Parent 1	Participated in at least one activity in the past month (binary response)

Table 8 (continued)

Nest dimension	Measure	Indicator or scale	Respondent	Threshold to identify wellbeing needs are met
Participating	Having a say in family decisions	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	Child sometimes, often or always has a say in family decisions (positive response to a single likert scale)
	Having a network of support	Emotional, informational and tangible support for parents, child social support	Parent 1, Study child	On average, both parents report positive responses to a set of questions on a likert scale ( $\geq 3$ ) AND Child has someone to talk to if they had a problem (binary response)
	Involvement in community	Extracurricular activities and volunteering	Study child	Participated in any activity or volunteered in the last 12 months (binary response)
	Sense of belonging	Experience of discrimination	Study child	Has not experienced any form of discrimination or intolerance in the last 6 months (binary response)

<sup>a</sup><https://www.ag.gov.au/families-and-marriage/families/family-violence>

## Appendix 2: Analysis of Bias from Removal of Observations

See Table 9

**Table 9** Analysis of bias from removal of observations

	Wave 4 (age 6–7)	Wave 5 (age 8–9)	Wave 6 (age 10–11)	Wave 7 (age 12–13)
Male	0.209 (0.768)	–0.301 (0.471)	0.088 (0.183)	0.228 (0.209)
Household income quintile				
2nd income quintile	0.965 (1.184)	–0.146 (0.696)	–0.126 (0.284)	0.152 (0.332)
3rd income quintile	–0.121 (1.418)	–0.411 (0.706)	–0.288 (0.294)	–0.370 (0.364)
4th income quintile	0 (empty) –	0.124 (0.659)	–0.041 (0.291)	0.090 (0.332)
5th (highest) income quintile	0.845 (1.576)	–0.754 (0.857)	–0.351 (0.327)	0.485 (0.322)
Highest parental qualification				
Graduate diploma/certificate	0.662 (1.185)	0.930 (0.925)	0.580 (0.397)	–0.488 (0.425)
Bachelor degree	–0.718 (1.455)	–0.444 (1.060)	0.652* (0.349)	–0.206 (0.318)
Advanced diploma/diploma	–0.098 (1.194)	0.107 (1.055)	0.678* (0.389)	0.419 (0.346)
Certificate	0 (omitted)	0.434 (0.898)	0.562 (0.360)	0.024 (0.307)
Other	0 (empty)	1.589 (1.306)	0.827 (0.783)	0.993 (0.666)
Constant	–6.475*** (1.029)	–5.245*** (0.881)	–3.655*** (0.392)	–3.571*** (0.376)

Dependent variable is a dummy variable indicating whether the observation will be removed from the analysis. The base case individual is female, in the lowest household income quintile, with the highest parental education level being a postgraduate degree

Robust standard error in brackets

\*\*\*Significant at 1% level

\*\*Significant at 5% level

\*Significant at 10% level

## Appendix 3: Percentage of Records with Missing Indicators by Each Wave

See Table 10

**Table 10** Percentage of records missing indicators by each wave (unbalanced panel)

Nest dimension	Sub-domain	Wave 4 (age 6–7)	Wave 5 (age 8–9)	Wave 6 (age 10–11)	Wave 7(age 12–13)
Loved and safe	Relationship with friends	0.05%	1.48%	0.17%	0.09%
	Relationship with parents	1.92%	1.68%	0.59%	0.62%
	Safe home environment	3.12%	3.26%	3.15%	5.83%
	Safe school environment	1.51%	1.38%	0.42%	0.09%
Material basics	Financial security of family	1.42%	1.85%	2.09%	3.18%
	Access to basic goods (toys, clothes, computer)	0.02%	0.17%	0.33%	0.56%
	Food security	N/A	0.35%	0.72%	0.00%
Healthy	Access to adequate shelter	0.02%	0.00%	0.00%	0.19%
	Exercising regularly	N/A	N/A	N/A	N/A
	Healthy diet	0.07%	0.25%	0.00%	0.00%
	Good mental health	1.89%	1.34%	0.22%	0.50%
Learning	Good state of mind	N/A	1.38%	0.17%	0.31%
	Attending school	0.40%	0.30%	0.56%	0.62%
	Satisfied at school	1.47%	1.24%	0.11%	0.72%
	Learning at home	0.02%	0.00%	0.00%	0.12%
Participating	Participating in cultural activities	0.02%	0.17%	0.28%	0.56%
	Having a say in family decisions	N/A	N/A	0.61%	0.69%
	Having a network of support	0.69%	0.89%	0.00%	0.00%
	Involvement in community	0.02%	0.17%	0.31%	0.34%
	Sense of belonging	0.64%	0.74%	0.61%	0.19%

