Unequal from the start:

The achievement gap and the early years

The Mitchell Institute, Victoria University

Acknowledgement of Country


The Mitchell Institute at Victoria University acknowledges, recognises and respects the Ancestors, Elders and families of the Bunurong/Boonwurrung, Wadawurrung and Wurundjeri/Woiwurrung of the Kulin who are the Traditional Owners of University land in Victoria, the Gadigal and Guring-gai of the Eora Nation who are the Traditional Owners of University land in Sydney, and the Yulara/Yugarapul people and Turrbal people living in Meanjin (Brisbane).

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Established in 2013, the Mitchell Institute at Victoria University is a leading policy think tank and research centre. With a focus on education policy, systems and place, we are working towards a more productive and equitable society where every individual, regardless of their background, has the opportunity to thrive.

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Executive Summary

Making sure all children have the best start in life is one of the most important things we can do for future generations. Yet Australia still has much work to do to achieve educational equity for its youngest citizens.

We know the difference quality education can make in a child's life. We also know that not all children start their education journey off on the same foot. Children from disadvantaged backgrounds are more likely to start school behind their peers - and when they start school behind, they tend to stay behind.

The reality is, children enter Australia's education system from different contexts and have different educational needs, and the cost of meeting these needs varies. This is acknowledged when it comes to funding schools. There is an understanding that providing the same funding to each child does not create an equitable outcome. This has led to 'needs-based' funding, a model where more resources go where they are needed most.

This approach - working towards equity of opportunity and of outcomes - is a key principle underpinning the design and implementation of school and education systems in Australia, and around the world.

However, despite the strong evidence showing the importance of early childhood education in creating the best start for children, Australia does not take the same child-centred, needs-based approach to the funding and provision of early childhood education and care (ECEC).

Box 1: What do we mean by early childhood education and care (ECEC)?

ECEC encompasses the range of non-compulsory education and care services for children before they begin school. The most common are centre-based ECEC providers such as long day care, preschool and kindergarten. Other services include family day care (provided in the home of an ECEC qualified educator) and in-home care (provided by an educator in the home of the child). In this report the term 'ECEC' includes all of these education and care services for children prior to school.

We also use the term 'childcare' to describe services provided to non-school aged children that are covered by the Child Care Subsidy. This is usually long day care. It is important to note that 'childcare' is a contested term. Childcare is not always preferred by the ECEC sector because there is a perception that it minimises the importance of early learning and devalues the role of the ECEC workforce. However, it is commonly understood by the public and is used to describe the Child Care subsidy. It is hence used in this report with this caveat.

We know that the early years (zero to five) are critical to a child's learning and social and emotional development.

As the proportion of children attending ECEC in Australia continues to grow, the system plays an increasingly important role in ensuring that all children begin their learning journeys in the best way possible.

Australian governments, like many others around the world, have increased their investment in preschool, both in the year before school and increasingly, in the two years before school.

On the one hand, it is positive that preschool provision in Australian states and territories can take a more nuanced, child-centric and place-based approach to providing education and care services, with a focus on quality and meeting the needs of three- and four-year-old children. We know this is required to address the effects of disadvantage that are clearly present at the start of school.

On the other hand, less is known about the impact of childcare or long day care, prior to preschool, on children's learning outcomes. There is a noticeable gap in the research when it comes to young children aged up to three years. That is why this report uses large longitudinal surveys and linkages to other datasets to track children from birth into primary school to investigate this relationship.

We know that socioeconomic status is broadly related to children's learning outcomes when they start school. New evidence from our study shows that the achievement gap informed by a child's socioeconomic status starts even younger.

We found clear differences in measures of children's learning and development based on socioeconomic status for children aged between birth and three years old.

For children under the age of two, socioeconomic status has little impact on overall measures of learning development. However, by two to three years of age, the achievement gap has begun to show. Once they reach school, the pattern of children from advantaged backgrounds outperforming children from disadvantaged backgrounds has become evident and the gap continues to widen. In our research, the socioeconomic status of children when they were aged between zero and one year had the most consistent impact on later learning outcome measures.

Our research suggests that not only are the early years important, but the first three years are crucial because children are on an uneven playing field - even before they are enrolled into preschool.

There are important caveats to this. Measures of learning development at a very young age are not as robust as measures of learning development for older children. Nonetheless, our findings point to the importance of early intervention, especially for children aged under three years, to close the achievement gap between socioeconomic groups. Intervention is incredibly important for children from the lowest socioeconomic groups because they tend to fall more and more behind over time - a trend that starts very early in life.

So, what does this mean for policy?

If we are to address this, we need to take a child-centred, needs-based approach to early years system design and funding. However, to date Australia has taken the opposite road when it comes to ECEC prior to preschool. The Child Care Subsidy (CCS), Australia's major funding mechanism for ECEC services (and for all ECEC services for children below preschool age), is a market-based model which follows parent demand.

Box 2: What is the Child Care Subsidy (CCS)?

The CCS is a subsidy that is paid to the service provider, who then pass it on to families as a fee reduction. The CCS depends on family income and the number of non-school aged children accessing childcare.

The Australian Government uses the CCS to pay a percentage of childcare fees up to an hourly rate cap. The out-of-pocket costs for childcare depend on how many hours a family uses, their CCS, the hourly rate set by the provider (if above the rate cap then this will not be subsidised), and the number of children.

Families with lower income and with more children using childcare receive a greater subsidy. Families with a higher income receive a lower subsidy and will have higher out-of-pocket costs.

In one sense, the CCS is progressive because greater subsidies are provided to families with lower incomes. However, because the CCS uses an hourly cap approach to funding, the ECEC services that can generate the most income are those that can charge the highest fees. This means that it is the more advantaged areas of the country that have more ECEC services [1], which are better funded and often better quality, than what is on offer in less advantaged areas [2].

Although not intentionally, this system sets up a staggered starting line from the very beginning, leaving the rest of our education system to do the heavy lifting.

We need to review the way we fund ECEC in Australia, with a view to moving in the direction of a more child-centred, needs-based funding model for all services, especially for the youngest children.

As Australia continues its journey towards ‘universal’ ECEC, now is the time to be more strategic about the services on offer. We need a strong focus on equity so children from all backgrounds can experience the lifelong benefits of high-quality ECEC.

The federal, state and territory governments should work together to ensure there is a more targeted approach that delivers high-quality services and additional supports when and where they are needed.

The opportunity is immense, and much of the infrastructure is already in place. However, to achieve this, we need to rethink the way we currently fund and shape the system.

Key Findings

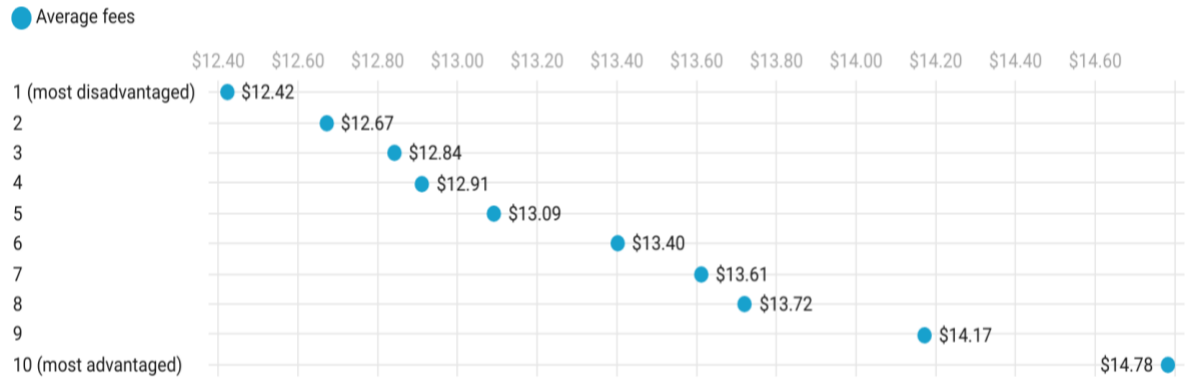
1. There has been an increase in the number of available ECEC places over the past decade, but this growth has been unequal. This leaves some families with poor or no access. The centres that receive the highest fees – and usually access to more resources - are also those in the most advantaged areas.

Through a series of reforms to the CCS settings, Australia has taken great strides in making ECEC services more affordable to more families in recent years. We have also made significant gains in preschool provision and participation thanks to a concerted policy focus. For many parts of Australia, this has resulted in a large increase in the supply of ECEC places. The private for-profit providers in the ECEC market have been largely responsible for this growth.

However, many families are still missing out. The market-based approach of the CCS system seemingly fails to deliver ECEC equitably across the country. Many children living in so called 'childcare deserts' miss out. Regional and remote areas of Australia often suffer from the worst levels of access.

Greater access is found in more advantaged suburbs where providers can also charge higher fees. While the Australian Government provides greater levels of subsidies to families from more disadvantaged backgrounds, it is the centres in the most advantaged parts of the country that receive the greatest amount of revenue by levying the highest fees. More money means more resources for providers and children in these suburbs. This shows that when it comes to equitably resourcing the system, we still have a long way to go.

Centres in the most advantaged suburbs receive the most income per child



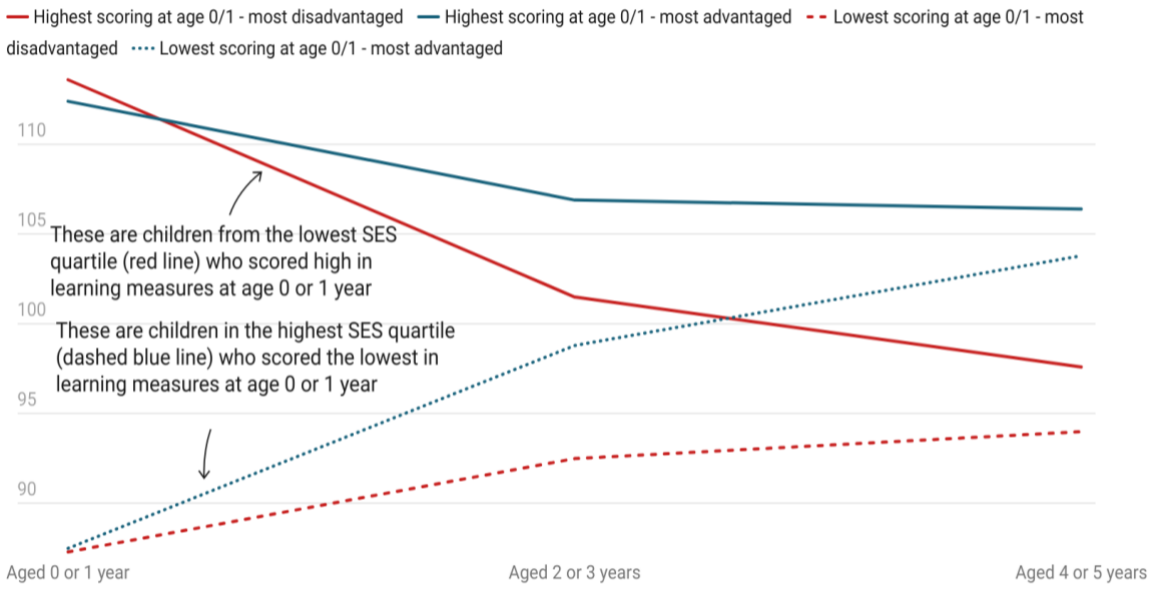
Estimated average hourly fees for long day care by socioeconomic decile of centre location

2. The achievement gap between children from high and low socioeconomic backgrounds can start at a very young age

In our analysis we found that the achievement gap - the persistent disparity in educational performance especially between different socioeconomic groups - begins at a very early age. Socioeconomic status has little impact on overall measures of learning development for children under one year of age, but by age two to three, the socioeconomic achievement gap has begun to show. Once they reach school, the pattern of children from more advantaged backgrounds outperforming children from more disadvantaged backgrounds has widened even further.

We examined data from the Longitudinal Survey of Australian Children (LSAC) to follow the trajectory of children and their scores in learning development measures. A snapshot of our results appears below. This figure shows the children who scored the highest and the lowest in learning development measures at age six months to one year and how they progress as they move towards starting school. This group is split into children from the most disadvantaged and the most advantaged backgrounds.

The achievement gap starts early



Average learning development score for the highest and lowest scoring children at age 0 to 1 year by top and bottom socioeconomic quartile

This data shows how children from disadvantaged backgrounds who score high on learning development measures at a very young age are overtaken by their peers from more advantaged backgrounds as they move towards school age.

This research points to the importance of high-quality services and family supports being made available to children aged under three years, to close the achievement gap between socioeconomic groups.

3. The home environment plays a key role in children's later learning outcomes

We used data from the LSAC to understand the impact of the home environment on children's later life academic outcomes. Children's results from the National Assessment Program for Literacy and Numeracy (NAPLAN) were used to examine achievement in the domains of grammar, numeracy, reading, spelling and writing when children were at primary school (Years 3 and 5) and secondary school (Years 7 and 9).

We looked at how early experiences in the years before school impacted later results across a range of different variables. We found that socioeconomic status and whether children had a learning difficulty were significant predictors across all domains and year levels.

Features of the home environment were also statistically significant. For instance, children whose parents read to them during the week reported greater achievement in all year levels and domains, except Year 5 writing and Year 9 numeracy. For Year 3 children, the number of books in the home significantly predicted their performance in numeracy and reading.

There is a lot of evidence that shows the positive impact high-quality early learning can have on children from more disadvantaged backgrounds. Despite this, Australia is failing to take advantage of this opportunity because services do not have the extra resources where they are needed most (or the service is not present at all).

Our findings suggest that closing the achievement gap will require innovative responses and a different approach to parts of the system, going beyond the current standard level of provision that the Australian Government funds through the CCS.

Where to from here?

Integrate, connect and 'stack' early years services

ECEC services are often where young children and families engage with the early years system for the first time. This is part of the reason why the South Australian Royal Commission into Early Childhood Education and Care suggested that ECEC could become the 'backbone' of the early years system, facilitating and fostering engagement between parts [3].

The CCS system already has several additional 'add on' supports in place, but we argue this is not enough. A focus on equity and directing resources to children who need them most should be at the heart of Australia's ambitions for 'universal' ECEC.

We need to better connect the range of early years services for the families of very young children. This can include 'stacking' ECEC in conjunction with health services, parental education and family support programs. It can be easier for ECEC services to support families by connecting with local maternal and child health, primary schools or other allied health services if they are geographically integrated.

There is evidence to support the creation of full-service schools, also known as 'full-service community schools' or 'hubs'. This refers to schools which provide for the co-location of additional services (health, early childhood, family and social) on or near school sites. Child health professionals such as paediatricians, speech pathologists and psychologists can also conduct visits at these sites.

There are currently hundreds of 'hubs' already in operation around the country. These hubs have shown promising evaluation results in terms of improving children's outcomes and parental and community engagement.

Adopt a 'cost model' for the funding of extra services based on children's needs, underpinned by proportionate universalism

Australia's current approach to funding rates for the CCS is based largely on market rates that were set almost a decade ago. Funding rates do increase with inflation, but the only way centres can fund extra services is by charging higher fees.

This means that Australia's approach to CCS subsidies is backwards-facing, limiting rather than building resources towards the future of childcare. Australia needs a different approach so that children's needs are met with the appropriate resources.

A 'cost model' focuses on the actual costs incurred by providers to deliver services, including wages, infrastructure and operational expenses. This approach more closely examines the true costs of providing quality care and may be adjusted to reflect regional variations or specific service needs. The model could also be used selectively to fund interventions and extra resources that are effective in improving children's developmental outcomes.

This cost model could be based on a principle of proportionate universalism where additional resources are directed in proportion to need.

Adopt a child-centred approach

A child-centred approach puts the needs of the child at the forefront. It considers what type of service would be best for the child, as well as when, where and how they may need it.

There is an inherent tension in CCS-funded long day care in that it is a both a care or 'child-minding' service for parents as well as an education and care service for children. The CCS funding model has been designed with working parents in mind and the market offering in Australia has evolved on this basis.

A child-centred approach is also linked to place. Under the current CCS model, ECEC providers have no incentive to establish in locations that best serve the needs of children. The market-based approach means that providers are often on main roads, in shopping centres or other industrial or commercial areas. While this can benefit parents in terms of ease of access to work and transport corridors, it may not benefit children.

The system would look very different if Australian governments' approach to ECEC started by examining the needs of the child and how these should inform service provision.

In short, the policy objective 'scales' should be tipped more in favour of the child.

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Chapter 1: ECEC in Australia

Why is ECEC so important?

The first five years of a child's life, the 'early years', are a crucial period for neurological, cognitive [4] and social development [5].

There is a vast research literature to draw upon to highlight the importance of early experiences in later development. For instance, neurological research shows that foundational aspects of children's brain development occur in the early years, including through what is commonly known as the 'serve and return' mechanism [4]. Children make gestures or 'serve' something into the world that is 'returned' by a caregiver or educator. Children learn about the world through these back-and-forth interactions which forms the neurological basis for important functions such as working memory, inhibitory control and attention, all of which are crucial for later learning [6].

When children are immersed in richly engaging environments in their first five years, they are more likely to perform well at school [7].

High-quality ECEC (highly rated practice from experienced educators), is particularly important for the development of children from disadvantaged backgrounds [8]. Evidence from large-scale longitudinal research tracking thousands of children in Australia [7] and England [5] supports this claim. That is why high-quality ECEC, not just ECEC attendance, is crucial to improving outcomes for children from disadvantaged backgrounds.

ECEC is a priority area for governments

Reflecting the growing recognition of the importance of the early years, ECEC in Australia is currently undergoing major policy reforms to increase support for families and their children. Significant changes have already occurred, making services more affordable for example, by increasing the CCS for most working families.

Since 2022, the Albanese Government has prioritised an expansion of ECEC and commissioned two major inquiries. The first was undertaken by the Australian Competition and Consumer Commission (ACCC) and focused on the cost of ECEC. The second inquiry, undertaken by the Productivity Commission, investigated a pathway to a 'universal' ECEC system.

The Albanese Government has recently passed legislation to 'guarantee' three days of subsidised ECEC for all families earning under $530k per year regardless of activity levels. This is slated to come into effect from January 2026.

In recognising that children from low socioeconomic status families often have poorer outcomes later in life, achieving equity during the early years is also central to ECEC reforms.

Governments at the federal, state and territory levels acknowledge the need to focus on

equity of access and quality of services, as well as supporting the expansion of provision.

Federal, state and territory education and early years ministers have developed a 'national vision' to drive reform of the ECEC sector. This vision sets out key principles and goals including equity, affordability, quality and accessibility [9].

The Australian Government has also recently published its 10-year Early Years Strategy 2024-2034 [9] (the Strategy). The Strategy envisages:

> That all children in Australia thrive in their early years. They have the opportunity to reach their full potential when nurtured by empowered and connected families who are supported by strong communities (p. 5).

The Strategy will be delivered through three action plans over 10 years. The First Action Plan [10] is made up of four Priority Focus Areas: valuing the early years; empowering parents, caregivers and families; support and work with communities; and strengthening accountability and coordination. Providing support for ongoing programs aimed at addressing children's health, family wellbeing and disadvantage make up some of the actions related to Priority Focus Areas one and two.

The vision is there, but realising Australia's ambition for a universal, high-quality ECEC system represents a big policy challenge.

How is ECEC delivered and funded in Australia?

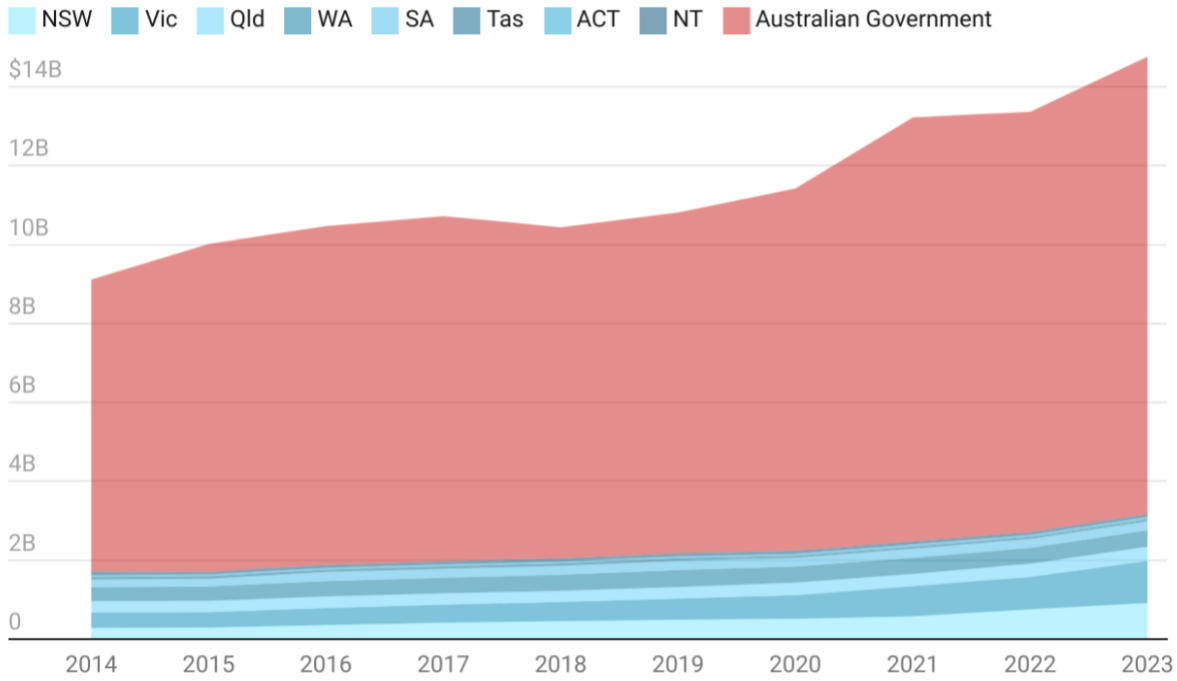
ECEC encompasses a range of education and care services for children, usually before they enrol into schools. It is a diverse sector that crosses jurisdictional divides, is delivered in many different settings, and is subject to many policy imperatives.

Long day care centres are the most common form of service, with over 9,200 centres registered in Australia [11]. ECEC also includes preschool or kindergarten, which is a more structured program aimed at children in the two years prior to school. Preschool or kindergarten programs might be delivered in stand-alone services or integrated within long day care centres or part of primary schooling.

Since 2018, the CCS has been the main subsidy paid by the Australian Government to support families. It covers services delivered in Centre Based Day Care (in long day care or occasional care centres), Family Day Care (provided in the educator's home), Outside School Hours Care (OSHC), and In Home care (provided at the family's home).

Figure 1 shows the expenditure on ECEC services by level of government. The Australian Government is by far the largest funder of ECEC services with the majority of these funds spent on the CCS.

Figure 1: The Australian Government's Child Care Subsidy is the largest form of expenditure on ECEC



ECEC expenditure by level of government per financial year from 2014 to 2023 [12]

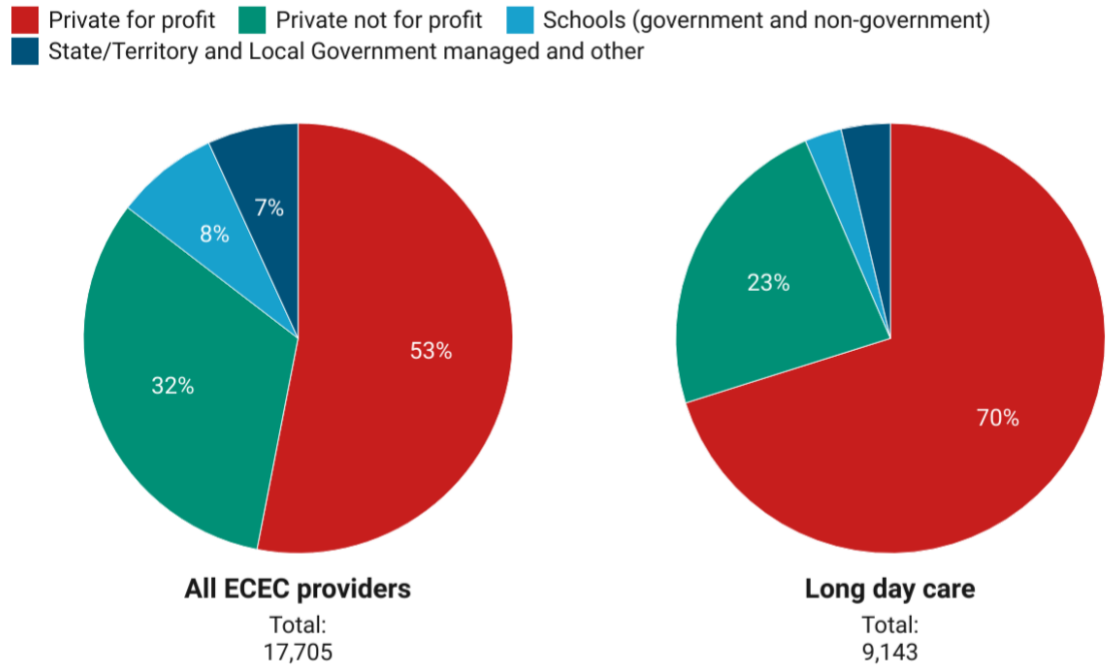
The CCS is a demand-side subsidy. It is paid to the service provider who then pass it on to families as a fee reduction. It is like a 'voucher system' where families can choose which service to use, and the funding follows the child. The CCS rate depends on family income and the number of non-school aged children accessing childcare. Currently, families earning under $80,000 per year receive up to 90% in subsidies for the cost of childcare.

The CCS has some additional supports to help families with additional needs, such as those experiencing hardship, disadvantage or financial stress. Centres attended by children with additional needs can also receive financial support and resourcing to help with care and inclusion. Community-led centres and centres located in under-served, remote and very remote locations can also apply for grants to help with the cost of delivering education and care to their communities.

It is important to note that Australia operates a mixed ECEC 'market' comprising a range of different providers – public and private and for-profit and not-for-profit. For example, preschools and kindergartens can be run by state or local governments and can receive extra funding for children with additional needs. Government preschools and kindergartens can also be strategically placed in areas of need and provide targeted supports linked to additional services.

However, government-run centres are a relatively small component of ECEC services. As Figure 2 shows below, more than half (53%) of all providers are private and operating for-profit. For long day care, over 70% per cent are private providers operating for-profit.

Figure 2: For-profit providers are the largest operators in the ECEC sector



Percentage of ECEC services by provider management type [13]

Box 3: What is a 'demand-side' subsidy?

A demand-side subsidy (also called an 'end-user subsidy') is a public funding mechanism used to overcome the barrier of affordability by 'subsidising' and therefore reducing the consumer price of a good or service.

The advantages are that it can support consumer choice, effective markets and competition as recipients can theoretically 'spend' their subsidy with any provider.

The disadvantages include the potential to distort markets by driving up prices and can result in an uneven supply in, and variability of, the quality of services, particularly in areas where demand is low.

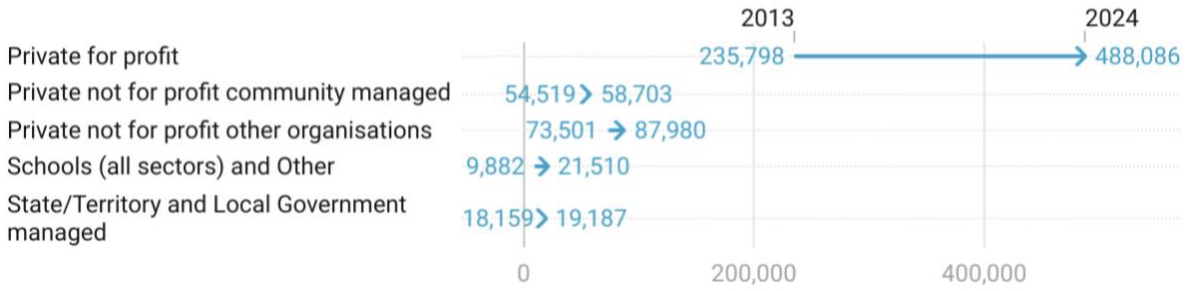
Australia's current policy approach to services covered by the CCS aims to boost supply as efficiently as possible. Providers respond to demand by creating supply in the form of ECEC places.