Table reports percentage missing after records with more than one third of sub-domains missing have been removed

## Appendix 4: Correlation Tables

See Tables 11, 12, 13 and 14

**Table 11** Correlations for wave 4 (age 6–7) indicators

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1 - Relationship with friends	1																			
2 - Relationship with parents	0.04	1																		
3 - Safe home environment	0.1	0.03	1																	
4 - Safe school environment	0.09	0.04	0.01	1																
5 - Financial security of family	0.09	0.05	0.13	0.05	1															
6 - Access to basic goods	0.06	0.02	0.08	0.02	0.06	1														
7 - Food security							1													
8 - Access to adequate shelter	0.05	0.00	0.08	0.00	0.16	0.08		1												
9 - Exercising regularly									1											
10 - Healthy diet	0.02	0.04	0.05	0.01	0.1	0.02		0.03		1										
11 - Good mental health	0.06	0.08	0.02	0.17	0.06	-0.01		0.04	0.04		1									
12 - Good state of mind												1								
13 - Attending school	0.04	0.00	0.00	-0.01	0.08	0.01		0.05	0.01	0.02			1							
14 - Satisfied at school	0.04	0.09	0.03	0.17	0.06	0.02		0.03	0.03	0.19		0.02		1						
15 - Learning at home	0.04	0.03	0.03	-0.02	0.02	0.04		0.00	0.06	0.02		-0.01	0.01		1					
16 - Participating in cultural activities	0.07	0.03	-0.02	0.03	0.04	0.04		0.03	0.03	0.02		0.01	0.03	0.06		1				
17 - Having a say in family decisions																	1			
18 - Having a network of support	0.12	0.02	0.14	0	0.07	0.02		0.05	0.00	0.03		0.01	0.01	0.00	0.02			1		
19 - Involvement in community	0.09	0.04	0.07	0.01	0.15	0.1		0.11	0.09	0.04		0.04	0.01	0.08	0.12				1	
20 - Sense of belonging	0.04	-0.03	0.06	0.00	0.06	0.03		0.03	0.03	0.00		0.04	-0.02	0.05	0.03					1

Table 12 Correlations for wave 5 (age 8–9) indicators

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1 - Relationship with friends	1																			
2 - Relationship with parents	0.05	1																		
3 - Safe home environment	0.00	0.01	1																	
4 - Safe school environment	0.21	0.08	0.01	1																
5 - Financial security of family	0.07	0.02	0.11	0.06	1															
6 - Access to basic goods	-0.01	0.00	0.03	0.04	0.07	1														
7 - Food security	0.00	0.03	0.03	0.04	0.06	0.04	1													
8 - Access to adequate shelter	0.06	0.06	0.05	0.05	0.16	0.08	0.08	1												
9 - Exercising regularly																				
10 - Healthy diet	0.01	0.03	0.03	0.02	0.07	0.06	0.1	0.04		1										
11 - Good mental health	0.21	0.07	0.01	0.23	0.07	0.02	0.04	0.03		0.04	1									
12 - Good state of mind	0.3	0.03	0.02	0.12	0.05	0.00	0.03	0.05		0.00	0.16	1								
13 - Attending school	0.00	-0.01	0.02	0.01	0.03	0.01	0.02	0.04		0.03	0.04	0.00	1							
14 - Satisfied at school	0.16	0.07	0.03	0.14	0.02	0.01	0.04	0.02		0.03	0.15	0.17	0.03	1						
15 - Learning at home	0.01	0.05	0.05	0.03	0.07	0.06	0.07	0.08		0.06	0.04	0.00	0.00	0.02	1					
16 - Participating in cultural activities	0.01	0.00	0.00	0.07	0.04	0.04	0.05	0.06		0.04	0.01	0.03	0.00	0.01	0.04	1				
17 - Having a say in family decisions																				
18 - Having a network of support	0.06	0.02	0.17	0.01	0.1	0.04	0.02	0.05		0.02	0.02	0.01	0.01	0.02	0.07	0.06	1			
19 - Involvement in community	0.05	0.02	0.05	0.06	0.13	0.08	0.05	0.11		0.06	0.06	0.11	0.06	0.02	0.14	0.09	0.07	1		
20 - Sense of belonging	0.04	-0.03	0.05	0.03	0.07	0.02	0.02	0.03	0.06	0.01	0.04	0.04	0.02	0.02	0.04	0.01	0.11	0.06	1	