By looking at the number of places over the past decade (Figure 3), we can see that Australia's approach has created extra supply to meet the increased demand for care services, even if it is not always clear that this growth has been evenly distributed.

In September 2013, there were approximately 400,000 licensed long day care places. By September 2024, this had increased to over 675,000 licensed long day care places. It is the private for-profit providers that have been largely responsible for this growth. Figure 3 shows the difference by provider management type between September 2023 and June 2024.

There are, however, limitations associated with the market model and CCS that restrict the system's ability to enact equity and deliver more support to those who need it most.

Figure 3: Private for-profit providers have been responsible for the growth in long day care places



Approved long day care places by provider management type for 2013 (Q3) and 2024 (Q2) [13]

Socioeconomic status can drive gaps in children's outcomes over time

One of the most persistent findings in education research is the relationship between family socioeconomic status and children's educational outcomes [14, 15]. Overall, children from more disadvantaged backgrounds perform worse on education measures than children from more advantaged backgrounds. This is also evident in the early years.

Box 4: What do we mean by high and low socioeconomic status?

Socioeconomic status refers to an individual or group's social and economic position in society. It can be measured in different ways. In economics, socioeconomic status is often measured by income, wealth, and employment status. Sociologists expand on this definition to include education level, occupational prestige (the relative status of an occupation) and access to resources.

While the components used to measure and define socioeconomic status vary, there are some commonalities. High socioeconomic status is usually characterised by greater income, higher levels of education and prestigious or well-paying occupations, leading to increased access to quality healthcare, education and social opportunities. In contrast, low socioeconomic status is associated with lower income, limited educational attainment and jobs with less stability or lower wages, often resulting in financial insecurity, reduced access to healthcare and education and fewer opportunities for upward mobility. We use the terms 'low socioeconomic status' and 'disadvantaged' interchangeably.

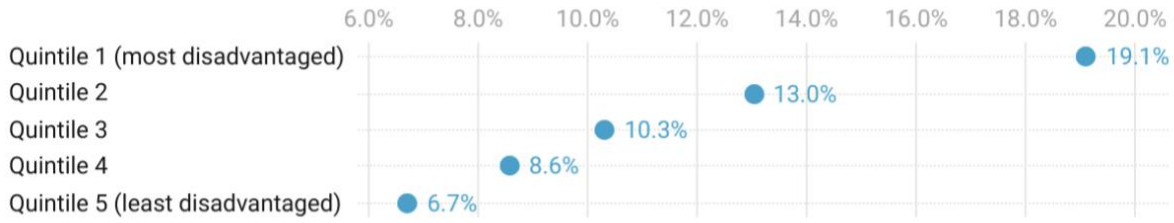
A family's socioeconomic background is often grouped in quartiles (four equal sized groups), quintiles (five equal sized groups), or deciles (ten equal sized groups). For instance, when describing socioeconomic quartiles of a population, the lowest quartile (1) represents the 25% with the lowest socioeconomic scores, and the highest quartile (4) represents the 25% with the highest socioeconomic scores.

The Australian Early Development Census (AEDC) measures the development of all Australian children before they start school. The AEDC is conducted every three years and assesses five key areas of development: physical health and wellbeing, social competence,

emotional maturity, language and cognitive skills (school based), and communication skills and general knowledge [16].

Developmental vulnerability can be reported in one, two or more than two domains. Figure 4 below shows the percentage of children who were assessed as developmentally vulnerable in two or more domains by socioeconomic quintile in the AEDC conducted in 2021. This figure shows how children from more disadvantaged backgrounds are more likely to be classified as developmentally vulnerable in two or more domains – almost one in five. This is almost three times as likely as the children from the most advantaged backgrounds.

Figure 4: Children from disadvantaged backgrounds are more likely to be developmentally vulnerable when they start school



Per cent of children developmentally vulnerable in their first year of school (2021 cohort) in two or more domains by socioeconomic status [16]

The reasons for this are complex and there are many factors that can influence children's developmental vulnerability. For instance, the home environment plays a major role during child development. Siraj-Blatchford et al. [17] contend that "the home is a powerful 'proximal' context. This helps children to establish masterful learning dispositions towards school and learning and stimulates the development of self-efficacy" (p. 7). Bradley [18] describes a quality home environment as one with experiences that promote child development. These include parent warmth and responsiveness, access to toys and enriching activities, social stimulation, safety and consistent family routines.

A quality home environment is associated with a range of positive child outcomes such as language, verbal ability, cognitive development and later achievement [8, 18] and positive social behaviour [19].

We need to address the inequity in ECEC access and quality

Australia's ECEC system can improve to deliver an enriching early learning experience for children. However, in the current system architecture there is an inherent tension between the objectives of meeting families' demands for services and improving equity in children's outcomes.

Within a largely privatised market, most providers can decide where they locate their centres, especially for services funded by the CCS. We see how this inequity plays out when we map the spatial distribution of places relative to children as a measure of access across Australia.

Mitchell Institute research into ECEC accessibility has found that where you live matters [1, 20]. Overall, inner-city areas have better access than outer-suburban areas, and metropolitan areas have better access than regional and rural areas, which are more likely to be 'childcare deserts'. The term 'childcare desert' refers to an area where there are three or more children for every one available childcare place. In many regional and rural areas, many communities are underserved or do not have any ECEC available at all.

Further, there is greater access in more advantaged suburbs where providers can charge higher fees. Figure 5 shows the mean hourly rate for long day care centres by estimated socioeconomic decile.[1] It reveals that centres located in the most advantaged parts of Australia levy the highest fees. More money means more resources for providers in already advantaged suburbs.

Figure 5: Centres in the most advantaged suburbs receive the greatest income per child

Average hourly fees for long day care centres by estimated socioeconomic decile of centre location [21]

We know that it is not just about access and cost. ECEC quality is important for the development outcomes for all children [22], giving them a better chance of starting school with the language and social skills they need to succeed [19].

When we talk about 'quality' in ECEC we are talking about a service's relative performance across a range of measures, including the way in which the ECEC is delivered, how the service is run and its physical environment and resources. Quality in ECEC is often thought of in terms of relative excellence. This is why ECEC services can be described as high or low quality.

[1] The smallest geography for publicly available data on long day care fees is by Statistical Area 3. This data has been used to estimate the socioeconomic decile by Statistical Area 2 level.

Box 5: How is centre quality measured in Australia?

The Australian Children's Education and Care Quality Authority (ACECQA) set standards and assesses the quality of ECEC providers through the National Quality Standards (NQS). State regulatory authorities assess centres against the following seven standards:

1. Educational program and practice
2. Children's health and safety
3. Physical environment
4. Staffing arrangements
5. Relationships with children
6. Collaborative partnerships with families and communities
7. Governance and leadership.

Centres that meet all standards are rated as 'meeting the NQS' and centres that are yet to meet all standards are rated as 'working towards the NQS'. Centres can also be 'exceeding the NQS' if they demonstrate exceptional practice in at least four of the seven quality areas, with at least two of these being quality areas 1, 5, 6, or 7. Centres that are exceeding the standards in all areas can apply to become 'excellent' centres, which are determined and awarded by ACECQA.

Poor-performing centres can be rated as 'needing significant improvement'. In these cases, 'steps are taken' towards improving centre ratings (although there is limited information available as to how this occurs). ECEC centre results are published on 'Starting Blocks', a publicly available website aimed at parents who may be seeking ECEC services.

The Australian Educational Research Organisation's (AERO) recent analysis [23] highlights that centres rated as 'exceeding' are more likely to reduce children's developmental vulnerability compared to centres rated below. Moreover, the standards of educational program and practice, physical environment, and relationships with children seem to have the largest impacts on reducing developmental vulnerabilities.

Despite this, the ACCC [24] has found that high-quality centres are not uniformly spread across geographical areas, with centres in rural, remote and disadvantaged locations less likely to meet the national standards for quality. The Productivity Commission [25] found that "children experiencing disadvantage and vulnerability – who are likely to benefit most from ECEC services – are less likely to attend than their more advantaged peers" (p. 61). They have recommended 30 hours a week of free ECEC for all children under five years of age as part of a universal system of ECEC provision.

However, a universal model that allocates the same level of resources to all families (based on family income) may inadvertently widen existing disparities. Families in disadvantaged areas can face additional barriers, such as lower quality ECEC in nearby centres [26].

Another issue is that Australia's current ECEC funding and provision framework encourages a degree of homogeneity in services. The CCS shapes an ECEC system that focuses on producing services in the most efficient way possible. For instance, the Productivity Commission report that was the basis for the introduction of the CCS recommended the demand-side subsidy model with co-payments from families and a maximum fee per hour

based on market rates because of its 'efficiency' relative to other approaches [27]. This has meant that Australia has an economical way of increasing the total supply of ECEC places, and services establish in areas of high demand.

The CCS does have some additional components aimed at directly supporting families in need. Some of these are outlined in Box 6 below.

Box 6: Additional supports through the CCS

The CCS includes extra support and funding to families and service providers through the three following policies:

1. Additional Child Care Subsidy (ACCS) – aims to provide extra support to cover the costs of ECEC for families experiencing difficult circumstances. The ACCS is paid to services and "will usually cover all of a child's ECEC fees" [28]. A parent or carer must be eligible for the CCS and meet one of the following additional criteria:

- an eligible grandparent receiving income support
- transitioning from income support payments to work
- experiencing temporary financial hardship
- caring for a child who is vulnerable or at risk of harm, abuse or neglect, as identified by providers. Applications for this Wellbeing stream are made to Services Australia.

In the September quarter of 2024, the ACCS accounted for just under five per cent of the $3.9 billion in subsidies funded by the Australian Government [21].

2. Inclusion Support Program (ISP) – aims to support ECEC services to provide care for children with additional needs. The ISP provides about $123 million per year in funding [29]. The program is available to CCS approved services offering Centre Based Day Care, Family Day Care, or Outside School Hours Care. There are three categories of support:

- Professional support is offered through Inclusion Agencies in each state or territory to help ECEC services deliver support for children and families with additional needs
- Specialist equipment can be provided by Inclusion Agencies, which manage a Specialist Equipment Library. Services can access free equipment and resources from the library such as portable ramps and standing frames to ensure children with additional needs can access care with their peers
- Inclusion Development Fund is available when professional support or specialist equipment is needed. Funding can go towards additional educators or reducing numbers in Family Day Care

3. Community Child Care Fund (CCCF) – helps providers located in disadvantaged or regional and remote areas. It operates through a series of grants for instances including:

- Special circumstances such as local emergencies creating situations where services need to remain open
- Disadvantaged and vulnerable communities that may require services to stay open longer or at certain times
- Limited supply, such as remote and very remote areas that may require new services or centres
- Restricted grants open to identified services to operate sustainably
- Restricted expansion to set up new First Nations-led services
- Connected Beginnings open to community-led services helping First Nations Children

Outside of these policies, the CCS has few systemic mechanisms to provide extra support to children with additional needs. Returning to the comparison to school funding, the government school funding system provides a set amount for each student (primary or secondary), plus a loading based on the features of the student cohort for each school. This is known as 'needs-based' funding.

Schools will generally receive more funding if they have a higher proportion of students from lower socioeconomic backgrounds, students with a disability or Indigenous students. Schools, parents and carers do not need to apply for this extra funding as it is systematically applied at the school level. The Australian Government estimates that about 29% of the total contribution to recurrent school funding comes from the 'needs-based' loadings.

Compared to schools, funding based on need is not as central to ECEC services covered by the CCS. The CCS can allocate additional resources in varying forms, but this can be complex. The onus is on parents, carers or providers to access additional supports which can mean some children in need miss out. Consequently, the system can be lop-sided with little incentive or capacity to provide the extra support services that would assist families experiencing disadvantage.

Needs-based funding is only one approach to funding services. For instance, a 'cost model' approach focuses on the actual costs incurred by providers to deliver services, including wages, infrastructure and operational expenses. This model more closely examines the true costs of providing quality care and may be adjusted to reflect regional variations or specific service needs. The Centre for Policy Development [30] believes this approach should replace the current CCS funding model.

Overall ECEC access and participation has improved in recent years alongside the implementation of the CCS. However, it is limited in delivering equity in the early years because it lacks the systemic mechanism required to allocate additional funds where and when they are needed most. The following chapter will show that the timing of interventions is crucial.

Chapter 2: The achievement gap and socioeconomic status

Students from lower socioeconomic backgrounds consistently perform worse on educational measures than their more advantaged peers, with gaps evident from early primary school and widening over time. This 'achievement gap' means that children from the lowest socioeconomic backgrounds fall behind those from high socioeconomic backgrounds.

Lifting disadvantaged students' outcomes in Australia's schools has been a major policy focus [31]. Despite this, there has been limited success in closing the achievement gap.

The Australian Early Development Census (AEDC) evidences the fact that socioeconomic background has a big impact on whether children are on track by the time they start school. We wanted to know more about the trajectories of children from different socioeconomic backgrounds in the years before school. To do this, data from the Longitudinal Study of Australian Children (LSAC) was used to track children from birth to school, exploring how ECEC, combined with different factors, can shape children's learning outcomes later in life.

Researching the achievement gap

We used data from the LSAC to examine the achievement gap. The LSAC involves approximately 10,000 children and their families. The study began in 2003 comprising two cohorts: B(aby) cohort who were under a year old when the study commenced, and the K(indergarten) cohort who were four to five years old when the study commenced.

This extensive and longitudinal data provides a rich source of information from parents and carers, enabling us to track thousands of children as they develop. Because we are interested in the early experiences of children, our research focuses on LSAC data from the Baby cohort.

The LSAC reports based on various data collection points, or 'waves', which occur roughly every two years (Table 1). To measure learning development, the LSAC uses a series of age-appropriate tests which are outlined in Table 2.

Table 1: LSAC waves and years included in this research

Wave	Year	Age group
1	2004	0 to 1 years
2	2006	2 to 3 years
3	2008	4 to 5 years
4	2010	6 to 7 years
5	2012	8 to 9 years
6	2014	10 to 11 years

Table 2: Tests used in the LSAC to determine children's learning outcomes

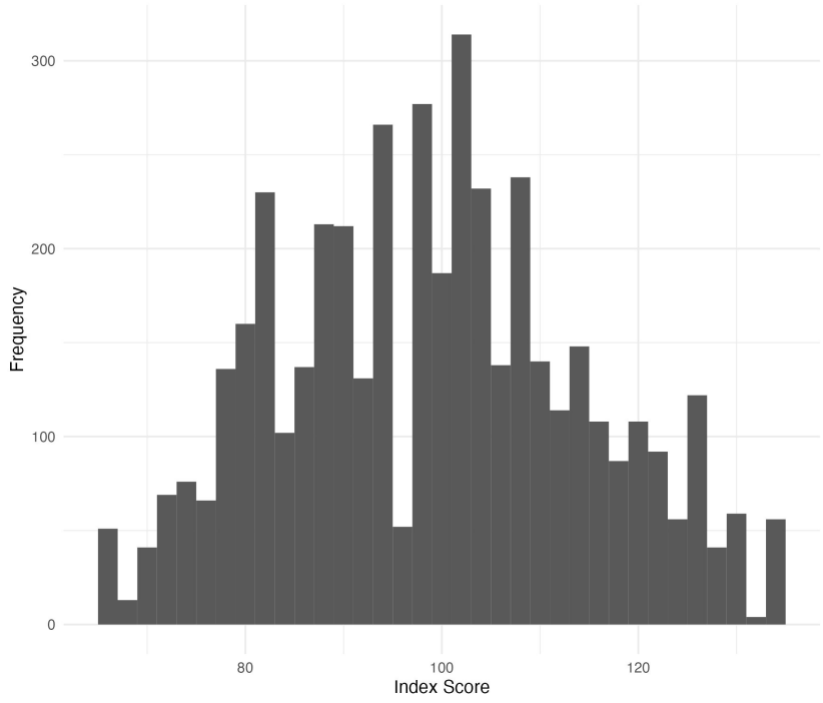
Age	Wave	Test	Overview
0-1	**1**	Communication and Symbolic Behaviour Scales (CSBS)	The CSBS is a test completed by parents based on their observations of their child's behaviours such as emotion, eye gaze, communication, gestures (waving, reaching), sounds and object use. The test is completed before children speak and is used as an early test for developmental conditions.
2-3	**2**	Child's Communication Skills Scale	The scale comprises six items assessing the child's ability to give and receive verbal information. It is completed by parents.
		MacArthur-Bates Communicative Development Inventory Third Edition (MCDI-III) Vocabulary	The MCDI-III Vocabulary is a parent-rated test of their children's vocabulary. It features a two-page checklist of different words and phrases related to animals, foods, clothing and body parts.
		MacArthur-Bates Communicative Development Inventory Third Edition (MCDI-III) Grammatical Markers	Parents are presented with 12 pairs of phrases, one with better and one with worse grammar. Parents indicate which of the two phrases the child uses.
4-5	**3**	Peabody Picture Vocabulary Test (PPVT)	The PPVT is an untimed test of children's vocabulary. The interviewer says a word, after which the child selects one out of four pictures to match the word.
		Who am I? (WAI)	The WAI test aims to assess general cognitive abilities before formal schooling. It focuses on reading and numeracy tasks such as copying words or sentences, symbol recognition and drawing.
		Teacher rating of numeracy skills	This test consists of five yes/no items that assess the child's numerical abilities. This might include counting, classifying and simple addition and number recognition.
6-7, 8-9	**4, 5**	ARS Language and Literacy	This test consists of 10 teacher-rated items assessing children's language tasks such as reading, writing and oral communication.
		Wechsler Intelligence Scale for Children IV (WISC-IV)	This test comprises four types of items related to pattern completion, classification, analogical reasoning and serial reasoning. It measures children's visual information processing and abstract reasoning.
		ARS Mathematical Thinking subscale	This tests the child's ability to perform various mathematical tasks. It comprises eight teacher-rated items.

We wanted to track learning development scores in children in the Baby cohort for a longer period than what is currently available in LSAC. To do this, we created variables based on the learning development measures used in the Kindergarten cohort. This meant we could track childhood development from the first year of a child's life to the age of 10 or 11 years old.

Most of the scores that are used in the measurements have been converted to an index using standardised distribution so that the average is ~100 and one standard deviation is ~10. This means that about two-thirds of results usually fall between 90 and 110 in learning scores, with more scores clustered around 100. This information helps to understand the distribution of scores in some of our analysis below. The index shows relative scores (how children compare to other children) and is effectively a ranking.

To highlight how these indices distribute scores, Figure 6 shows the frequency of index scores for the Communication and Symbolic Behaviour Scales (CSBS) that is collected when children are aged zero to one year. The figure shows the standardised distribution of results with a higher frequency of results around 100. An index score of 90 does not mean that a child scored 10% less than a child with an index score of 100, but rather that they are approximately one standard deviation from the mean and are approximately in the bottom 15% of all scores.

Figure 6: Learning measurement scores are standardised so the average score is ~100



Distribution of Communication and Symbolic Behaviour Scales (CSBS) index scores in the LSAC for children aged 0 to 1 year

All research has limitations and it is important to understand some of these. Measurements of children's development can be difficult. The measurement of children's learning development when children are aged zero to one year is completed by parents. Children under the age of six months are not included because the test is not appropriate.

Misson et al. [32] state that although "the early years of life are a period of substantial change and instability […] the instrument has a very strong theoretical framework [and] is particularly useful for a longitudinal study since the focus is on predictive rather than concurrent validity" (p. 11).

More detail about the data and methodology used can be found in the appendix of this report.

What did we find?

The achievement gap starts at a very early age

In our analysis we found that the achievement gap begins at a very early age. For children aged zero to one year, socioeconomic status has little impact on overall measures of learning development. If anything, the LSAC data showed that children from the cohort's lowest socioeconomic quartile performed marginally better than children from more advantaged backgrounds.

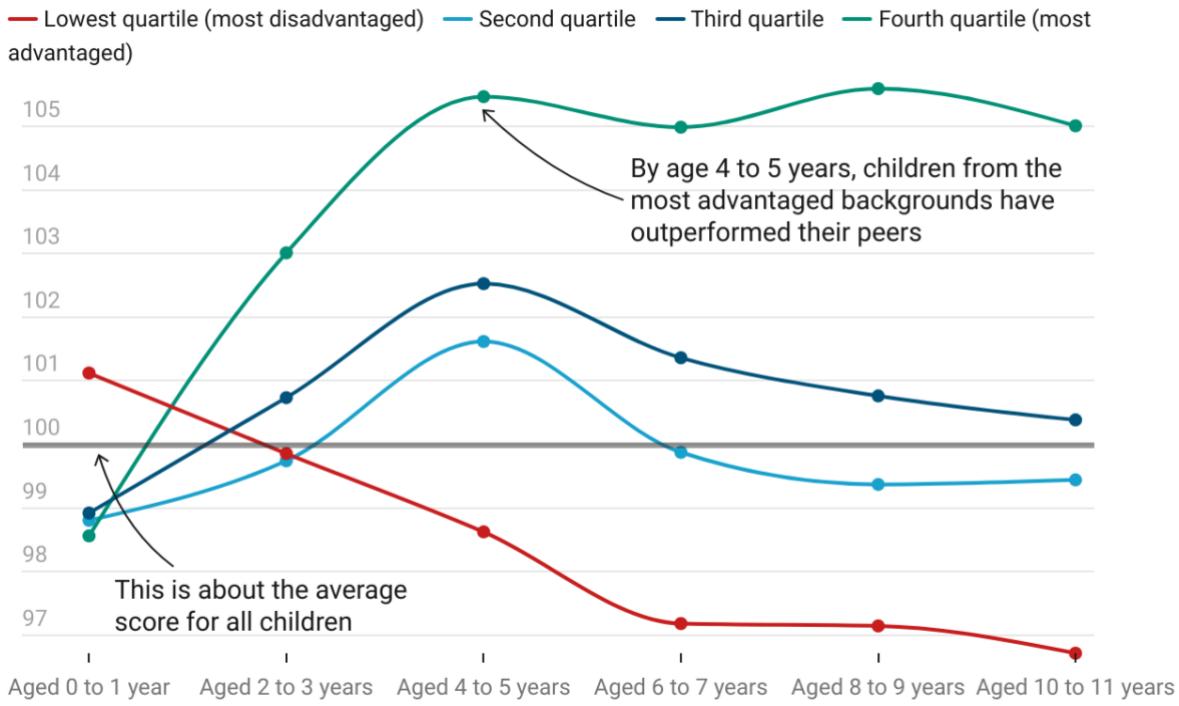
However, by the time children reach two to three years of age, the socioeconomic achievement gap has begun to show. By the time they enter school, the pattern of children from advantaged backgrounds outperforming children from disadvantaged backgrounds has widened even more.

Figure 7 below tracks children's learning development by socioeconomic status using LSAC data and the index measures for learning development created in the LSAC survey (in the index measures, a score of 100 is roughly the average score for the whole cohort.)

This figure separates children according to their socioeconomic quartile[2] as calculated in LSAC.

[2] Note that the socioeconomic quartile can change through the survey as family circumstances change. We have used the socioeconomic quartile recorded in the first wave of the survey for this analysis.

Figure 7: By the time children start school, the influence of socioeconomic status on learning measures has started to become entrenched



Mean score on learning development indices by age and socioeconomic quartile (at age 0 to 1 year). Average score is 100

This figure shows that in the first 'wave' of the survey, there is little difference in the average index score by socioeconomic quartile. By the time children were aged two to three years (wave 2), the average learning index scores for children from the second, third and top socioeconomic quartile had increased. This trend continued until children reached four to five years of age (wave 3), when children generally start school.

Children from the top socioeconomic quartile had the biggest increase in average learning development index scores. By the age of four to five years, children from the top quartile were outperforming children from other socioeconomic quartiles, a trend that continued through primary school.

In contrast, the average learning index score for children from the lowest socioeconomic quartile trended downwards. By the time they were beginning school at four to five years old, children from the lowest socioeconomic quartile had the lowest average learning development index score.

The learning development index score for children from second and third socioeconomic quartiles also declined slightly in the first couple of years of primary school.

Figure 7 illustrates the strong impact of socioeconomic status on cognitive measures. It also helps demonstrate that the foundations for the achievement gap begin at a very early age.

Further analysis helps demonstrate how socioeconomic status can influence the trajectory of children on learning measurement indices.

Table 3 focuses on children who scored in the lowest and highest quartile in learning development index measures. It compares these for the bottom and top socioeconomic groups when they were aged between zero and one year old.

Table 3: Achievement scores for low and high socioeconomic status children at age 2 and 4

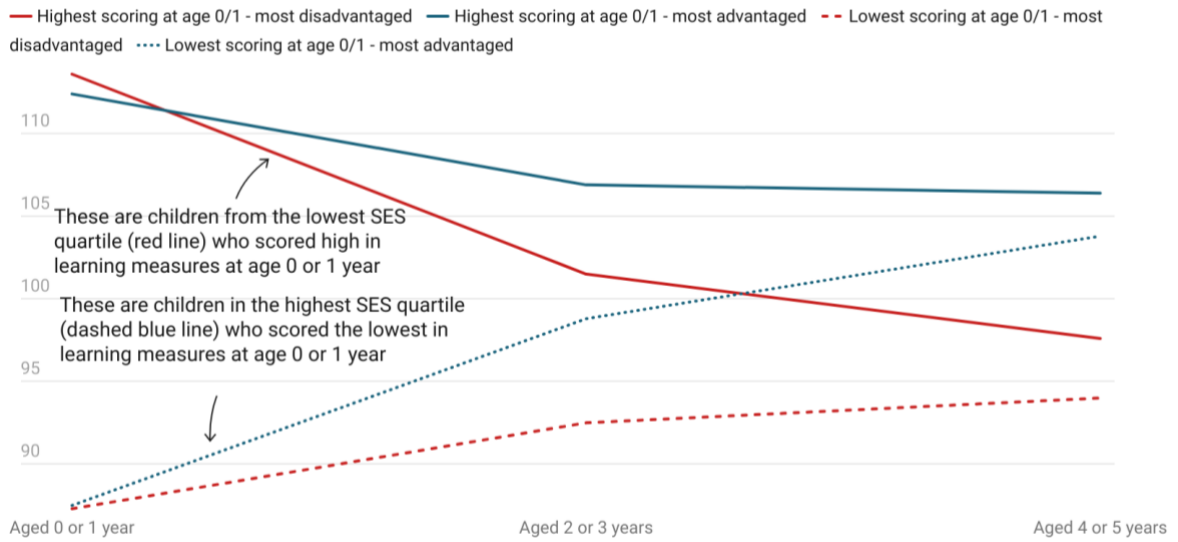
Lowest socioeconomic status group	Scores on learning index measures		
Learning outcome quartiles at age 0 to 1 year	Age 0 to 1 year	Age 2 to 3 years	Age 4 to 5 years
1 (average of 'low' scoring group)	87.3	92.5	94.0
2	96.2	97.6	96.0
3	103.4	98.2	96.0
4 (average of 'high' scoring group)	113.6	101.5	97.6
Top socioeconomic status group			
Learning outcome quartiles			
1 (average of 'low' scoring group)	87.5	98.8	103.8
2	96.4	102.7	105.0
3	103.2	105.0	105.1
4 (average of 'high' scoring group)	112.4	106.9	106.4

Again, this table highlights the influence of socioeconomic status on trajectories at a very young age. In the second column representing children aged zero to one year, the scores for each learning outcome quartile are very similar for both the bottom and top socioeconomic groups.

There are two main observations as children progress towards school. The first is that there is a general convergence between the 'low' and the 'high' scoring groups in learning measures so over time, there is less difference within socioeconomic groups.

Figure 8 highlights this observation. It shows how the high and low scoring children from the most disadvantaged backgrounds (the red lines) converge. It is a similar story with high and low scoring children from the most advantaged backgrounds (blue lines).