**Table 13** Correlations for wave 6 (age 10–11) indicators

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1 - Relationship with friends	1																			
2 - Relationship with parents	0.09	1																		
3 - Safe home environment	0.04	0.01	1																	
4 - Safe school environment	0.24	0.04	0.03	1																
5 - Financial security of family	0.05	0.02	0.12	0.04	1															
6 - Access to basic goods	0.02	0.01	0.02	0.07	0.06	1														
7 - Food security	0.06	0.00	0.02	0.05	0.08	0.05	1													
8 - Access to adequate shelter	0.07	0.02	0.04	0.03	0.16	0.12	0.08	1												
9 - Exercising regularly																				
10 - Healthy diet	0.05	0.02	0.03	0.07	0.08	0.04	0.07	0.06	1											
11 - Good mental health	0.23	0.04	0.05	0.22	0.06	0.02	0.04	0.09	0.08	1										
12 - Good state of mind	0.33	0.15	0.05	0.17	0.06	0.03	0.06	0.04	0.04	0.16	1									
13 - Attending school	0.05	0.04	0.02	0.05	0.08	0.04	0.03	0.07	0.01	0.05	0.07	1								
14 - Satisfied at school	0.19	0.11	-0.01	0.14	0.04	0.01	0.09	0.02	0.08	0.12	0.25	0.1	1							
15 - Learning at home	-0.02	0.02	0.02	0.03	0.04	0.05	0.05	0.05	0.06	0.04	0.00	0.01	0.02	1						
16 - Participating in cultural activities	0.02	0.00	-0.01	-0.01	0.02	0.03	0.06	0.04	-0.02	0.00	0.00	-0.03	0.01	0.03	1					
17 - Having a say in family decisions	0.09	0.08	0.00	0.10	0.04	0.00	0.06	0.00	0.03	0.08	0.13	0.02	0.09	0.04	0.01	1				
18 - Having a network of support	0.08	0.07	0.2	0.03	0.11	0.03	0.05	0.07	0.02	0.07	0.08	0.03	0.06	0.03	0.03	0.03	1			
19 - Involvement in community	0.08	0.03	0.04	0.07	0.13	0.12	0.09	0.10	0.06	0.05	0.08	0.06	0.08	0.07	0.09	0.04	0.07	1		
20 - Sense of belonging	0.01	0.02	0.01	0.03	0.03	0.00	0.02	0.03	0.04	0.03	0.03	0.00	0.00	0.01	-0.01	0.01	0.11	0.05	1	

**Table 14** Correlations for wave 7 (age 12–13) indicators

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1 - Relationship with friends	1																			
2 - Relationship with parents	0.06	1																		
3 - Safe home environment	0.02	0.02	1																	
4 - Safe school environment	0.15	0.13	0.04	1																
5 - Financial security of family	0.01	0.05	0.11	0.05	1															
6 - Access to basic goods	-0.01	0	0.04	0.02	0.07	1														
7 - Food security	0.04	0.06	0	0.06	0.07	0.03	1													
8 - Access to adequate shelter	0.02	0.02	0.03	0.06	0.12	0.09	0.06	1												
9 - Exercising regularly																				
10 - Healthy diet	0.05	0.01	-0.01	0.07	0.06	0.04	0.11	0.05		1										
11 - Good mental health	0.15	0.16	0.02	0.19	0.05	0.02	0.09	0.04	0.09	1										
12 - Good state of mind	0.18	0.15	0.08	0.18	0.03	-0.01	0.09	0.04	0.03	0.26	1									
13 - Attending school	0.02	0.01	0.01	0.04	0.07	0.01	0.08	0.02	0.05	0.07	0.07	1								
14 - Satisfied at school	0.13	0.14	0.04	0.14	0.06	-0.01	0.13	0.07	0.08	0.16	0.22	0.08	1							
15 - Learning at home	0.08	0.14	0.07	0.11	0.05	0.01	0.13	0.03	0.08	0.11	0.16	0.01	0.16	1						
16 - Participating in cultural activities	0.06	0.01	-0.02	0.03	0.04	0	0.03	0.03	0.03	0.04	0.02	0.02	0	0.04	1					
17 - Having a say in family decisions	0.09	0.12	0.04	0.04	0.03	0.02	0.09	0.02	0.03	0.11	0.07	0.03	0.1	0.12	0.02	1				
18 - Having a network of support	0.07	0.08	0.15	0.03	0.14	0	0.07	0.02	0.03	0.08	0.08	0.07	0.06	0.09	0.02	0.05	1			
19 - Involvement in community	0.03	0.02	0	-0.01	0.08	0.06	0.12	0.06	0.11	0.05	0.03	0.04	0.11	0.05	0.08	0.08	0.04	1		
20 - Sense of belonging	0.13	0.12	0.02	0.33	0.09	0.02	0.06	0.08	0.04	0.22	0.2	0.06	0.09	0.12	0.01	0.06	0.08	0.01	1	