Figure 8: The achievement gap starts in the first year and increases throughout the early years



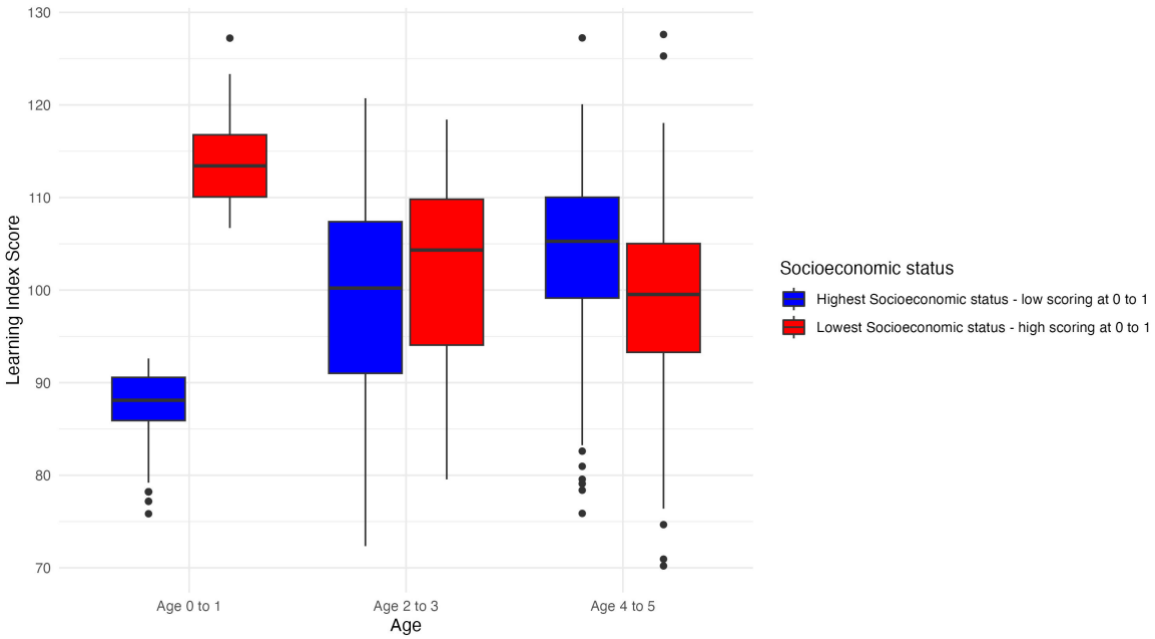
Average learning development index score for the highest and lowest scoring children at age 0 to 1 year by top and bottom socioeconomic quartile

The second observation is the divergence in outcomes between the bottom and top socioeconomic groups over time, which Figure 9 helps to highlight.

Figure 9 is a boxplot where the median is the middle line of the coloured box and the 25th and 75th percentile are the edges of the coloured box. This figure shows that children from the lowest socioeconomic group who scored in the 'high' range at age zero to one year had fallen to close to the overall average by age two to three years. By the age of four to five years, these children performed below average.

Children from the top socioeconomic group who scored in the 'low' learning outcome at age zero to one year later improved. By the age of four to five years, these children scored above the children from lower socioeconomic quartiles who had initially scored 'high' on learning measures.

Figure 9: High scoring students from disadvantaged backgrounds at age 0 to 1 years fall down the achievement ladder by the time they reach school age



Boxplot of Learning Index Score by age for children from low socioeconomic status backgrounds who scored in the top quartile at age 0 to 1 year and children from high socioeconomic status backgrounds who scored in the bottom quartile at age 0 to 1 year

Figure 8 and Figure 9 highlight the profound impact of socioeconomic status on trajectories in the early years. The data shows that by the time children start school, socioeconomic stratification, or the relative ordering of children's learning outcomes by socioeconomic status, has already taken effect.

This does not mean that children experiencing disadvantage cannot catch up, but these data indicate that children's outcomes are unequal from the start, which can make it more difficult for children, families and schools.

We also looked at a range of variables including attendance at long day care, parental involvement, parental mental health, children's use of television and playing video games, the number of books in a household and many other variables. We used the academic index score at age 10 or 11, as described in the LSAC survey, to track the impact of early experiences on later life outcomes. We found that many of these had a small impact, and many did not.

For instance, an identified learning difficulty when children were aged two or three years was a big predictor of lower scores on learning outcome measures by age 10 or 11 years. We found that adults reading books to a child aged two to three years was a statistically significant predictor of higher scores on learning outcome measures at age 10 or 11 years. We also found that not having books in a home was a statistically significant predictor of academic outcomes for children aged 10 to 11 years.

Ultimately, we found that the socioeconomic status of a child had the most consistent impact on later learning outcome measures.

This finding highlights the importance of access to high-quality early childhood services and family supports, specifically for children aged three years and under, to close the achievement gap between socioeconomic groups. Early intervention is especially important for children from the lowest socioeconomic group because they are falling more and more behind.

Taking a closer look at the home environment

We also used data from the LSAC to more closely explore the impact of the home environment on children's academic outcomes into adolescence.

There are many different variables available for this analysis. Some of those we considered can be found in the appendix. We used variables including the frequency of shared reading in the home, the number of books at a home, parental warmth and parental mental health to understand if there was any impact on later life educational outcomes. To measure this, we looked at NAPLAN results for children in Year 3, Year 5, Year 7 and Year 9.

We found that socioeconomic status and whether children had a learning difficulty were significant predictors across all domains and year levels. Also important was how often parents read to their children. Children whose parents read to them during the week reported greater achievement in all year levels and domains, except Year 5 writing and Year 9 numeracy. For Year 3 children, the number of books in the home significantly predicted their performance in numeracy and reading.

Many of the variables listed above had an impact on later academic achievement, but many others were not statistically significant.

When examining long day care attendance for children at a young age, we did not find a statistically significant impact.

It is important to note that statistical significance refers to whether we can claim with confidence that a difference in results is more than just chance based on the data that we are using. It also does not refer to the overall size of the impact. In our analysis of NAPLAN scores, we found that many of the variables had a statistically significant impact on later results, but the overall size of the impact was modest.

Nonetheless, these findings suggest that while socioeconomic status influences academic outcomes, so too does the home environment, and particularly parental interaction with children.

Tables 4-7 below highlight what we found to have had a statistically significant impact on NAPLAN results for children using the different 'bands'.

Table 4: Statistically significant factors as they related to NAPLAN learning domains in Year 3

Factors	Grammar	Numeracy	Reading	Spelling	Writing
Socioeconomic status	✓	✓	✓	✓	✓
Gender	✓		✓	✓	✓
Indigenous background					
Learning difficulty	✓	✓	✓	✓	✓
Read to child	✓	✓	✓	✓	✓
Number of books at home		✓	✓		

Table 5: Statistically significant factors as they related to NAPLAN learning domains in Year 5

Factors	Grammar	Numeracy	Reading	Spelling	Writing
Socioeconomic status	✓	✓	✓	✓	✓
Gender	✓		✓	✓	✓
Indigenous background					
Learning difficulty	✓	✓	✓	✓	✓
Read to child	✓	✓	✓	✓	
Number of books at home					

Table 6: Statistically significant factors as they related to NAPLAN learning domains in Year 7

Factors	Grammar	Numeracy	Reading	Spelling	Writing
Socioeconomic status	✓	✓	✓	✓	✓
Gender	✓		✓	✓	✓
Indigenous background	✓	✓	✓	✓	✓
Learning difficulty	✓	✓	✓	✓	✓
Read to child	✓	✓	✓	✓	✓
Number of books at home					

Table 7: Statistically significant factors as they related to NAPLAN learning domains in Year 9

Factors	Grammar	Numeracy	Reading	Spelling	Writing
Socioeconomic status	✓	✓	✓	✓	✓
Gender	✓		✓	✓	✓
Indigenous background	✓	✓	✓	✓	✓
Learning difficulty	✓	✓	✓	✓	✓
Read to child	✓		✓	✓	✓
Number of books at home					

Chapter 3: What does this mean for ECEC policy in Australia?

Our research shows that the achievement gap begins very early. In fact, by two to three years of age, children from more advantaged backgrounds had already begun to outperform other children on educational measures. By the time children reached school, the achievement gap had become entrenched.

These findings highlight, once again, the critical importance of the early years in laying the right foundations for later learning and development. They also tell us that for the ECEC system to deliver on its promise, we need a system-wide focus on meeting the needs of children, equitably, from the very start.

The OECD [33] argues that,

> ECEC on its own, without consideration of the broader policy landscape, cannot be expected to mitigate early inequalities. …[M]odels for coordinated services … highlight, there is not a single strategy that is best suited to all contexts, nor one that can ensure that the full range of comprehensive services effectively reaches the most vulnerable families (p. 89).

This suggests that if Australia is to close the gaps in educational outcomes that appear in the school system, it needs to better allocate resources and put more policy effort into the early years.

In recent years, Australia has made great progress in improving the affordability of ECEC services through a series of reforms to the CCS settings. It has also made significant gains in preschool provision and participation thanks to a concerted policy focus. However, when it comes to improving equity of opportunity, and of outcomes, this country still has a long way to go.

If the effect of socioeconomic disadvantage is evident in Australia from the earliest years, our ECEC system needs to acknowledge and proactively work to address this from the start.

How can we achieve a more equitable ECEC system in Australia?

Start with the concept of 'proportionate universalism'

Also known as 'progressive universalism', proportionate universalism "involves a 'baseline' of universal services for all families, with additional services provided according to need" [34] (p. 64). It is increasingly becoming recognised as an effective approach to ECEC and child development [35]. The South Australian Royal Commission into Early Childhood Education and Care Final Report [3] defined progressive universalism as "the capacity of a universal service delivery platform to 'ramp up' the intensity or nature of services to meet the needs of those for whom a standard service is not enough" (p. 31). The report argued that the roll out of three-year-old preschool, as well as pre-natal, maternal and child health (including home

visiting) and parenting supports should be underpinned by the principle of proportionate universalism.

Proportionate universalism is a policy framework that seeks to combine universal access to services with targeted support to address inequalities. It recognises that while all individuals or families may benefit from certain government support, those with greater needs require additional resources to achieve equitable outcomes. Applying this philosophy to Australia's ECEC system could transform how ECEC is currently delivered.

However, putting this principle at the heart of Australia's ECEC system would represent a significant shift, as the dominant funding model (the CCS) is a market-based system designed to subsidise the cost of childcare; not address the development and learning of all our children.

In line with proportionate universalism, further reforms to the system should be informed by the following:

A 'child-centred' approach

There is an inherent tension in CCS-funded long day care in that it is a both a 'childminding' service for parents and an education and care service for children. The CCS funding model has been designed with working parents in mind, and the market offering in Australia has evolved on this basis.

The system would look very different if Australia started from the needs of the child, considering the type of ECEC services they may need, where, when and how they may need it delivered. The policy objective 'scales' should favour the child at the system and funding level.

The OECD [33] makes the following recommendations as a starting point, as part of longer-term efforts to help address inequity in the early years:

- Align ECEC with broader early years policies – cross-sectional approach with other social and health services for children and parents
- Flexible ECEC programs – longer operating hours and regular communication between staff and parents
- Co-ordinated services throughout childhood – starting from pre-natal services and throughout early childhood and schools
- Parenting and parent engagement programs – promoting child-parent relationships, parental mental health, literacy activity and nutrition and health
- Home visiting – usually these begin in the pre-natal stage through public health programs but are an important feature of early years development and can link to ECEC participation
- Access to primary medical care and nutritional support – important for the overall health and development of children
- Complementary ECEC entitlements that align with the duration of paid parental leave.

Fund providers according to the cost of provision

Australia should move away from a simple price 'subsidy' to a 'cost model' as a more equitable means of funding ECEC services.

A 'cost model' focuses on the actual costs providers incur to deliver services, including wages, infrastructure, and operational expenses. This approach more closely examines the true costs of providing quality care and may be adjusted to reflect regional variations or specific service needs. The model could also be used selectively, to fund interventions and extra resources that have been shown to be effective in improving children's developmental outcomes.

The Centre for Policy Development [30] argues for the CCS funding model to be replaced with such a cost model, in addition to embedded equity and inclusion where families receive wraparound services.

We argue that whilst overall access and participation has improved in recent years alongside the expansion of the CCS, it will never deliver the equity needed in the early years. This is because it lacks a systematic mechanism to allocate additional funds where and when they are needed most.

Address geographic disadvantage

There is a body of evidence telling us that the market-based CCS system is failing to deliver equitably across the country, with the many children living in 'childcare deserts' missing out.

Australia is a large country with services and opportunities varying greatly depending on where families live. In metropolitan locations, low socioeconomic areas are more likely to have poor access compared to advantaged areas. Market-based solutions also seem to fail when it comes to providing services in rural and remote locations, with additional policy responses often needed to address inequities.

As set out earlier, the CCS system already has a number of additional 'add-on' supports in place. However, we argue this not enough, and a focus on geographic equity should be at the heart of system design.

A child-first approach to the location of ECEC services

Under the current CCS model, ECEC providers have no incentive to establish in locations that best serve the needs of children. The market-based approach means that providers are often on main roads, in shopping centres or other industrial or commercial areas. While this can benefit parents in terms of ease of access to work and transport corridors, it may not benefit children.

It can be easier for ECEC services to support families by connecting with local maternal and child health services, primary schools or other allied health services if they are co-located.

There is evidence to support the creation of full-service schools, also known as 'full-service community schools', 'integrated children and family centres' or 'hubs'. These are schools which provide for the co-location of additional services (health, early childhood, family and

social) on school sites. Child health professionals such as paediatricians, speech pathologist and psychologists can also conduct visits at these sites. Full-service schools are not new in Australia or overseas [36]. There are currently 460 community hubs operating as part of the National Child and Family Hubs Network [37]. Additionally, there are 100 hubs operating as part of the National Community Hubs program across four states (Queensland, New South Wales, Victoria and South Australia) [38]. These hubs have shown promising evaluation results in terms of improved outcomes for children, and parental and community engagement [39].

Integrate and connect early years services

Following the underlying principle of proportionate universalism, it is important that the ECEC ecosystem can facilitate the ramping up and connection of a range of support services when needed.

'Stacking' services refers to the combined positive effects children experience from engagement in ECEC in conjunction with health services and parental education and support programs [40]. Analysing data from the LSAC, Molloy et al. (2019) [40] found that children's reading abilities were higher when ECEC was 'stacked' with other services compared to children who attended ECEC without other services. The researchers suggest that 'stacking services' may have potential as a framework, working towards a more systematic approach for integrating ECEC with other health and education services for parents and families to address disadvantage and inequality.

ECEC services are often the place where young children and families engage with the early years system for the first time. This is part of the reason why some inquiries have suggested that ECEC could indeed become the 'backbone' of the early years system, facilitating and fostering engagement with other parts of the system [3].

Conclusion

Australia's policy ambition for universal early childhood education and care means that for an increasing number of children, ECEC is becoming a foundational part of their education journey. For many, an ECEC service is where they will spend most of their time outside of the family home prior to starting school.

ECEC is one of the first and most important steps Australian kids will take as they make their way through our education system.

So, it is worth our focus and our investment. In short, it is worth getting right.

If we want to achieve the best start for every child, mitigating the effects of socioeconomic disadvantage should be a key principle underpinning an expanding ECEC system. However, there are currently systemic challenges in the way of achieving this. The CCS funding system was created to subsidise the out-of-pocket cost of childcare and to stimulate a market by encouraging supply. Most crucially, despite the progressive nature of the subsidy level provided to families, it takes a largely a 'one size fits all' approach.

Australians are very familiar with how the geographic and socioeconomic landscape of our country can produce (or indeed reproduce) inequity. The cost of providing ECEC in inner-city suburbs is going to be very different to providing that service in remote communities. Operating services in areas where greater numbers of children are facing disadvantage will be very different to operating in more advantaged areas.

Our study reiterates just how determinative socioeconomic circumstances can be to a child's educational journey, and that these disparate trajectories begin in the earliest years of life.

Given this, we need to shift our ECEC system to focus on equity right from the start.

Australia is embarking on a once-in-a-generation expansion of ECEC. The time is now for us to ensure we make the most of that opportunity so that all children have the best start in life.

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Appendix

Growing Up in Australia: The Longitudinal Study of Australian Children (LSAC) is a major study following the development of approximately 10,000 young people and their families from all parts of Australia. The study began in 2003 with a representative sample of children (who are now young adults), with the aim to provide information about the pathways of the development, wellbeing, parenting, family, peers, education, childcare and health over the lives of two cohorts of Australian children: The B cohort (5,000 children born between March 2003 and February 2004) and the K cohort (5,000 children born between March 1999 and February 2000). The study informs social policy and is used to identify opportunities for early intervention and prevention strategies.

Participating families have been interviewed every two years from 2004, and they have also participated in between-wave questionnaires in 2005 (wave 1.5), 2007 (wave 2.5) and 2009 (wave 3.5). Study informants include the young person, their parents (both resident and non-resident), carers and teachers.

The study links to other databases including the National Assessment Program for Literacy And Numeracy (NAPLAN). The NAPLAN is a national assessment of students' abilities in reading, writing, conventions of language (spelling, grammar and punctuation) and numeracy that takes place each year for students in Years 3, 5, 7 and 9. In this research, we use students' reading and numeracy achievement.

Table 8: Variables used for the analysis of NAPLAN

Variable	Description or survey question
Frequency of shared reading	How often do parents read to children in the past week?
Number of books at home	About how many children's books does the study child have in your home now, including any library books?
Home activities index	Mean score of following 6 items: In the past week, on how many days have you, or an adult in your family, told child a story not from a book? In the past week, on how many days have you, or an adult in your family, draw pictures or done other arts and crafts with the study child? In the past week, on how many days have you, or an adult in your family, played music, sung songs, danced or done other musical activities with the study child? In the past week, on how many days have you, or an adult in your family, played with toys or games indoors, like dolls or toy cars with the study child? In the past week, on how many days have you, or an adult in your family, involved the study child in everyday activities such as cooking? In the past week, on how many days have you, or an adult in your family, played a game outdoors or exercised with the study child such as walk?

Vocabulary	The Peabody Picture Vocabulary test Third edition (PPVTIII) is an untimed test of children's vocabulary. The interviewer says a word, after which the child selects one out of four pictures to match the word
Early academic skills	The Who am I test assesses general cognitive abilities related to reading and numeracy tasks such as copying words or sentences, symbol recognition and drawing
School age variable	NAPLAN scores at age 8-9 years
Frequency of shared reading	In the past week, on how many days have you, or an adult in your family, read to the study child from a book?
Parent warmth	Mean of six following items: In the last six months, how often did you express affection by hugging, kissing and holding the child? In the last six months, how often did you hug or hold this child for no particular reason? In the last six months, how often did you tell this child how often he/she makes you? In the last six months, how often did you have warm close times together with this child? In the last six months, how often did you enjoy listening to the child and doing things with him/her? In the last six months, how often did you feel close to the child both when he/she was happy and when he/she was upset?
Parenting self-efficacy	On a scale of one to five, how good of a parent do you feel you are?
Parent mental health	Kessler 6 Depression Scale – Self rating on a scale of zero to four about feeling: nervous, hopeless, restless or fidgety, worthless, depressed and felt that everything was an effort
TV watching	About how many hours on a typical weekday does study child watch TV, DVDs or videos at home? About how many hours on a typical weekend day does child watch or videos at home?
Time spent on electronic games	About how many hours on a typical weekday would you say that the study child plays with an electronic game system? About how many hours on a typical weekend day does child play with an electronic game system?

After asking for parental consent for LSAC participants and gaining agreement from each state and territory, NAPLAN results were linked with LSAC data based on the children's names and date of birth, and school name and postcode. The B cohort presented their Year 3 NAPLAN exams between 2011 and 2013 and their Year 9 exams between 2017 and 2019.

This data linkage process was not successfully completed for all LSAC participants, either because parental consent could not be obtained or because student and school information did not match in LSAC and NAPLAN datasets. Data for children of parents with higher education levels, English-speaking backgrounds and full-time working mothers and children with higher Peabody Picture Vocabulary Test scores were more likely to be linked. This implies that NAPLAN average scores in the LSAC NAPLAN linked data are higher than national NAPLAN average scores (Daraganova, Edwards, and Sipthorp, 2013; Mohal, et. al., 2023).

The following measures were adopted in our study:

Socioeconomic status – this was measured with a variable on family socioeconomic position in the LSAC data set which is a z score for socioeconomic position among all families (sep). It incorporates an aggregate of normalized each family's income; the educational attainment of each parent, quantified in terms of standardized educational years; the occupational classifications of each parent, aligned with the categories delineated by the Australian and New Zealand Standard Classification of Occupations; and the familial structure, such as single parent vs. two-parent family. The wave 1 (child age: 0/1) score was used in the analysis (asep).

Indigenous status – a new variable was created based on the LSAC data variable (zf12m1) indigenous status (is the child aboriginal or Torres Strait Islander). Indigenous infants were recorded as those whose biological mother or biological father identified their infants as being of Aboriginal or Torres Strait Islander origin including Indigenous children whose mothers spoke a language other than English at home. There were 4 options in the LSAC variable (no, yes aboriginal, yes Torres Strait Islander, yes both). In this study, a new variable was created which was scored as 1/2 (1 = no, 2 = aboriginal or Torres Strait Islander or both).

Learning difficulty – this was measured using the LSAC data variable on learning difficulty (which medical conditions or disabilities does the study child have? Difficulty learning or understanding things). The wave 2 (child age: 2/3) variable (bf17em1) was chosen to include difficulties that might not be apparent at wave 1 but become apparent as the child starts some form of early childhood education. The variable was scored as 0/1 (0 = no, 1 = yes).

Gender – this was measured using the LSAC data variable on child gender (1 = male, 2 = female) measured at wave 1 (zf02m1).

Early childhood education attendance – this was measured by wave 2 LSAC variable (bpc05a) on type of childcare (day care centre), scored as 0 = no, and 1 = yes. The wave 2 variable was chosen because by wave 3, the majority of the study children were attending kindergarten.

Number of children's books in home – this was measured using the LSAC data variable (he04) on number of books that the study child had at home, including library books. The variable was scored on a 5-point scale (0 = 0, 1 = 1-10, 2 = 11-20, 3 = 21-30, 4 = more than 30). Both wave 2 and wave 3 (child age 4/5) variables were used.

Parents reading with children (wave 2) – this was measured using the LSAC data variable "In the past week, on how many days have you, or an adult in your family, read to the study child from a book" (bhe02a1a). The variable was scored on a 4-point scale (0 = none, 1 = 1 or 2 days, 2 = 3-5 days, 3 = every day, 6-7 days).

Parents reading with children (wave 3) – this was measured using the LSAC data variable "In the past week, on how many days have you, or an adult in your family, read to the study child from a book" (che02a1d). The variable was scored on a 4-point scale (0 = not in the

past week, 1 = 1 or 2 days, 2 = 3-5 days, 3 = 6-7 days).

Home activities (wave 2) – this variable was created by calculating the mean of six wave 2 LSAC data variables (bhe02a2a, bhe02a3a, bhe02a4a, bhe02a5a, bhe02a6a, bhe02a7a). Each LSAC data variable was scored on a 4-point scale (0 = none, 1 = 1 or 2 days, 2 = 3-5 days, 3 = every day, 6-7 days). The variables included telling the study child a story (not from a book), drawn pictures or did other art and craft activities with the study child, played music, sung songs, danced or done other musical activity with the study child, played with toys or games indoors, like with dolls or toy cars with the study child, involved child in everyday activities at home such as cooking, played a game outdoors or exercised with the study child like walking.

Home activities (wave 3) – this variable was created by calculating the mean of six wave 3 LSAC data variables (che02a2d, che02a3d, che02a4d, che02a5d, che02a6d, che02a7d). Each LSAC data variable was scored on a 4-point scale (0 = not in the past week, 1 = 1 or 2 days, 2 = 3-5 days, 3 = 6-7 days). The variables included telling the study child a story (not from a book), drawn pictures or did other art and craft activities with the study child, played music, sang songs, or done other musical activity with the study child, played with toys or games indoors, like board or card games with the study child, involved child in everyday activities at home such as cooking, played a game outdoors or exercised together like walking, swimming with the study child.

Amount of TV watching – this was measured using the LSAC wave 2 and wave 3 variables amount of weekday TV (bhe06b1, cheo6b1) and amount of weekend TV (bhe06c1, che06c1). For weekday TV watching, the parents were asked how many hours on a typical weekday did the study child watch TV, DVD or videos at home, with scores ranging from 1 to 5 (1 = does not watch TV or videos, 2 = less than one hour, 3 = 1 up to 3 hours, 4 = 3 to 5 hours, 5 = 5 or more hours). For the weekend TV question, the parents were asked how many hours on a typical weekend day did the study child watch TV, DVD or videos at home, with scores ranging from 1 to 5 (1 = does not watch TV or videos, 2 = less than one hour, 3 = 1 up to 3 hours, 4 = 3 to 5 hours, 5 = 5 or more hours).

Access to electronic games – this was measured using the LSAC wave 3 variables amount of weekday access to electronic games (che17b1) and weekend access to electronic games (che17c1). There was no wave 2 data on this variable. For the weekday variable, the parents were asked how many hours on a typical weekday would the study child play with an electronic game system on a 5-point scale (1 = does not play with it on weekdays, 2 = less than one hour, 3 = 1 up to 3 hours, 4 = 3 to 5 hours, 5 = 5 or more hours). For the weekend variable, the parents were asked how many hours on a typical weekend day would the study child play with an electronic game system on a 5-point scale (1 = does not play with it on weekends, 2 = less than one hour, 3 = 1 up to 3 hours, 4 = 3 to 5 hours, 5 = 5 or more hours).

Parent warmth scale – this was measured using the wave 2 (bawarm) and wave 3 (cawarm) LSAC variables parent warmth which are the means of 6 items on parent warmth in the

respective waves. The items asked parents how often they express affection by hugging, kissing and holding the child (pa03a1), hug or hold the child for no particular reason (pa03a2), tell this child how happy s/he makes you (pa03a3), have warm, close times with the child (pa03a4), enjoy listening to the child and doing things with him/her (pa03a5), and feel close to the child both when s/he was happy and when s/he was upset. These items were measured on a 5-point scale (1 = never/almost never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always/almost always).

Parenting self-efficacy - this was measured using the wave 2 (bpa01m) and wave 3 (cpa01m) LSAC variables which were measures of global rating of self-efficacy. The variable was measured on a 5-point scale (1 = not very good at being a parent, 2 = a person who has some trouble being a parent, 3 = an average parent, 4 = a better than average parent, 5 = a very good parent).

Parent mental health – this was measured using the Kessler 6 Depression Scale at both wave 2 (bak6s) and wave 3 (cak6s). It included questions on how often the parent feel nervous (hs24a1), hopeless (hs24a2), restless or fidgety (hs24a3), everything is an effort (hs24a4), so sad that nothing would cheer you up (hs24a5) and worthless (hs24a6). The questions were measured on a 5-point scale (1 = all the time, 2 = most of the time, 3 = some of the time, 4 = a little of the time, 5 = none of the time) which was reverse scored.

Analysis

A series of multiple regression analyses were conducted to examine the predictors to NAPLAN scores at grades 3, 5, 7 and 9 (dependent variables). For each grade, there are 5 domains (grammar, numeracy, reading, writing and spelling). The independent variables were SES, gender, indigenous status as measured in wave 1, and learning disability as measured in wave 2 (child age: 2/3), childcare attendance at wave 2, parents reading with child at home (waves 2 and 3), home activities (waves 2 and 3), amount of TV watching (waves 2 and 3), parent warmth scale (waves 2 and 3), parent mental health (waves 2 and 3), parent self-efficacy (waves 2 and 3) and wave 3 access to electronic games.

To manage the problem of inflated alpha due to the large number of comparisons, Bonferroni adjustment was used with an adjusted alpha level = .0025. In the tables below, the original unadjusted p values were listed but those meeting the adjusted alpha level of ≤ .0025 were marked in bold.