## Appendix 5: Correlations Between Indicators of Consecutive Waves

See Table 15

**Table 15** Correlations between indicators of consecutive waves (balanced panel)

Nest dimension	Indicator	Correlation: Wave 4–5	Correlation Wave 5–6	Correlation Wave 6–7
Loved and safe	Relationship with friends	0.141 <sup>^</sup> (***)	0.252 (***)	0.113 <sup>^</sup> (***)
	Relationship with parents	-0.003 <sup>^</sup> (-)	0.033 <sup>^</sup> (*)	0.065 (***)
	Safe home environment	0.396 (***)	0.432 (***)	0.457 (***)
	Safe school environment <sup>ψ</sup>	0.181 <sup>^</sup> (***)	0.212 (***)	0.244 (***)
Material basics	Financial security of family	0.453 (***)	0.446 (***)	0.492 (***)
	Access to basic goods (toys, clothes, computer)	0.215 <sup>^</sup> (***)	0.283 (***)	0.231 (***)
	Food security <sup>#</sup>	N/A	0.172 (***)	0.200 (***)
	Access to adequate shelter	0.477 <sup>^</sup> (***)	0.468 (***)	0.535 (***)
Healthy	Exercising regularly	N/A	N/A	N/A
	Healthy diet <sup>#</sup>	0.245 (***)	0.151 (***)	0.221 (***)
	Good mental health	0.159 (***)	0.166 <sup>^</sup> (***)	0.167 <sup>^</sup> (***)
	Good state of mind	N/A	0.171 (***)	0.153 <sup>^</sup> (***)
Learning	Attending school <sup>ψ</sup>	0.099 (***)	0.115 (***)	0.111 (***)
	Satisfied at school	0.208 (***)	0.191 <sup>^</sup> (***)	0.279 (***)
	Learning at home	0.111 <sup>^</sup> (***)	0.365 (***)	0.057 <sup>^</sup> (**)
	Participating in cultural activities	0.165 (***)	0.141 (***)	0.127 (***)
Participating	Having a say in family decisions	N/A	N/A	0.104 (***)
	Having a network of support	0.349 (***)	0.385 <sup>^</sup> (***)	0.386 (***)
	Involvement in community <sup>ψ</sup>	0.336 (***)	0.320 (***)	0.243 (***)
	Sense of belonging <sup>ψ</sup>	0.264 <sup>^</sup> (***)	0.354 (***)	0.020 (-)

<sup>^</sup>indicates that indicators used in correlation calculation are not consistent

<sup>ψ</sup>Waves that are shown to have consistent indicators have some minor variations

<sup>#</sup>Waves that are shown to have consistent indicators have variation in whether they are parent or child reported

\*\*\*Correlation significant at 1% level \*\*Correlation significant at 5% level \*Correlation significant at 10% level (-) Correlation not significantly different from 0