Table 9: Wave 2 predictors of Year 3 NAPLAN results

	Grammar			Numeracy			Reading			Writing			Spelling		
	b	*t*	*p*	*b*	*t*	*p*	*b*	*t*	*p*	*b*	*t*	*p*	*b*	*t*	*p*
SES	30.43	13.21	<.001	27.01	13.13	<.001	29.98	13.26	<.001	20.06	10.23	<.001	23.48	11.17	<.001
Gender	32.24	7.71	<.001	-0.36	0.10	.922	20.14	4.91	<.001	35.41	9.95	<.001	29.69	7.79	<.001
Indigenous status	-27.96	2.25	.025	-4.79	0.43	.667	-21.59	1.77	.077	-20.09	1.90	.058	-16.62	1.47	.143
Learning difficulty	-174.93	6.84	<.001	-167.44	7.33	<.001	-171.66	6.84	<.001	-172.22	7.91	<.001	-141.61	6.07	<.001
Wave 2 reading to child	18.33	6.72	<.001	14.66	6.02	<.001	20.60	7.70	<.001	11.42	4.92	<.001	12.64	5.08	<.001
Wave 2 home activities	-5.32	1.34	.179	-6.09	1.72	.085	-4.12	1.06	.288	-7.96	2.36	.018	-8.48	2.35	.019
Wave 2 day care attendance	-5.30	1.26	.208	-0.68	0.18	.857	-1.55	0.38	.707	-2.91	0.81	.416	-2.08	0.54	.587
Wave 2 warm parenting	1.97	0.378	.706	-0.38	0.08	.935	3.87	0.76	.450	6.41	1.44	.149	3.92	0.82	.411
Wave 2 parenting self-efficacy	-2.23	1.27	.206	-1.73	1.10	.272	-2.68	1.55	.121	-0.58	0.38	.701	-0.41	0.26	.797
Wave 2 parent depression	0.77	1.13	.258	0.60	0.99	.321	1.06	1.59	.112	0.54	0.92	.355	0.86	1.39	.165
Wave 2 number of books at home	7.55	2.80	.005	8.01	3.33	<.001	8.71	3.29	.001	4.68	2.04	.042	3.62	1.47	.142
Wave 2 weekday TV	4.43	1.39	.165	-0.56	0.20	.843	4.73	1.51	.131	4.37	1.61	.108	4.66	1.60	.109
Wave 2 weekend TV	2.02	0.76	.447	5.26	2.22	.027	4.51	1.73	.083	2.13	0.94	.346	2.84	1.18	.240
Wave 3 weekday electronic games	4.30	0.98	.326	-0.41	0.11	.917	10.10	2.35	.019	9.20	2.47	.014	11.05	2.77	.006
Wave 3 weekend electronic games	2.56	0.71	.480	3.75	1.16	.246	-3.75	1.06	.291	-0.38	0.12	,903	-0.77	0.23	.816
F and p value	F (15, 3680) = 31.12, p <.001			F (15, 3680) = 26.38, p <.001			F (15, 3680) = 31.35, p <.001			F (15, 3680) = 24.39, p <.001			F (15, 3680) = 21.18, p <.001		

Table 10: Wave 2 predictors of Year 5 NAPLAN results

	Grammar			Numeracy			Reading			Writing			Spelling		
	b	t	p	b	t	p	b	t	p	b	t	p	b	t	p
Socioeconomic status	36.56	15.31	<.001	33.98	14.89	<.001	33.90	14.49	<.001	27.79	12.81	<.001	29.29	12.90	<.001
Gender	26.87	6.20	<.001	-6.15	1.48	.138	17.68	4.16	<.001	37.52	9,53	<.001	31.03	7.53	<.001
Indigenous status	-27.99	2.14	.033	-7.93	0.63	.527	-13.72	1.07	.286	-30.18	2.53	.011	-22.62	1.81	.070
Learning difficulty	-211.94	8.10	<.001	-203.63	8.16	<.001	-209.57	8.20	<.001	-188.89	7.97	<.001	-177.79	7.17	<.001
Wave 2 reading to child	13.65	4.80	<.001	9.98	3.67	<.001	14.75	5.29	<.001	7.02	2.72	.007	9.04	3.34	<.001
Wave 2 home activities	-3.36	0.81	.416	-5.53	1.40	.161	-0.78	0.19	.848	1.16	0.31	.757	-4.67	1.19	.234
Wave 2 day care attendance	-10.29	2.36	.018	-5.42	1.30	.193	-7.37	1,73	.085	-10.06	2.54	.011	-8.99	2.17	.030
Wave 2 warm parenting	-6.85	1.26	.207	-8.78	1.69	.091	-3.59	0.68	.500	-2.37	0.48	.631	-1.93	0.37	.709
Wave 2 parenting self-efficacy	-2.29	1.25	.213	-2.76	1.57	.118	-1.68	0.93	.351	-0.73	0.44	.662	-.91	0.52	.605
Wave 2 parent depression	0.20	0.28	.781	-0.33	0.48	.630	0.34	0.49	.621	-0.25	0.39	.699	-0.19	0.28	.777
Wave 2 number of books at home	3.87	1.37	.171	5.42	2.01	.045	5.77	2.09	.037	2.18	0.85	.395	0.53	0.20	.843
Wave 2 weekday TV	1.82	.55	.583	-3.81	1.20	.229	-0.87	0.27	.789	1.65	0.55	.585	-1.54	0.49	.624
Wave 2 weekend TV	6.17	2.23	.026	6.99	2.64	.008	4.81	1.77	.076	4.29	1.71	.088	5.04	1.92	.055
Wave 3 weekday electronic games	=1.35	0.29	.770	-5,30	1.21	.228	0.05	0.01	.991	2.74	0.66	.512	5.22	1.19	.233
Wave 3 weekend electronic games	3.72	0.99	.325	1.14	0.32	.753	1.76	0.47	.636	-0.66	0.19	.847	1.54	0.43	.669
F and p value	F (15, 3561) = 33.01, p <.001			F (15, 3561) = 28.80, p <.001			F (15, 3561) = 30.34, p <.001			F (15, 3561) = 27.40, p <.001			F (15, 3561) = 23.54, p <.001		

Table 11: Wave 2 predictors of Year 7 NAPLAN results

	Grammar			Numeracy			Reading			Writing			Spelling		
	b	t	p	b	t	p	b	t	p	b	t	p	b	t	p
Socioeconomic status	34.111	13.25	<.001	34.19	12.95	<.001	31.14	12.07	<.001	28.05	11.48	<.001	26.88	10.71	<.001
Gender	28.84	6.16	<.001	=3.60	0.75	.454	15.31	3.27	<.001	41.34	9.31	<.001	23.74	5.20	<.001
Indigenous status	-65.99	4.56	<.001	-81.85	5.52	<.001	-50.61	3.49	<.001	-80.77	5.88	<.001	-66.41	4.71	<.001
Learning difficulty	-219.86	7.66	<.001	-220.251	7.48	<.001	-207.18	7.20	<.001	-186.32	6.84	<.001	189.87	6.78	<.001
Wave 2 reading to child	12.65	4.12	<.001	12.72	4.05	<.001	15.69	5.11	<.001	13.11	4.51	<.001	11.21	3.75	<.001
Wave 2 home activities	-5.16	1.16	.246	-5.67	1.24	.214	-1.06	0.24	.813	-5.20	1.23	.218	-5.33	1.23	.219
Wave 2 day care attendance	-8.44	1.79	.073	-4.19	-0.87	.385	-7.61	1.62	.106	-8.65	1.94	.053	-5.55	1.21	.226
Wave 2 warm parenting	-6.62	1.14	.256	-13.19	2.21	.027	-14.62	2.50	.012	-7.51	1.36	.175	-4.66	0.82	.413
Wave 2 parenting self-efficacy	-3.37	1.72	.086	-2.98	1.48	.139	-2.33	1.18	.237	-2.07	1.11	.267	-2.03	1.06	.289
Wave 2 parent depression	-0.53	0.68	.495	-1.40	1.77	.077	-0.74	0.96	.337	-1.14	1.55	.121	-0.64	0.84	.400
Wave 2 number of books at home	2.91	0.95	.343	0.83	0.26	.793	5.35	1.74	.082	2.96	1.02	.310	-0.11	0.034	.970
Wave 2 weekday TV	0.65	0.18	.857	1.76	0.48	.632	-2.03	0.56	.573	0.98	0.29	.773	-0.56	0.16	.873
Wave 2 weekend TV	3.31	1.10	.271	3.52	1.14	.253	4.53	1.51	.132	4.47	1.57	.117	3.55	1.21	.226
Wave 3 weekday electronic games	4.33	0.87	.385	5.14	1.01	.314	6.23	1/25	.212	10.48	2,22	.027	10.28	2.12	.034
Wave 3 weekend electronic games	-2.26	0.56	.579	-1.22	0.29	.769	-3.91	0.96	.338	-5.67	1.47	.141	-4.12	1.04	.299
F and p value	F (15, 3390) = 28.04, p <.001			F (15, 3390) = 25.16, p <.001			F (15, 3390) = 24.87, p <.001			F (15, 3390) = 28.51, p <.001			F (15, 3390) = 19.47, p <.001		

Table 12: Wave 2 predictors of Year 9 NAPLAN results

	Grammar			Numeracy			Reading			Writing			Spelling		
	b	t	p	b	t	p	b	t	p	b	t	p	b	t	p
Socioeconomic status	44.50	13.46	<.001	49.62	13.95	<.001	45.16	13.74	<.001	47.65	14.70	<.001	40.44	12.22	<.001
Gender	28.92	4.79	<.001	-5.83	0.90	.370	18.53	3.08	.002	42.58	7.19	<.001	26.42	4.37	<.001
Indigenous status	-68.62	3.49	<.001	-83.61	3.96	<.001	-88.31	4.52	<.001	-82.94	-4.31	<.001	-67.19	3.42	<.001
Learning difficulty	-211.33	5.74	<.001	-217.86	5.50	<.001	-215.25	5.88	<.001	-207.94	5.76	<.001	-189.21	5.13	<.001
Wave 2 reading to child	12.64	3.19	.001	10.57	2.48	.013	13.33	3.38	<.001	12.48	3.21	.001	12.58	3.16	.002
Wave 2 home activities	-8.07	1.41	.160	-13.18	2.13	.033	-3.85	0.67	.501	-4.95	0.88	.380	-9.93	1.73	.085
Wave 2 day care attendance	-8.26	1.36	.174	-7.01	1.07	.284	-6.67	1.10	.270	-8.35	1.40	.161	-3.90	0.64	.521
Wave 2 warm parenting	-7.04	0.94	.349	-12.07	1.49	.136	-3.85	0.51	.607	-1.32	0.18	.858	-0.19	0.03	.980
Wave 2 parenting self-efficacy	-3.99	1.54	.124	-0.47	0.17	.867	-2.92	1.14	.256	0.48	0.19	.851	-3.02	1.16	.244
Wave 2 parent depression	-1.83	1.83	.067	-2.34	2.18	.029	-0.37	0.37	.713	-1.18	1.21	.227	-0.81	0.81	.417
Wave 2 number of books at home	-5.06	1.27	.205	-3.02	0.70	.482	-1.08	0.27	.786	-4.89	1.25	.212	-4.08	1.02	.308
Wave 2 weekday TV	4.43	0.96	.336	3.18	0.64	.521	4.45	0.97	.331	2.00	0.44	.659	4.52	0.98	.326
Wave 2 weekend TV	2.10	0.54	.587	-2.46	0.59	.554	3.71	0.97	.335	5.03	1.33	.184	1.39	0.36	.719
Wave 3 weekday electronic games	3.87	0.60	.548	-0.11	0.02	.997	6.61	1.03	.302	9.42	1.49	.136	6.12	0.95	.342
Wave 3 weekend electronic games	-1.51	0.29	.773	-1.13	0.20	.841	-1.77	0.34	.735	-6.34	1.23	.218	-1.71	0.33	.745
F and p value	F (15, 3196) = 22.01, p <.001			F (15, 3196) = 22.08, p <.001			F (15, 3196) = 22.78, p <.001			F (15, 3196) = 27.33, p <.001			F (15, 3196) = 17.98, p <.001		

Table 13: Wave 3 predictors of Year 3 NAPLAN results

	Grammar			Numeracy			Reading			Writing			Spelling		
	b	t	p	b	t	p	b	t	p	b	t	p	b	t	p
Socioeconomic status	29.02	11.75	<.001	26.32	12.08	<.001	28.22	11.69	<.001	19.03	9.14	<.001	22.04	9.84	<.001
Gender	30.54	6.92	<.001	-1.15	0.30	.767	18.27	4.23	<.001	34.41	9.24	<.001	28.38	7.08	<.001
Indigenous status	-30.31	2.29	.022	-7.30	0.63	.531	-21.25	1.65	.100	-20.67	1.85	.064	-16.97	1.42	.157
Learning difficulty	-193.06	6.53	<.001	-181.27	6.95	<.001	-188.68	6.53	<.001	-187.37	7.52	<.001	-162.07	6.04	<.001
Wave 3 number of books at home	13.11	3.59	<.001	10.43	3.24	.001	14.53	4.07	<.001	7.03	2.28	.023	7.46	2.25	.024
Wave 3 reading to child	7.74	2.76	.006	6.08	2.46	.014	9.65	3.52	<.001	2.33	0.98	.326	3.42	1.35	.178
Wave 3 home activities	-4.54	1.09	.274	0.09	0.02	.981	1.52	0.38	.707	-4.10	1.17	.241	-6.72	1.79	.074
Wave 2 day care attendance	-7.58	1.72	.085	-1.66	0.43	.669	-1.61	0.38	.707	-2.94	0.79	.4428	-3.30	0.83	.408
Wave 3 warm parenting	-1.85	0.37	.708	-7.47	1.71	.087	-4.38	0.91	.365	2.61	0.63	.532	0.26	0.06	.954
Wave 3 parenting self-efficacy	-3.46	1.86	.063	-1.57	0.95	.340	-2.79	1.53	.125	-2.20	1.40	.161	-2.10	1.24	.214
Wave 3 parent depression	-0.45	0.68	.496	-0.59	0.98	.328	-0.55	0.83	.409	-0.74	1.29	.197	-0.62	1.00	.315
Wave 3 weekday TV	-3.95	1.23	.218	-3.04	1.08	.282	-2.00	0.64	.524	-1.92	0.71	.478	-3.74	1.29	.199
Wave 3 weekend TV	5.16	1.83	.067	2.92	1.18	.239	3.66	1.33	.183	3.09	1.30	.193	2.86	1.12	.262
Wave 3 weekday electronic games	4.50	0.97	.333	2.11	0.52	.607	10.98	2.42	.016	9.47	2.42	.016	11.59	2.75	.006
Wave 3 weekend electronic games	2.19	0.58	.564	4.81	1.44	.151	-3.07	.83	.408	0.46	0.14	.886	-1.25	0.36	.717
F and p value	F (15, 3321) = 23.61, p <.001			F (15, 3321) = 20.41, p <.001			F (15, 3321) = 22.92, p <.001			F (15, 3321) = 18.68, p <.001			F (15, 3321) = 16.35, p <.001		

Table 14: Wave 3 predictors of Year 5 NAPLAN results

	Grammar			Numeracy			Reading			Writing			Spelling		
	b	t	p	b	t	p	b	t	p	b	t	p	b	t	p
Socioeconomic status	35.37	14.01	<.001	33.06	13.69	<.001	33.22	13.55	<.001	26.49	11.59	<.001	27.58	11.58	<.001
Gender	26.98	5.99	<.001	-5.85	1.36	.175	17.16	3.92	<.001	37.70	9.24	<.001	31.55	7.42	<.001
Indigenous status	-29.18	2.14	.033	08.98	0.69	.492	-16.09	1.21	.225	-30.60	2.48	.013	-25.62	1.99	.047
Learning difficulty	-204.81	6.88	<.001	-205.64	7.22	<.001	-207.39	7.18	<.001	-184.777	6.86	<.001	-185.86	6.62	<.001
Wave 3 number of books at home	7.58	1.99	.046	7.51	2.06	.039	9.86	2.67	.008	2.15	0.62	.533	2.27	0.63	.528
Wave 3 reading to child	1.34	0.47	.639	1.90	0.69	.488	2.30	0.83	.408	2.70	1.04	.297	-0.10	0.04	.971
Wave 3 home activities	0.82	0.19	.848	0.29	0.07	.944	4.34	1.05	.292	-0.04	0.01	.992	-3.34	0.84	.404
Wave 2 day care attendance	-9.03	2.01	.045	-2.05	0.48	.634	-5.63	1.29	.196	-8.52	2.10	.036	-7.16	1.69	.091
Wave 3 warm parenting	-1.90	0.38	.706	-4.74	0.99	.324	-2.31	0.47	.636	3.42	0.75	.453	1.15	0.24	.809
Wave 3 parenting self-efficacy	-1.35	0.71	.475	0.81	0.45	.653	-0.76	0.42	.677	-0.66	0.39	.700	0.42	0.24	.813
Wave 3 parent depression	-1.26	1.82	.069	-0.88	1.33	.184	-1.17	1.73	.084	-1.70	2.71	.007	-1.67	2.56	.011
Wave 3 weekday TV	-5.75	1.75	.080	-2,18	0.69	.488	-6.43	2.02	.044	0.58	0.19	.847	-4.18	1.35	.177
Wave 3 weekend TV	-1.21	0.42	.674	-0.90	0.33	.742	0.77	0.28	.783	-1.35	0.52	.603	-1.06	0.39	.695
Wave 3 weekday electronic games	-2.44	0.51	.613	-6.89	1.49	.136	0.42	0.09	.928	3.45	0.79	.429	4.78	1.05	.293
Wave 3 weekend electronic games	4.66	1.20	.232	3.88	1.04	.299	0.98	0.26	.796	0.86	0.24	.808	1.69	0.46	.646
F and p value	F (15, 3228) = 26.61, p <.001			F (15, 3228) = 22.89, p <.001			F (15, 3228) = 25.09, p <.001			F (15, 3228) = 23.02, p <.001			F (15, 3228) = 20.04, p <.001		

Table 15: Wave 3 predictors of Year 7 NAPLAN results

	Grammar			Numeracy			Reading			Writing			Spelling		
	b	t	p	b	t	p	b	t	p	b	t	p	b	t	p
Socioeconomic status	30.17	11.25	<.001	30.29	10.93	<.001	27.51	10.20	<.001	24.28	9.58	<.001	22.62	8.69	<.001
Gender	26.32	5.48	<.001	-4.07	0.82	.413	13.05	2.70	.007	38.70	8.52	<.001	221.71	4.66	<.001
Indigenous status	-55.27	3.73	<.001	-62.08	4.06	<.001	-39.73	2.67	.008	-74.72	5.34	<.001	-54.87	3.82	<.001
Learning difficulty	-203.88	6.39	<.001	-205.24	6.23	<.001	-190.03	5.92	<.001	-163.48	5.42	<.001	-180.18	5.82	<.001
Wave 3 number of books at home	9.34	2.28	.023	7.80	1.85	.065	10.34	2.525	.012	6.12	1.58	.114	4.79	1.21	.227
Wave 3 reading to child	6.17	2.00	.045	5.70	1.79	.073	11.37	3.67	<.001	9.34	3.21	.001	6.26	2.09	.036
Wave 3 home activities	-2.68	0.59	.553	-2.34	0.50	.617	-3.38	0.74	.457	-5.67	1.33	.184	-4.54	1.04	.301
Wave 2 day care attendance	-8.69	1.81	.070	-5.01	1.01	.312	-8.19	1.70	.090	-7.89	1.74	.082	-5.25	1.13	.259
Wave 3 warm parenting	-10.20	1.91	.056	-14.60	2.65	.008	-12.29	2.29	.022	-7.15	1.42	.157	-8.50	1.64	.102
Wave 3 parenting self-efficacy	-1.59	0.80	.425	0.05	0.02	.983	-1.89	0.95	.345	-1.67	0.89	.374	-0.74	0.38	.703
Wave 3 parent depression	-1.00	1.34	.180	-1.94	2.53	.012	-1.07	1.43	.153	-1.85	2.63	.009	-1.44	2.00	.046
Wave 3 weekday TV	-11.19	3.18	.002	-7.56	2.08	.038	-10.21	2.88	.004	-7.83	2.35	.019	-9.98	2.92	.004
Wave 3 weekend TV	5.72	1.86	.063	0.61	0.19	.849	2.00	0.65	.517	2.56	0.88	.377	3.58	1.20	.231
Wave 3 weekday electronic games	1.96	0.38	.703	2.77	0.52	.602	5.38	1.04	.298	9.61	1.98	.048	7.82	1.57	.117
Wave 3 weekend electronic games	0.98	0.24	.812	3.15	0.74	.462	-1.85	0.44	.658	-2.03	0.52	.604	-1.47	0.37	.715
F and p value	F (15, 3080) = 22.66, p <.001			F (15, 3080) = 19.67, p <.001			F (15, 3080) = 20.08, p <.001			F (15, 3080) = 23,22, p <.001			F (15, 3080) = 15.71, p <.001		

Table 16: Wave 3 predictors of Year 9 NAPLAN results

	Grammar			Numeracy			Reading			Writing			Spelling		
	b	t	p	b	t	p	b	t	p	b	t	p	b	t	p
Socioeconomic status	39.04	11.58	<.001	41.50	11.23	<.001	38.28	11.22	<.001	42.14	12.67	<.001	34.65	10.30	<.001
Gender	28.12	4.64	<.001	-4,52	0.68	.497	19.00	3.10	.002	41.41	6.92	<.001	26.44	4.37	<.001
Indigenous status	-58.22	3.04	.002	-71.11	3.39	<.001	-74.06	3.82	<.001	-71.19	3.77	<.001	-54.93	2.87	.004
Learning difficulty	-257.97	6.41	<.001	-275.16	6.23	<.001	-261.20	6.41	<.001	-257.62	6.48	<.001	-237.51	5.91	<.001
Wave 3 number of books at home	4.15	0.79	.430	3.80	0.66	0.51	5.33	1.00	.316	4.56	0.88	.379	3.34	0.64	.525
Wave 3 reading to child	0.57	0.15	.885	6.07	1.42	.156	2.67	.68	.499	4.83	1.25	.211	1.52	0.39	.697
Wave 3 home activities	-1.75	0.31	.750	-5.60	0.89	.373	3.73	0.64	.521	-4.29	0.76	.449	-4.28	0.75	.455
Wave 2 day care attendance	-12.70	2.10	.036	-9.43	1.42	.155	-7.45	1.22	.224	-10.40	1.74	.081	-5.36	0.89	.375
Wave 3 warm parenting	-15.18	2.25	.025	-17.86	2.41	.016	-8.87	1.30	.194	-4.42	0.66	.507	-7.46	1.11	.268
Wave 3 parenting self-efficacy	1.21	0.48	.631	0.83	0.30	.764	1.57	0.62	.537	3.03	1.22	.222	1.95	0.78	.439
Wave 3 parent depression	-3.23	3.42	<.001	-3.51	3.39	<.001	-1.95	2.04	.042	-2.33	2.50	.012	-3.27	3.47	<.001
Wave 3 weekday TV	-4.28	0.97	.331	-10.20	2.11	.035	-7.21	1.62	.106	3.93	0.90	.366	-4.36	0.99	.322
Wave 3 weekend TV	0.77	0.20	.843	1.27	0.30	.764	-0.64	0.17	.869	0.63	0.17	.858	0.16	0.04	.967
Wave 3 weekday electronic games	6.82	1.05	.293	-0.26	0.04	.971	6.74	1.03	.305	11.09	1.73	.083	9.74	1.50	.133
Wave 3 weekend electronic games	1.82	0.35	.727	4.62	0.81	.419	2.83	0.54	.592	1.97	0.38	.702	1.25	0.24	.810
F and p value	F (15, 2895) = 19.11, p <.001			F (15, 2895) = 19.17, p <.001			F (15, 2895) = 18.42, p <.001			F (15, 2895) = 24.12, p <.001			F (15, 2895) = 15.64, p <.001		

Limitations

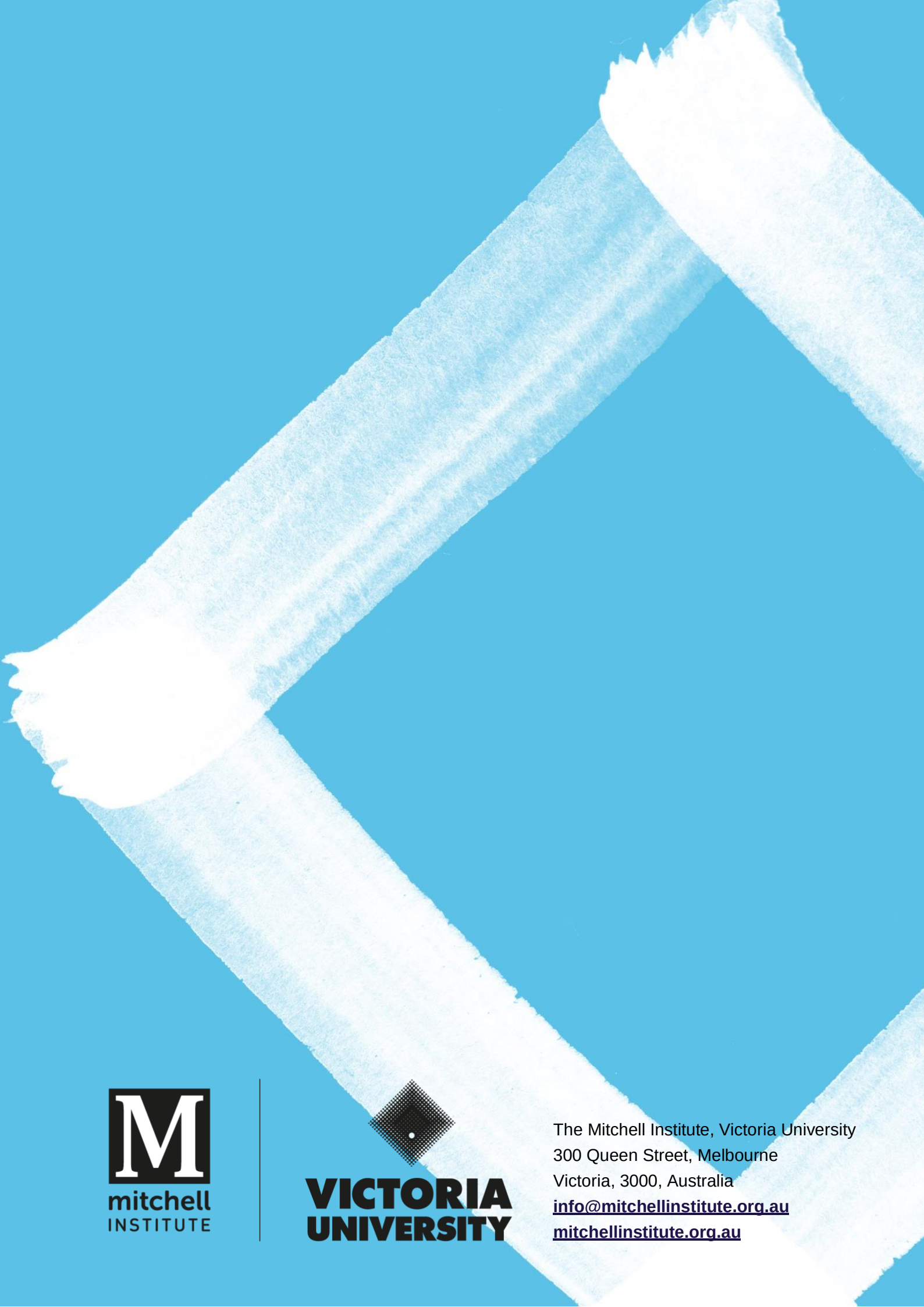
The data analysis was based on participants with complete data, including NAPLAN data. As mentioned before, data for children of parents with higher education levels, English-speaking backgrounds and full-time working mothers and children with higher Peabody Picture Vocabulary Test scores were more likely to be linked. This needs to be taken into consideration in the interpretation of the findings.

Due to the large sample size, statistical significance might not necessarily imply a large effect size. This again should be considered in the interpretation of findings.

In our analysis, we have examined NAPLAN results over four year levels, each with five domains. There is the possibility of inflated alpha due to the large number of analyses conducted. Though we have used Bonferroni adjustment to deal with this, interpretation of the findings should take this into consideration.

Apart from the NAPLAN results, the predictor variables were based on parent reports. There was no triangulation in terms of independent observation or direct assessment of children.

The definition of early childhood education attendance is only a crude measure, as there are many different forms and combinations of early childhood education attendance. Furthermore, the quality of early childhood education provision was not included in the analysis. It is possible that the quality of the early childhood provision might be a significant variable impacting academic outcomes such as NAPLAN scores in our case. We used wave 2 (two to three years old) early childhood education attendance in our analysis, but this did not capture the duration of early childhood education attendance.



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