## Appendix 6: Rates of Wellbeing by Sub-Domain

See Table 16

**Table 16** Percentage of children meeting wellbeing threshold by sub-domain (unbalanced panel)

Nest dimension	Indicator	Wave 4 (age 6–7)	Wave 5 (age 8–9)	Wave 6 (age 10–11)	Wave 7 (age 12–13)
Loved and safe	Relationship with friends	80.45% (0.63)	88.78%* (0.52)	83.82%* (0.64)	90.35% (0.55)
	Relationship with parents	96.69% (0.28)	98.92% (0.17)	98.01%* (0.24)	96.63%* (0.34)
	Safe home environment	84.03%* (0.58)	84.65%* (0.59)	85.65%* (0.61)	85.76%* (0.66)
	Safe school environment <sup>y</sup>	54.42% (0.79)	66.42%* (0.77)	78.56%* (0.71)	78.65%* (0.76)
Material basics	Financial security of family	79.19%* (0.65)	80.16%* (0.65)	80.73%* (0.68)	84.97%* (0.67)
	Access to basic goods (toys, clothes, computer)	90.65% (0.46)	96.35%* (0.31)	96.75%* (0.31)	97.76%* (0.28)
	Food security <sup>#</sup>	N/A	95.27%* (0.35)	93.33%* (0.43)	87.21%* (0.62)
	Access to adequate shelter	84.45% (0.58)	83.23%* (0.61)	83.91%* (0.64)	83.41%* (0.69)
Healthy	Exercising regularly	N/A	N/A	N/A	N/A
	Healthy diet <sup>#</sup>	40.76%* (0.78)	40.06%* (0.80)	30.84%* (0.80)	34.90%* (0.89)
	Good mental health	75.31%* (0.69)	76.03%* (0.70)	86.35% (0.60)	74.44% (0.81)
	Good state of mind	N/A	97.06%* (0.28)	95.13%* (0.37)	75.32% (0.80)

**Table 16** (continued)

Nest dimension	Indicator	Wave 4 (age 6–7)	Wave 5 (age 8–9)	Wave 6 (age 10–11)	Wave 7 (age 12–13)
Learning	Attending school <sup>ψ</sup>	88.78%* (0.50)	89.55%* (0.50)	90.39%* (0.51)	88.11%* (0.60)
	Satisfied at school	71.30%^ (0.72)	77.86%^ (0.68)	90.08%* (0.52)	88.25%* (0.60)
	Learning at home	94.82% (0.35)	79.00%* (0.67)	67.49%* (0.81)	87.29% (0.62)
Participating	Participating in cultural activities	97.17%* (0.26)	96.22%* (0.31)	95.85%* (0.35)	93.17%* (0.47)
	Having a say in family decisions	N/A	N/A	93.82%* (0.42)	94.55%* (0.42)
	Having a network of support	80.26%* (0.63)	82.84%* (0.62)	81.76%^ (0.67)	82.87%^ (0.72)
	Involvement in community <sup>ψ</sup>	84.41%* (0.58)	90.66%* (0.48)	91.53%* (0.48)	90.73%* (0.54)
	Sense of belonging <sup>ψ</sup>	72.38% (0.71)	76.66%* (0.69)	75.47%* (0.75)	70.79% (0.85)

Standard error in parentheses

\*and ^ indicates that indicators for that wave were consistent with other waves with corresponding symbol

<sup>ψ</sup>Waves that are shown to have consistent indicators have some minor variations

#Waves that are shown to have consistent indicators have variation in whether they are parent or child reported

### Appendix 7: Logit Models by Sub-Domain

See Table 17

**Table 17** Odds ratios for logit models exploring long-term wellbeing impacts of being born into monetary poverty

Sub-domains	Wave 4 (age 6–7) odds ratio		Wave 5 (age 8–9) odds ratio		Wave 6 (age 10–11) odds ratio		Wave 7 (age 12–13) odds ratio	
	No controls	Controlling for current income	No controls	Controlling for current income	No controls	Controlling for current income	No controls	Controlling for current income
<b>Relationship with friends models</b>								
Relationship with friends	0.63***	0.69***	0.94	1.08	1.08	1.19	1.01	1.02
Income		1.00***		1.00		1.00		1.00*
<b>Relationship with parents models</b>								
Relationship with parents	0.84	0.86	1.16	1.71	1.96	2.01	1.22	1.15
Income		1.00		1.00***		1.00**		1.00**
<b>Safe home environment models</b>								
Safe home environment	0.57***	0.59***	0.62***	0.65***	0.79	0.85	0.72*	0.74
Income		1.00		1.00**		1.00**		1.00***
<b>Safe school environment models</b>								
Safe school environment	0.99	0.99	0.99	1.11	1.18	1.25	1.03	1.19
Income		1.00		1.00***		1.00*		1.00***
<b>Financial security of family models</b>								
Financial security of family	0.64***	0.98	0.54***	0.92	0.51***	0.80	0.57***	0.76
Income		1.00***		1.00***		1.00***		1.00***
<b>Access to basic goods (toys, clothes, computer) models</b>								
Access to basic goods	0.56***	0.83	0.38***	0.71	0.77	1.43	0.45**	0.77

**Table 17** (continued)

Sub-domains	Wave 4 (age 6–7) odds ratio		Wave 5 (age 8–9) odds ratio		Wave 6 (age 10–11) odds ratio		Wave 7 (age 12–13) odds ratio	
	No controls	Controlling for current income	No controls	Controlling for current income	No controls	Controlling for current income	No controls	Controlling for current income
Income		1.00***		1.00***		1.00***		1.00***
Food security models								
Food security	–	–	0.49***	0.62**	0.69	0.93	0.60***	0.70*
Income	–	–	–	1.00**	–	1.00***	–	1.00***
Access to adequate shelter models								
Access to adequate shelter	0.39***	0.54***	0.51***	0.82	0.47***	0.65***	0.43***	0.57***
Income	–	1.00***	–	1.00***	–	1.00***	–	1.00***
Exercising regularly models								
Exercising regularly	–	–	–	–	–	–	–	–
Income	–	–	–	–	–	–	–	–
Healthy diet models								
Healthy diet	0.76**	0.88	0.64***	0.68***	0.72**	0.80	0.66***	0.81
Income	–	1.00***	–	1.00***	–	1.00***	–	1.00***
Good mental health models								
Good mental health	0.85	0.97	0.75**	0.80*	0.93	1.06	0.88	0.94
Income	–	1.00***	–	1.00***	–	1.00***	–	1.00***
Good state of mind models								
Good state of mind	–	–	0.70	0.88	0.77	0.98	1.05	1.12
Income	–	–	–	1.00	–	1.00	–	1.00***
Attending school models								
Attending school	0.71**	0.74*	0.92	1.01	0.74	0.85	0.72	0.74
Income	–	1.00**	–	1.00**	–	1.00**	–	1.00**
Satisfied at school models								
Satisfied at school	1.03	1.03	1.22	1.28*	1.04	1.23	0.94	0.87

**Table 17** (continued)

Sub-domains	Wave 4 (age 6–7) odds ratio		Wave 5 (age 8–9) odds ratio		Wave 6 (age 10–11) odds ratio		Wave 7 (age 12–13) odds ratio	
	No controls	Controlling for current income	No controls	Controlling for current income	No controls	Controlling for current income	No controls	Controlling for current income
Income	1.00	1.00**	1.00	1.00	1.00	1.00	1.00	1.00*
Learning at home models								
Learning at home	0.47***	6.56*	0.46***	0.61***	0.68***	0.90	1.00	1.20
Income	1.00***	1.00***	1.00***	1.00***	1.00***	1.00***	1.00***	1.00***
Participating in cultural activities models								
Participating in cultural activities	0.41***	0.54**	0.48***	0.60*	0.75	0.99	0.63**	0.69
Income	1.00***	1.00***	1.00***	1.00***	1.00***	1.00***	1.00**	1.00**
Having a say in family decisions models								
Having a say in family decisions	–	–	–	–	1.58*	1.76*	0.82	1.00
Income	–	–	–	–	1.00	1.00	1.00*	1.00*
Having a network of support models								
Having a network of support	0.70***	0.74**	0.70**	0.74**	0.68***	0.82	0.74*	0.85
Income	1.00***	1.00***	1.00***	1.00**	1.00***	1.00***	1.00***	1.00***
Involvement in community models								
Involvement in community	0.49***	0.70**	0.48***	0.82	0.71*	0.98	0.54***	0.64**
Income	1.00***	1.00***	1.00***	1.00***	1.00***	1.00***	1.00***	1.00***
Sense of belonging models								
Sense of belonging	0.73***	0.71***	0.73**	0.71**	0.60***	0.64***	0.73**	0.80
Income	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00***

Each logit model uses sub-domain as dependent variable, and flag indicating poverty status at birth as independent variable. Household equivalised income used as control variable

\*\*\*Significant at the 1% level; \*\*Significant at the 5% level; \*Significant at the 10% level



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**Data Availability** The LSAC data is available through the Australian Data Archive (<https://dataverse.ada.edu.au/dataverse.xhtml?alias=lsac>).

**Code Availability** The code for this work is available to access through the Australian Data Archive (<http://dx.doi.org/10.26193/AJQSF>).

## Declarations

**Conflict of interest** Initial scoping work for this paper was conducted while the primary author was an employee of ARACY.

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